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 Champaign County and the risk to people, property, and structures resulting from those hazards. 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 demographic and descriptive information on Champaign County and its jurisdictions. The Hazard Identification (2.2) describes hazards that pose a threat to Champaign County and provides a brief history of significant occurrences. The Vulnerability Assessment (2.3) examines the vulnerability of each individual jurisdiction, and the Risk Analysis (2.4) evaluates and ranks the risks Champaign County must address through its mitigation efforts.

This plan section will identify and describe specific hazards for each of the municipalities in the county, describe their specific vulnerabilities, and address their local ability to respond to a variety of incidents. The social, financial, and physical vulnerability of each community and the county will be discussed. The local capacity to address core capabilities associated with response will be examined and analyzed, and gap areas where capabilities are not sufficient for worst-case scenarios will be addressed. Champaign County's ability to manage all eight community lifelines will be examined and gap areas will be described, including where and how the county would compensate for and backfill those needs based upon past significant events and community history.

Various demographic and statistical online tools have been used to research and address social vulnerability and community resilience, factors that will provide the foundation for mitigation strategies formulated to meet the unique and individualized needs of Champaign County's small communities. As a rural county with less population than many of Ohio's metropolitan areas, Champaign County is unlikely to receive significant federal assistance in a widespread disaster. Most assistance from outside the immediate region would likely come from either Dayton, Columbus or Lima. To realistically discuss these theoretical situations, stakeholders have diligently worked to identify gaps in capabilities and resources, potential areas of response compromise, and the special needs of various populations within the county. This section will address non-English speaking communities, disabled and disadvantaged persons, and transient populations that are common to the county as well as the more typical populations like elderly, rurally isolated, and those without local familial connections.

To meet the current mitigation planning requirements for social vulnerability and community resilience information, sections have been added to the plan. The demographics include information about minority populations and their needs, as well as age-based and disability-based data that includes both the traditional multi-generational residents of Champaign County and the new residents who have limited family support, are making lifestyle changes, or other temporary and permanent considerations.

Discussions examined and analyzed community capabilities to respond in a significant disaster as well as a long-term incident, and to identify where additional help would be found in an incident that reached past the limitations of local capabilities. As a small county, Champaign County officials recognize the likelihood of receiving measurable state and federal resources in a widespread incident is highly unlikely; therefore, it is the county's burden to identify alternate and non-traditional resources to meet those potential needs as a way to minimize long-term negative effects on residents, their families and their property.

Goals included the identification of ways to ensure that every person in Champaign County has a similar opportunity to survive a disaster in a similar manner, and has the ability to recover to the same degree as other residents. Realizing that most of the residents would require more resources and services to make that happen, discussions included the identification of those probable groups of people and discussion about how that process might work to enable them to survive the worst of days.

Indicators of changing weather patterns have been discussed and deliberated. Situated a distance from any metropolitan area in Ohio, Champaign County is not significantly affected by new massive manufacturing plants or excessive traffic flow across federal highways. Some of the very negative environmental and social impacts felt in the major metropolitan areas like Columbus, Cincinnati, and Cleveland are not present in Champaign County. Most urban sprawl in the area is residential as new people fill jobs in the Greater Dayton Metropolitan area, but choose to live in Champaign County. Many people work in the Marysville area or at automotive plants in adjacent counties.

In Champaign County, people all tend to know one another and take their neighbor in when disaster strikes because outside resources are limited. Communities of only a hundred or so residents have few resources, but many neighbors are willing to share their homes, supplies and help. While they may be limited in equipment or other goods, they are filled with the desire and willingness to help one another. They have the ability to improvise, adapt and overcome. Needs after a severe storm may be addressed differently, and perhaps anecdotally, in these communities because they do not have access to fully certified shelters, commercially provided food supplies, and personnel to meet post-disaster needs for help. Residents will identify a need, and develop a solution to solve it. Champaign County residents assume they will need to help themselves, if only for the first few days in the worst situations. These characteristics unique to small rural communities change little over the years. However, changes in storm characteristics and other natural phenomenon are noted, and discussions included these potential effects of worsening storms that hit much harder and faster.

This plan, through application of the information in this Hazard Identification and Risk Analysis section, intends to then develop mitigation strategies that will equitably and inclusively provide potential solutions for disaster outcomes likely in Champaign County. Stakeholders worked to identify, characterize and understand how each group of its local society will react and respond to disasters of catastrophic or serious magnitude, and developed solutions to ensure that all populations, all communities, and all parts of this small county can survive and recover from a disaster successfully and become as whole as possible after the incident.

2.1 COUNTY PROFILE

Champaign County is located in west central Ohio between Columbus and the Indiana state line. Dayton lies to the southwest, and Lima to the north. The county is an agricultural county with several mid-size industrial and manufacturing companies. Of the county's 38,714 residents, fifty-five percent of the residents live outside incorporated areas and forty-five percent live inside municipalities. Twenty-five Ohio counties are smaller than Champaign County.

The US Census in 2010 shows a total population of 40,097; when the mitigation planning took place in 2018, the population was listed at 38,840. In 2020, population is listed as 37,714. This slight decline appears to be reversing with 2024 population estimates at 38,947 according to World Population Reviews. This source anticipates Champaign County growing by about 102 people per year for the coming five years, placing and 2029 potential population at 39,457. That calculates to a growth rate just over 1%.

Champaign County consists of 430 square miles, of which 429 are land. Two inland lakes make up the additional square mile. Adjacent counties include Miami and Shelby to the west, Logan to the north, Union and Madison to the east, and Clark to the north. The closest city is Dayton, approximately 40 miles to the southwest. Lima is 90 miles to the south, and Columbus is 54 miles to the east-southeast.

The CHAMPAIGN County Board of County Commissioners and other elected and appointed officials provide leadership, support, and service to the county. In addition to the commissioners, elected officials include the county Engineer, Auditor, Treasurer, Clerk of Courts, Prosecutor and Sheriff, all of whom were instrumental in mitigation planning activities. Appointed officials particularly involved included the chief elected and appointed officials, floodplain managers, community development coordinators, social assistance departments, agricultural industry leaders, conservation and natural resources employees, and many others. Many officials in Champaign County fill multiple roles in the community, crossing local levels of government and combining responsibilities in a non-traditional way that allows the available staffing to fill all critical roles.

2.1.1 Demographics

The population of Champaign County is 38,714 according to 2020 U.S. Census. The population has dropped slightly with 1,364 fewer residents than in 2010. The county occupies 430 square miles.

Table 2-1: CHAMPAIGN County Population Statistics

Statistic	Figure
Population Density	90.32 persons/sq. mile
Population	38,714
Female Population	50.05%
Male Population	49.95%

Median Age	41.9 years
Population under 18	22.5%
Population over 65 living alone	11.6%
White	94.5
Hispanic or Latino	1.6%
African-American	1.8%
Two or More races	2.5%
Households	15,159
Average Household Size	2.44 persons
Median Household Income	$60,112
Persons in Poverty	8.8%
Percent w/o health insurance	6.8%
Households with a disability	27.1%
Owner-occupied Residential structures	73.2%
Language spoken other than English	1.09%
Veterans	6.4%
Households with no vehicle or access	4.9%
Households with Internet/broadband	87.4%

Within Champaign County, there are 16,876 housing units. The median value of owner-occupied units is $132,800. There are approximately 6.57%, or approximately 1,015 mobile homes across the county. Many of these are located in one of eight mobile home parks across the county. The median gross rent for all types of rental properties is $696 per month while the median cost for homes with mortgages is $1,156 per month.

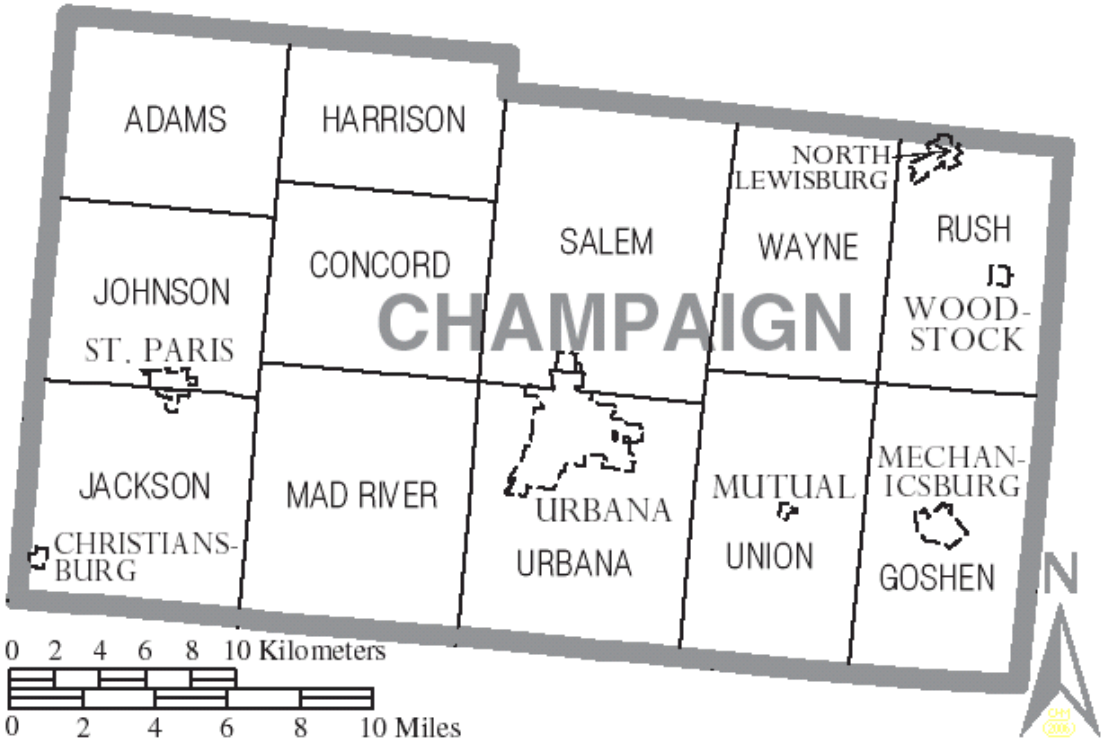
2.1.2 Incorporated Jurisdictions

CHAMPAIGN County incorporated jurisdictions include one city, six incorporated villages, and twelve townships.

The City of Urbana is the largest municipality and serves as the county seat. It is the hub of most business and government activity in the county, and most of the population lives in this area. Healthcare, retail centers, government services, and other commercial businesses are primarily located in Urbana. This city has a full line of municipal services and employs

The villages include Christiansburg, Mechanicsburg, Mutual, North Lewisburg, St. Paris and Woodstock. Christiansburg, Mutual and Woodstock are very small villages and have limited capacity to provide services. Populations range from slightly over one hundred residents to about five hundred. St. Paris is the largest of the other three, being slightly more populated than Mechanicsburg and North Lewisburg. All three have less than two thousand residents.

Map 2-1: CHAMPAIGN County Map



Christiansburg

Christiansburg is located in the southwest quarter of Champaign County near the Miami County line. It is a very small village. The US Census Service estimates its population to fluctuate slightly over the past five years with totals between 501 and 508 residents

Table 2-2: Christiansburg Demographics

Statistic	Figure
Population, 2020	505
White	92.7%
Hispanic or Latino	0.9%
Households	229
Median Income	$72,375
Persons in Poverty	9.6%
Owner-Occupied Homes	79.5%
Disabled Population	17.0
Without Health Insurance	7.9%
Language other than English	0.7%
Elderly >65 y/o	17.3%
Veterans	9.7%
Households with Internet	n/a

Mechanicsburg

Mechanicsburg is located in the southeast quadrant of Champaign County near Madison County. It is home to the tri-county correctional facility utilized by Champaign, Logan and Union counties. The US Census Service indicates the population has fluctuated very little in the past five years with a low of 1,675 in 2023 and a high of 1,681 in both 2021 and 2023.

Table 2-3: Mechanicsburg Demographics

Statistics	Figure
Population, 2020 US Census	1,681
White	92.8%
Hispanic or Latino	1.3%
Households	739
Median Income	$56,146
Persons in Poverty	16.6%
Owner-Occupied Homes	47.8%
Disabled Population	12.3%
Without Health Insurance	3.9%
Language other than English	1.3%
Elderly >65 y/o	10.3%
Veterans	3.9%

Mutual

The village of Mutual is east of Urbana on State Route 29. The US Census Service indicates that the population has not changed at all in the last five years.

Table 2-4: Mutual Demographics

Statistic	Figure
Population, 2020	127
White	95.3%
Hispanic or Latino	0.8%
Households	33
Median Income	$46,875
Persons in Poverty	16.7%
Owner-Occupied Homes	78.8%
Disabled Population	15.0%
Without Health Insurance	15.0%
Language other than English	0.0%
Elderly >65 y/o	30.0%
Veterans	7.4%
Households with Internet	n/a

North Lewisburg

North Lewisburg is in northeastern Champaign County near the Logan County line. The US Census Service indicates that the population has changed very little over the past five years, with a high of 1,645 and a low of 1,636.

Table 2-5: North Lewisburg Demographics

Statistic	Figure
Population, 2020	1,636
White	94.4%
Hispanic or Latino	1.3%
Households	745
Median Income	$53,580
Persons in Poverty	10.1%
Owner-Occupied Homes	68.2%
Disabled Population	20.9%
Without Health Insurance	3.5%
Language other than English	0.3%
Elderly > 65 y/o	17.9%
Veterans	9.7%
Households with Internet	n/a

St. Paris

The village of St. Paris is located in the central western side of Champaign County. It is the largest of the six villages, and has a secondary hub of retail, services and manufacturing businesses within the village. The US Census Service indicates that the population has changed very little over the past five years, with a low of 1,878 in 2022 and a high of 1,885 in 2023.

Table 2-6: St. Paris Demographics

Statistic	Figure
Population, 2020	1,878
White	93.0%
Hispanic or Latino	0.1%
Households	802
Median Income	$62,500
Persons in Poverty	5.7%
Owner-Occupied Homes	70.9%
Disabled Population	10.5%
Without Health Insurance	2.0%
Language other than English	0.2%
Elderly >65 y/o	11.9%
Veterans	8.4%
Households with Internet	n/a

Urbana

The City of Urbana is centrally located, and serves as the county seat of Champaign County. Urbana is the commerce and business hub of the county; its population is estimated to remain

relatively flat over the coming decade. The US Census Service indicates that the population reached a high of 11,161 and a low of 11, 135 within the past five years.

Table 2-7: Urbana Demographics

Statistics	Figure
Population, 2020	11,135
White	88.4%
Hispanic or Latino	1.0%
Households	4,692
Median Income	$62,628
Persons in Poverty	16.5%
Owner-Occupied Homes	59.4%
Disabled Population	11.0%
Without Health Insurance	6.5%
Language other than English	0.7%
Elderly >65 y/o	19.6%
Veterans	5.3%
Households with Internet	84.2%

Woodstock

This very small village is located near the Union County line southeast of North Lewisburg. The US Census Service indicates its population is very stable, fluctuating from 286 to 291 over the past five years.

Table 2-8: Woodstock Demographics

Statistics	Figure
Population, 2020	287
White	98.6%
Hispanic or Latino	1.4%
Households	91
Median Income	$61,250
Persons in Poverty	5.5%
Owner-Occupied Homes	69.2%
Disabled Population	17.0%
Without Health Insurance	4.6%
Language other than English	0.0%
Elderly > 65 y/o	16.5%
Veterans	7.4%
Households with Internet	n/a

2.1.3 Townships and Unincorporated Communities

CHAMPAIGN County is divided into twelve townships. Each is governed by three trustees and a fiscal officer elected by the voters. They meet monthly and are responsible for the health, safety, and welfare of township residents. Approximately 55.45% of county residents live in the unincorporate townships. Townships are not required to adopt the mitigation plan; Champaign

County acts on their behalf for mitigation actions and projects. Note: Township statistics do not include incorporated area populations within the township.

Table 2-9: Township Population (2020) Statistics

Township	Population 2020	2010 Comparison
Adams	1,036	1,110
Concord	1,387	1,408
Goshen	1,952	2,052
Harrison	882	932
Jackson	1,811	2,118
Johnson	1,434	1,417
Mad River	2,765	2,821
Rush	865	818
Salem	2,341	2,539
Union	1,985	2,106
Urbana	3,151	3,002
Wayne	1,872	1,809

Unincorporated Communities and Neighborhoods

CHAMPAIGN County has twenty-two unincorporated areas and one census-designated place. They do not have formal government, and do not function as a jurisdiction, but are well-known areas.

- Bowlusville
- Cable
- Carysville
- Catawba Station
- Crayon
- Darnell
- Eris
- Five Points
- Fountain Park
- Grandview Heights
- Kennard
- Kingscreek
- Lippincott
- Middletown
- Millerstown
- Mingo
- Northville
- Powhattan
- Roseville
- Springhills
- Terre Haute
- Thackery
- Westville

2.1.4 Institutions and Special Facilities

Champaign County residents have access to multiple educational and healthcare resources in the county. Access to these services improves the quality of life for residents and contributes to the successful development of CHAMPAIGN County.

Education

Five public school districts serve the residents of Champaign County. They all establish and maintain relationships with their political subdivisions in their district, and these schools include those listed below.

- Graham Local School District
- West Liberty Salem Local School District
- Triad Local School District
- Urbana City School District
- Mechanicsburg Exempted Village School District

There are two private schools, including Victory Christian School and Operation Rebirth, which is a boarding school.

Ohio High Point Career Center provides vocational education options to Champaign County students; the school is located in Logan County in Bellefontaine.

There are no colleges or universities in Champaign County. Urbana University closed its doors permanently in mid-2020. The university's 1,264 students were transferred to Franklin University or given a severance package for outplacement assistance. The job loss to local residents amounted to over one hundred jobs.

Healthcare

Champaign County, residents have access to comprehensive medical care at Mercy Health Urbana Hospital in Urbana. This is a 25-bed critical access-general services hospital. Memorial Urgent Care has a new facility in Urbana that provides urgent care and specialty services. Mercy also provides sports medicine and rehabilitation services as well as diagnostic services.

Mary Rutan Hospital from Bellefontaine provides various specialty services in Urbana through individual practitioners and offices.

There are approximately 167 nursing home beds across the county, the majority of those in Urbana, showing a 20% decrease in beds over the past five years. There are approximately 149 assisted living units in the county. There are various facilities that provide special services like rehabilitation, dialysis, physical therapy, and diagnostic services, and there are primary care physicians in multiple communities in Champaign County.

Table 2-10: Special Residential Facilities

Facility	Facilities	Beds
Nursing Home Facilities	3	167
Residential Care Facilities	3	149

2.1.5 Infrastructure

CHAMPAIGN County's infrastructure provides residents, workers, and visitors with critical access to services, and facilitates the conveyance of goods and services to the entire region as vehicles pass through the county on highways, roadways and rail. This section describes the county's transportation and utility systems.

Transportation

CHAMPAIGN County's highway system includes state highways, county roads, and local streets. The county does not have any interstates but the plentiful state routes provide easy access to the nation's road infrastructure. Traffic spreads in all directions, heading north to Lima and Toledo, east to Columbus, west to Dayton or Indianapolis and Ft. Wayne, Indiana, and south to Cincinnati.

Within Champaign County, there are 407 miles of federal and state highway and 104 bridges on that highway. Ohio Department of Transportation District 7 covers Champaign County, and a district facility in Urbana houses 15 vehicles and other maintenance equipment.

There are 239 miles of county roads, and 340 miles of township roads. The County Engineer is responsible for road, bridge and culvert maintenance for 239 miles of roadway, 213 bridges, and hundreds of culverts. 340 miles of township roads are maintained directly by the townships or through contractual agreements. The City of Urbana maintains 62.6 miles of city streets.

Table 2-11: CHAMPAIGN County Highways

Interstates	U.S. Highways	State Highways	
None	36	4	235
	68	29	245
		54	296
		55	507
		56	559
		161	560
		187	814

Rail

Rail is another transportation system in Champaign County. The WESTCO Line operates rail that crosses north to south from Bellefontaine in Logan County to the south, running through Urbana into the west side of Springfield in Clark County. Another WESTCO line runs northeast out of Springfield to its end in Mechanicsburg. There are 21 active WESTCO railroad crossings in Champaign County. The Indiana and Ohio Railway operations a line that comes into Champaign County in Mad River Township, runs northwest through St. Paris and through Johnson and Adams Township.

Airports

Champaign County has five airports, including the Champaign County Airport in Urbana, commonly known as Grimes Field Airport. Mercy Memorial Hospital maintains a heliport at its hospital in Urbana. Weller Airport (Urbana), Dad Field Airport (Christiansburg) and Reeds Airport (St. Paris) round out the air traffic facilities in the county.

Utilities

The majority of homes in Champaign County, approximately 38.4%, are heated with natural gas. An additional 23.8% utilize electric heat. These utilities are provided by multiple private

providers; there are no municipal electric providers in the county. 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 2-12 below.

Table 2-12: Champaign County Utility Providers

Electric Services	Natural Gas Services	Telecom
Dayton Power and Light Inc. Pioneer Rural Electric Ohio Edison*	Columbia Gas of Ohio CenterPoint Energy of Ohio	Champaign Telecom Windstream Frontier Century Link

*Ohio Edison services a very small group of customers along the Clark County line in far southern Champaign County.

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

- Bottled, tank or LP gas – 21.8%
- Fuel oil or kerosene – 7.7%
- Coal, coke or wood – 5.9%
- Solar energy or other fuel – 2.1%
- No fuel used – 0.3%

Buckeye I and Buckeye II windfarm projects were approved for Champaign County in 2010. Implementation of the project was delayed due to local opposition, and eventually the certificates to construct the turbines expired, and the project was abandoned. There are no plans for wind turbine construction in Champaign County at this time. There are no solar energy facilities in Champaign County, but there are just under twenty facilities certified with PUCO as meeting standards for the Ohio Renewable Energy Portfolio. Many of these are private residences or businesses.

There are two major hazardous liquid pipelines that cross the western third of the county. One line runs from east of Christiansburg about five miles to the north through St. Paris, to the northwest through the unincorporated area referred to as Rosewood, and into Loagan County near Quincy. A second line enter Champaign County in mid-Mad River Township and goes northwest into St. Paris; it then follows the other line up through Rosewood and into Loagan County. A gas transmission line runs from the southern border in Mad River Township just west of SR 68 to the north into Urbana.

Water and wastewater services are provided by municipal services. Mechanicsburg provides water and sewer services. Their water system includes three wells, one tower, 8 miles of distribution lines and 67 hydrants. The wastewater system includes one treatment facility, eight miles of lines, and two lift stations.

North Lewisburg provides water and wastewater facilities. The water system is fed by three wells and includes two towers, 9.8 miles of distribution lines, and 74 hydrants. The wastewater facility treatment plant serves 8.6 miles of lines and treats 140,000 gallons per day.

St. Paris provides wastewater treatment and sanitary sewers. They operate a sewage treatment facility and maintain over 65,000 feet of lines. The water treatment system consists of one pump house, three wells, two towers, 66,000 feet of water lines, and distribution lines.

The City of Urbana provides water, wastewater and sanitary sewer services for residents. They maintain 87 miles of water mains, four water towers and 5 wells. They have one treatment facility. The city's water and sewer systems serve both residents and businesses, including several major industrial customers. The sanitary sewer system has two pump stations with the recent addition of a new station on Three Mile Road near the former Robert Rothschild Farm. The other pump station is located near Vancrest Nursing Home. The city also has a wastewater treatment facility. They maintain 77 miles of sanitary sewer lines, 1,200 manholes, and one pump station. They accept septic system waste from professional haulers on a contractual basis for homes with septic systems. Their stormwater management program provides storm sewer lines and containment with 34 miles of storm sewer lines. The city provides a compost facility for yard waste and tree debris.

Christiansburg operates a sanitary sewer system with a treatment facility, and they have a municipal water system. Mutual and Woodstock do not provide utility services for the village residents. North Lewisburg provides sanitary sewer services for Woodstock.

According to census figures, 87.4% of the households in the county have internet, broadband, and/or a computer. Telecom providers are listed in Table 2-12.

2.1.7 Topography and Climate

Topography

The terrain in Champaign County is flat to slightly rolling, with steeper terrain in a few limited areas. Between the highest and lowest points, there is approximately 741 feet of difference. The county's highest point is approximately 1,437 feet above sea level, and is in Johnson Township. The lowest elevation is 696 feet above sea level.

Soil Types

There are eight soil associations in Champaign County. Most soils are deep to very deep. There is also a glacial boulder belt which is an area where the melting glaciers left boulders and stone on the surfaces, as well as depositing stone pieces in the soils. The soil associates are as follows, as taken from the Soil Survey of Champaign County by K.L. Powell and VL Siegenthaler in 1966:

- Brookston-Crosby: Nearly level and undulating, very poorly drained, moderately fine texture
- Crosby-Brookston-Celine: nearly level and undulating, moderately well drained to very poorly drained, medium textured and moderately fine textured

- Miami-Celine-Brookston: undulating to steep, well drained and moderately well drained, medium-textured and nearly level or depressed, very poorly drained, and moderately fine textured on uplands;
- Miami: Nearly level to undulating, well-drained, medium textured on uplands
- Miami (Steep); sloping to steep, well-drained, medium textured on uplands
- Fox-Lippincott: nearly level to sloping, well-drained, medium textured on-stream terraces, and nearly level or depressed, moderately fine textured on-stream terraces
- Miami-Fox-Casco: gently sloping to steep, well-drained, medium textured on moraines and kames
- Patton: level or depressed, very poorly drained, moderately fine textured on old glacial lakebeds

Climate

Champaign County's climate is similar to all of mid-Ohio. The humid continental climate zone features cold winters and hot summers. The average annual temperature is 35.5° F. July is the warmest month with an average high temperature of 81° F. January is the coldest month with an average low temperature of 21° F. Average annual precipitation is 48.11 inches. May is typically the wettest month with average precipitation of 5 inches of rain. The winter months generally all have just over 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. Average wind speeds are 10 mph or less, with lower wind speeds in the summer months. Humidity is lowest in the winter and highest in the summer months. Cloud cover is significantly less during the summer months and much higher during cold, winter months. Likewise, summer months have much longer periods of sunshine than winter months.

According to USA Facts, climate change trends are occurring in Champaign County. June 2016 through May 2017 has the highest twelve-month temperature average at 54.4 degrees, and February 1917 through January 1918 was the coldest twelve-month average at 45.3 degrees. The twelve-month average temperature increased 2.2 degrees from May 1900 to April 2023.

USA Facts indicates that the wettest twelve-month period in Champaign County, Ohio was February 2011 through January 2012 when 59.7 inches of precipitation fell. The driest twelve-month average is from December 1900 through November 1901 with only 23.5 inches of precipitation. For Champaign County, November 1985 was the greatest excess deviation in precipitation at seven inches more rainfall that average, and April 1962 was the largest negative difference at three inches less than average.

2.1.7 Waterways and Watershed

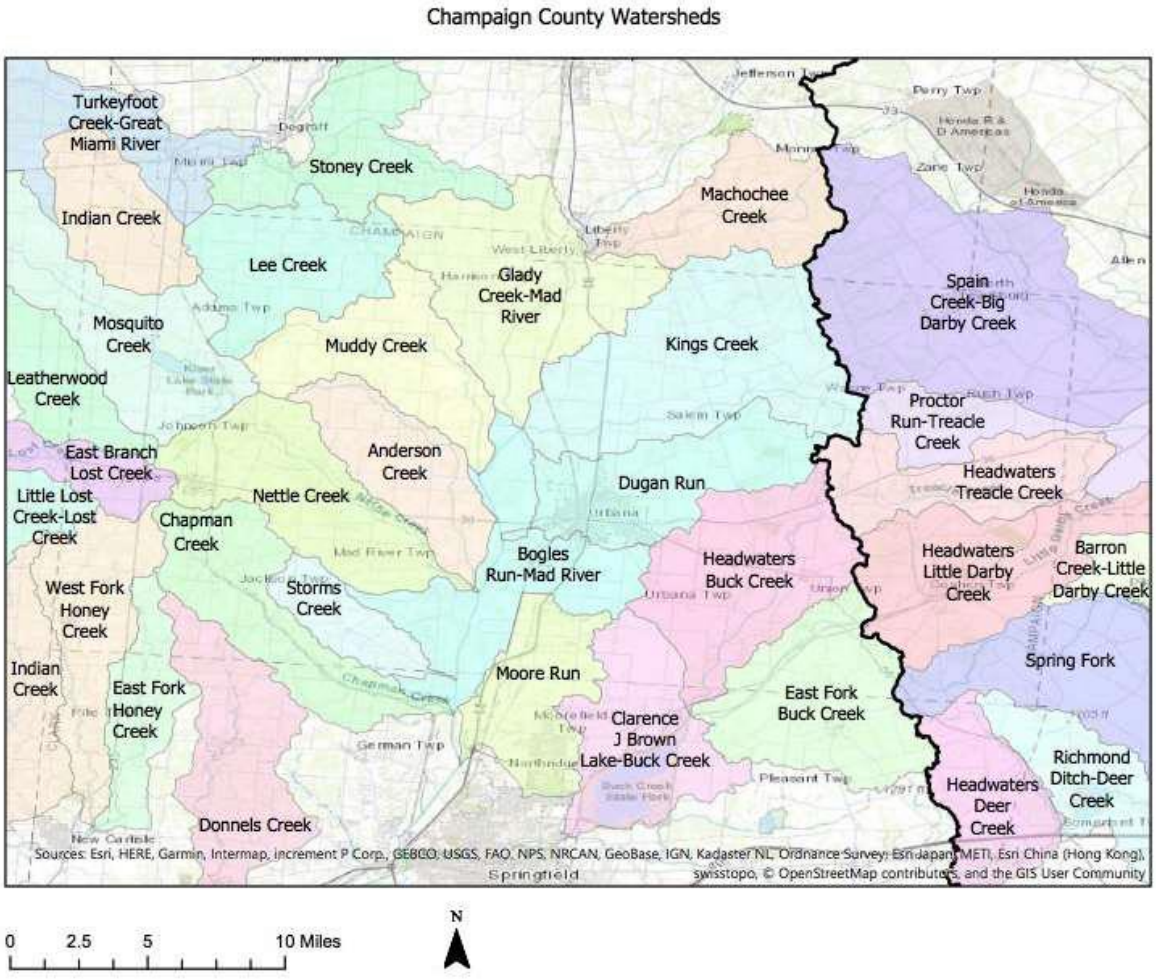
Champaign County is part of two distinct watersheds as the county's water drains south towards the Ohio River. The majority of the county falls in the Great Miami Watershed. This large watershed includes portions of fifteen Ohio counties and drains 3,802 square miles of land. This watershed is broken down into several sub-watersheds, two of which include Champaign County. The Mad River sub-watershed includes 657 square miles of Champaign, Logan, Clarke, Miami, Greene, and Montgomery counties. It flows southwest until it joins the

Great Miami River in Dayton. This sub-watershed encompasses the majority of Champaign County, including most of the western two-thirds of the county. A small section in the northwest corner of Champaign County is located in the Great Miami River (Upper) sub-watershed. This large sub-section drains 748 square miles at the top of Great Miami watershed and flows into the Ohio River west of Cincinnati.

The remainder of Champaign County is located in the Scioto River watershed, which includes all or part of 31 counties in central and southern Ohio and drains 6,513 square miles. The eastern third of Champaign County falls in the Big Darby Creek sub-watershed. This basin also includes portions of Logan, Union, Clark, Madison, Franklin, and Pickaway Counties. A small section in the far southeast corner of Champaign County falls in the Deer Creek sub-watershed.

Map 2-2 identifies the watershed sub-basins on Champaign County. The heavy black line that runs through the county depicts the border between the Great Miami and Scioto watersheds.

Map 2-2: Champaign County Watersheds



2.1.8 Land Use

With 190,060 acres of farmland, agriculture is the predominant land use in Champaign County. Cultivated crops account for 72% of all land use in the county. Countywide, there are 873 farms with an average size of 218 acres. Individuals and families operate 91.6% of the farms. Farmers cultivate approximately 69,450 acres of corn, 82,913 acres of soybeans, and 5,602 acres of wheat. Orchards make up just 81 acres of the county. Farmers also raise poultry, cattle, and dairy cows.

The forested areas, grassland, and wetlands in Champaign County include 2,082 acres of state parks, forests, nature preserves and wildlife areas. This includes the Cedar Bog Dedicated Nature Preserve (Urbana Township), Urbana Wildlife Area (Salem Township), Davey Woods Dedicated Nature Preserve (Concord Township), Seigenthaler-Kaesther Esker Dedicated Nature Preserve (Harrison Township), Kiser Lake State Park and Kiser Lake Wetlands (Johnson Township).

Table 2-13: Champaign County Land Use

Use	Percentage
Cultivated Crops	72.59%
Forest	11.69%
Pasture/Hay	7.84%
Developed, Lower Intensity	5.76%
Wetlands	0.60%
Shrub/Scrub and Grasslands	0.58%
Open Water	0.46%
Developed, Higher Intensity	0.45%
Barren (strip mines, gravel pits, etc.)	0.04%

2.1.9 Regulation and Community Development Planning

Building regulations are enforced by several entities across Champaign County. LUC Regional Planning Commission is a three-county entity that provides regional planning for the contiguous counties of Champaign, Logan, and Union. The Commission is responsible for approving subdivisions in unincorporated areas and reviewing and recommending zoning amendments for township zoning commissions.

Zoning regulations are in place in most municipalities and all townships in Champaign County. Each municipality or township is responsible for adopting and enforcing these regulations through their local zoning inspector and zoning board or commission. Rules are adopted and enforced by each individual municipality or township. The zoning status for all jurisdictions in the county is listed in Table 2-14 below.

The Champaign County Building Regulations department conducts inspections, issues building permits, and enforces commercial and residential building codes. The County Engineer serves as the county's floodplain manager and is in charge of regulating development in special flood hazard areas. The City of Urbana Zoning official enforces floodplain regulations within the city.

Table 2-14: Champaign County Zoning Status

Zoned Municipalities	Zoned Townships		Unzoned
City of Urbana	Adams	Mad River	Village of Christiansburg
Village of Mechanicsburg	Concord	Rush	Village of Mutual
Village of North Lewisburg	Goshen	Salem	
Village of St. Paris	Harrison	Union	
Village of Woodstock	Jackson	Urbana	
	Johnson	Wayne	

Jurisdictional Capability for Mitigation

The capability to implement mitigation strategies and to manage mitigation projects varies across Champaign County. The county is fully capable of developing, executing and administering a complex mitigation project, as is the City of Urbana. Both jurisdictions have full capabilities for designing, administering, executing, and completing a significantly complex mitigation project. They have ample engineering staff for technical design and implementation work, and administrative staff to develop project applications and manage the deliverables. The three larger villages – Mechanicsburg, North Lewisburg and St. Paris – would be able to develop, execute and administer a less complex mitigation project. They have involved elected officials, as well as some full-time staff with technical and administrative capacity. The remaining villages – Christiansburg, Mutual and Woodstock - have limited access to individuals who would design, administer or execute a project, and would have to either hire a contractor to do this work, or forego the option of funding due to a lack of resources.

The townships would generally work through the Champaign County Commissioners for mitigation projects. They lack the personnel to manage complex projects but have a working relationship with the county to address their needs.

Table 2-15: Jurisdictional Capabilities

Jurisdiction	Planning Commission	Comprehensive Plan	Building Codes	Zoning Ordinances	Floodplain Regulations	Capital Budget Mitigation	Capital Budget PW Mitigation
CHAMPAIGN County	Yes	Yes	Yes	n/a	Yes	Yes	Yes
Village of Christiansburg	No	No	Yes	No	Yes	No	No
Village of Mechanicsburg	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of Mutual	No	No	Yes	No	Yes	No	No
Village of North Lewisburg	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of St. Paris	Yes	Yes	Yes	Yes	Yes	Yes	Yes
City of Urbana	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of Woodstock	No	No	Yes	Yes	No	No	No
Adams Township	Yes	Yes	Yes	Yes	n/a	No	No
Concord Township	Yes	Yes	Yes	Yes	n/a	No	No
Goshen Township	Yes	Yes	Yes	Yes	n/a	No	No

Harrison Township	Yes	Yes	Yes	Yes	n/a	No	No
Jackson Township	Yes	Yes	Yes	Yes	n/a	No	No
Johnson Township	Yes	Yes	Yes	Yes	n/a	No	No
Mad River Township	Yes	Yes	Yes	Yes	n/a	No	No
Rush Township	No	No	Yes	Yes	n/a	No	No
Salem Township	Yes	Yes	Yes	Yes	n/a	No	No
Union Township	No	No	Yes	Yes	n/a	No	No
Urbana Township	Yes	Yes	Yes	Yes	n/a	No	No
Wayne Township	Yes	Yes	Yes	Yes	n/a	No	No

*

2.1.10 Economy and Business

Champaign County is part of the Dayton-Springfield Metropolitan Statistical Area. Its proximity to Columbus also allows for an easy exchange of business with the state's capitol, providing a wide array of resources, products and services for county residents and businesses.

Community development is accomplished through the collaborative efforts of multiple entities and organizations. Township trustees, municipal officials and employees, and county workers work together to recruit new business, retain current ones, and make changes to regulations that result in wise development that protects the built community and natural resources. In various documents, these professionals are referred to as "plan partners".

Regional planning is led by Logan Union Champaign Regional Planning (LUC-RP), a three-county entity that represents Logan, Union, and Champaign counties. It is funded in part by Champaign County. LUC-RP assists by providing floodplain regulation development and revision, zoning regulation development and revision, and land use planning services. They provide assistance and leadership in development of transportation plans and other local resources, housing plans and assist with the development of projects, management of the CDBG program, and other administrative and planning activities.

Champaign County representatives currently serve on the LUC-RP Board of Directors, Executive Board, Zoning and Subdivision Rules Committee, Budget and Finance Committee, Building Committee, RTPO Technical Advisory Committee, By-laws Committee, Subdivision Regulations Committee, Records Committee, and the Visioning Committee.

LUC-RP provides assistance in the development and implementation of regulations, forms, and processes. They provide informational materials, inspector training, and they represent the three counties at various events and meetings. Locally, LUC-RP staff works with County Commissioners, local mayors and township trustees. They participate in hazard mitigation planning in multiple counties, bridging gaps between land use planning and local regulation and mitigation efforts and projects.

The Champaign Economic Partnership, CEP, works to attract and retain business in the county. Seventy percent of the board members of CEP are from local private industry. They work with government entities to rapidly address business development opportunities to the benefit of

the entire county. CEP functions as Champaign County's community improvement corporation. They establish and maintain a listing of available sites and locations as well as tracking and assessing the local workforce, its needs and characteristics, and its development into the future. They work with local educational and vocational institutions to provide necessary training for future workforce needs, and to assess and revise compensation so that Champaign County workers sustain a safe and stable lifestyle. CEP develops the Champaign County Comprehensive Plan and the county's Housing Study. Champaign County, the City of Urbana, and the Villages of Mechanicsburg, North Lewisburg, and St. Paris are active members of CEP. Ten of twelve townships are active participants, not including Rush and Union Townships. The villages of Christiansburg, Mutual and Woodstock do not participate in CEP.

The Champaign County Chamber of Commerce supports business in the county through the advancement of business and community interests, and by supporting trade that occurs in the county. They provide leadership training, committees that advocate for specific business interests such as agriculture and safety, and they operate the local visitors' bureau. Members include the Champaign County Commissioners, Champaign Health District, Champaign County Engineer, Board of Developmental Disabilities, Auditor, Prosecutor and Department of Job & Family Services. The City of Urbana and the Village of St. Paris are members. Many local businesses of all types, utilities, and other entities sit alongside public officials at the Chamber of Commerce.

Under the Chamber's leadership, the Champaign County Ag Council works to enhance agricultural economic development and education to the community. They have worked with the local schools to provide food-related education and facilities to promote food production and associated jobs. The Safety Council works to increase safety awareness, prevent occupational accidents, and to provide quality occupational safety and health and wellness programs to workers. The Visitors Bureau works to promote the county as a leisure travel destination through highlighting the historical, cultural and recreational activities available.

Business and Industry

Champaign County has a generally stable, and diverse economy that has benefitted from a healthy combination of agriculture, manufacturing, and service industries. Local economic development is led by Champaign Economic Partnership which has worked diligently to foster business growth in the county. The Champaign Chamber of Commerce works hand-in-hand with CEP to maintain high employment, business prosperity, and worker satisfaction.

The workforce has remained very stable, numbers-wise, since 2016. Ohio County Profiles show that in 2016, there were 20,000 local people considered part of the workforce, and of those, 19,100 were employed. That resulted in a 4.5% unemployment rate. The number stayed the same until 2019 when it increased by 1%, and unemployment dropped to 3.7%. However, in 2020, the workforce decreased to 20,000 and unemployment rose higher than it had recently been, reaching 7.1% or 1.400 unemployed.

Employment in Champaign County is attributed to many industrial sectors. Average employment for each sector, based on 2019 data, provided in the Ohio County Profile by the Office o, is listed in Table 2-17.

Table 2-16: Average Employment by Type

Employer Type or Business Type	Number of Establishments	Average Employment	Percentage of Workforce
Private Sector	605	8,903	45.01%
Manufacturing	48	3,875	19.59%
Trade, Transportation and Utilities	146	1,520	7.69%
Local Government	--	1,851	9.36%
Education and Health Services	67	1,128	5.70%
Construction	60	252	1.27%
Leisure and Hospitality	66	810	4.10%
Professional and Business Services	66	512	2.59%
Other Services	65	362	1.83%
Financial Services	63	257	1.30%
Natural Resources and Mining	17	142	0.72%
Information	8	46	0.23%
Federal Government	--	69	0.35%
State Government	--	51	0.26%

Trends in employment include decreases in some sectors and increases in others. Government workers, including local, state and federal agencies, are higher than in years past. Since 2013, the number of goods-producing establishments has fallen 4.6%, and construction has fallen 10.4%. Education, health services, and hospitality have grown in double digits.

More specific information from the Ohio Economic Profile indicates that transportation, warehousing and professional, scientific and technical services establishments employ proportionately more people than in 2017.

According to the Ohio Department of Development, major employers in the county include those in the following table.

Table 2-17: Champaign County Major Employers

Employer	Sector
Bundy Baking Solutions	Manufacturing
Merch Health – Urbana Hospital	Service
Graham Local Schools	Government
Honeywell International Inc.	Manufacturing
Johnson Welded Products	Manufacturing
KTH Parts Industries Inc.	Manufacturing
ORBIS/Menasha Corp.	Manufacturing
Rittal Corp	Manufacturing
Urbana City Schools	Government
Wal-Mart Stores Inc.	Trade

Weidemann Electrical Technology	Manufacturing
Sutphin Corp	Manufacturing
City of Urbana	Government
Champaign County	Government

In general, Champaign County experiences moderate employment statistics. Like all of Ohio, unemployment increased significantly during the pandemic in 2020. The highest unemployment was experienced in 2020 when the unemployment rate reached 7.1%. Since then, the rate has steadily improved, reached 3.7% in 2022. As of December, 2023, CHAMPAIGN County's unemployment rate was 3.2%. The data below comes from the Ohio Department of Job & Family Services Local Area Unemployment Statistics.

Table 2-18: Total Employment Statistics*

	2024 (April)	2023	2022	2021	2020	2019	2018
Employed	18,557	18,867	19,200	19,300	19,800	20,200	20,000
Unemployed	747	620	700	900	1,400	800	800
Unemployment Rate	3.9%	3.2%	3.7%	4.5%	7.2%	3.7%	3.8%%

*2023 Ohio County Profile for Champaign County used for 2018-2022 data

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, much of the acreage in CHAMPAIGN County is classified as prime farmland, making agriculture a major contributor to the local economy.

The Ohio Department of Development shows CHAMPAIGN County has 841 farms with an average acreage of 271 acres. The major crops grown include corn, soybeans and wheat with some small amounts of vegetables, fruit and berries, popcorn, forage, and nursery/greenhouse products. There are also cattle and calves, daily cows, chickens, turkeys, hogs and pigs, sheep, and goats produced in CHAMPAIGN County. There are 245 horses and ponies used for recreation or breeding.

There are 839 farms in Champaign County and a total of 1.487 farmers, of which 403 are new and beginning farmers. Almost a third of those are over age 65. Slightly under seven percent are younger than 35 years old. There are 97 family farms, and 20 farms hire outside labor. About 88% of farms have internet access. Only 34 farms use no-till practices, but an additional 27 use reduced-till practices. Seven plant cover crops; only ten use intensive-till practices. While stakeholders reported that the family farm numbers are decreasing, there is still a very strong predominance of the agricultural industry in Champaign County, and that is not expected to change in the near future. Farm numbers are stable.

Table 2-19: Farmland Data

Crops	Acres	Livestock	Head
Land Area	274,194	Cattle and Calves	9,687
Land in Farms	217,289	Milk Cows	1,100
Cropland	193,824	Hogs & Pigs	44,279
Harvested Cropland	182,924 + n/d	Goats	1,354
Irrigated Acreage	5,996 ac.	Broilers	1,228
Pastureland	6,496 ac.	Horses & ponies	549
Woodland	8,870 ac.	Sheep & lambs	1,658
Average Farm Size	259 ac.	Layers and pullets	4,071
		Turkeys	82

This data was taken from the 2022 Census of Agriculture, Champaign County Ohio County Profile.

2.1.11 Community Growth and Development Trends

Community growth and development in Champaign County are the outcome of multiple organizations and jurisdictions working together to meet community needs and improve the local business environment and economy. Major players in this collaboration are the Champaign Economic Partnership, LUC Regional Planning, the Champaign-Urbana Chamber of Commerce, and various county and municipality officials and offices.

The Champaign Economic Partnership serves as the local community improvement corporation, providing site availability and information with new and expanding business owners and leaders. They work to advance economic development and job creation in the county through promoting and facilitating business expansion and growth to generate economic opportunity, job availability and an improved quality of life. They consist of a partnership of government, private industry, and individuals who are appointed and elected officials.

The CEP Board of Trustees includes representation from the municipalities, townships and industries in Champaign County. Presently, representatives from the City of Urbana, Village of North Lewisburg, and Champaign County hold positions as trustees. They are joined by a township trustee who represents all townships on the board. Additionally, healthcare, news media, financial institutions, nonprofit utility providers, professionals, private businesses, public education, and agricultural representatives from all areas of Champaign County round of the CEP leadership. Some of the private business leaders also represent a municipal jurisdiction.

Additionally, CEP has a staff of two, including a CEP Director and a CEP-Ohio High Point Business Liaison. They work from an office located in Urbana.

The Champaign Economic Partnership brings the development community together under one umbrella, working through the Board of Trustees to help entrepreneurs design and build a startup business or expand an existing one in Champaign County. They assist with site selection

as new businesses are established, and help with workforce development to provide the right workers for selected jobs. CEP lists and describes available sites, and helps potential businesses identify and use financial incentives and training programs to successfully establish themselves in Champaign County. They provide information about utilities, taxes and regulation so that new businesses can utilize local resources to succeed in their chosen field of endeavor. CEP provides information about worker training programs, wages and other compensation, and links to educational programs in the county. They have a local job board where positions open for hire can be listed and shared with potential workers.

The CEP serves to coordinate creation of the Champaign County Comprehensive Plan and the Champaign County Housing Study. They provide information about area demographics, maps, and local real estate connections for potential workforce members.

In 2019, the CEP worked to update the county's comprehensive plan utilizing partnerships and participation from across the county. LUC Regional Planning Commission, described in the forthcoming paragraphs, prepared the plan based upon input from a large set of participants from all areas and levels of local government, a wide array of local businesses and professionals, and multiple elected and appointed officials. The comprehensive plan was funded by Champaign County, the City of Urbana, Villages of Mechanicsburg, North Lewisburg and St. Paris, and ten of twelve townships. There is current activity to update this plan again, keeping its relevancy and accuracy alive through constant attention to collaboration.

LUC Regional Planning Commission serves Logan, Union and Champaign Counties. Its membership includes Champaign County, the City of Urbana, the Villages of Mechanicsburg, North Lewisburg, St. Paris and Woodstock, and Adams, Concord, Goshen, Harrison, Johnson, Jackson, Mad River, Rush, Salem, Union, Urbana, and Wayne Townships. The Villages of Christiansburg and Mutual do not participate in LUC Regional Planning Activities. The organization employes four people, including a director, operations manager, planner and planner GIS operator.

LUC Regional Planning Commission provides planning assistance to the CEP for purposes of creating the comprehensive plan for Champaign County, The Environmental Justice Plan for the Regional Transportation Planning Organization of Logan and Champaign Counties, The Analysis of Impediments to Fair Housing for the purposes of housing equitability, and numerous sets of regulations and procedures used in growth and development management. They are the creators of the Champaign County Land Use Plan.

LUC Regional Planning manages transportation planning, fair housing programs, Community Development Block Grant programs, special program assistance (floodplain, zoning, subdivision and records retention) for local government. They assist local governments in development of regulations, training of enforcement and operational personnel, and development of informational materials. LUC Regional Planning staff attend township association, mayors' group and jurisdictional meetings as well as county and regional events where development and regulations are a topic.

Regulation development and revision is a key focus of LUC-RP. The have addressed current regulation amendment trends such as accessory building standards, agritourism, manufactured home and mobile home regulations, open space issues, permitted and conditional uses, solar energy systems and temporary buildings. They conduct zoning inspector training for all zoning officials. They provide assistance in the development of subdivision regulations. LUC-RP works closely with floodplain managers in the jurisdictions to incorporate flood prevention and floodplain regulation in the planning, regulation and development efforts.

A St. Paris Bike Trail Feasibility Study was completed in 2022, and worked to re-establish the Cardinal Trail partly in Champaign County. They completed an Income Survey through the use of CDBG funds in Christiansburg. LUC-RP provides transportation planning to all local jurisdictions through the Rural Transportation Planning Organization.

LUC-RP, with representation from a comprehensive and broad spectrum of communities and entities in Champaign County, provides the link between the people who lead and work in Champaign County and the demographics and plans that are developed to guide their actions. Serving as an interpreter, teacher, and advocate for responsible and feasible growth, the regional planning group is the catalyst for a developing and growing community with opportunity to prosper for its businesses.

The Champaign County Chamber of Commerce and Visitors Bureau provides a forum for business owners to address the needs of their companies, to identify human resources concerns and develop solutions, and to promote doing business in Champaign County. They participate in CEP and LUC-RP activities and other community activities that promote business. The chamber also coordinates a local Ag Council, a Leadership Program, Safety Council, and Visitors Bureau. They have multiple staff members and volunteer who promote Champaign County as a premier destination for leisure travel while highlighting the area's historical, cultural and recreational activities in order to attract visitors who help to enhance the county's economic and social vitality.

The City of Urbana Planning Commission has seven members. They review site plans, applications for development, redevelopment or alterations in the Urbana Corridor Overlay District, change to zoning maps, planning and zoning code changes, and street and alley vacations. The planning and zoning code is included in the Codified Ordinances of Urbana, and provides standards of performance and design regarding style, height, and various other components of structural design. They meet monthly to manage their affairs.

The City of Urbana employs a Community Development director to promote, guide and manage economic and community growth in the city. This director works with CEP and LUC-RP, in addition to the Chamber of Commerce and Visitors Bureau, to expand the city's business community and to provide for the needs of a growing city. The Zoning and Compliance Officer implements and enforces the zoning, nuisance, vacant building, floodplain, architectural, downtown historical building and safety codes adopted by the city. The Engineer's office

manages infrastructure projects, floodplain mapping, and permits and building standards and regulations.

The villages of Mechanicsburg, North Lewisburg and St. Paris employ village administrators who work with CEP and LUC-RP on behalf of their village. Their participation brings about village inclusion in comprehensive planning, economic development and growth activities, and regulation development and enforcement. Mayors and elected officials participate as they are able, but most are volunteers who work full-time jobs outside the village, and their time is limited.

Christiansburg, Mutual and Woodstock do not directly participate in planning meetings because volunteer officials are generally unavailable when meetings are held, and they do not have employed managers or administrators to attend. Through participation of the township trustees where the communities are located, they are able to provide input when they choose to do so. Informal communication takes place that includes the community development leaders, elected officials, and key residents.

Development goals in Champaign County currently focus on the addition of business and commercial entities to the county, and creation of housing where the workforce can live in Champaign County and take advantage of the smalltown and rural lifestyle and values while raising their families. Broadly stated, the Champaign County Comprehensive Plan includes the following vision statements, quoted from the document written and published CEP and LUC-RP:

- Preservation of farmland resources, promotion of agriculture through public education and tourism events, protection of water quality and an economic environment supportive of diversified crops;
- To stimulate economic growth throughout Champaign County by strengthening the county's competitive position and facilitating investments that build capacity with existing businesses, create jobs, generate economic opportunity and improve the quality of life;
- Encouragement of efficient housing policies that repurpose, redevelop and reoccupy areas of the county; in this instance, efficiency refers to proximity to existing public services;
- Advocate for land use decisions supportive of existing areas of development and industries and preservation and protection of the county's natural resources, rural character, and small-town atmosphere through careful decision-making;
- Build on successful recreational initiatives, implement new amenities, increase connectivity between facilities, improve the physical and mental wellness of the citizens, and preserve natural, historical, and culturally important resources;
- View transportation activities through the lends of transportation safety; network connectivity, reliability, and efficiency; improve and expand multi-modal access, support economic vitality; and be good stewards of the transportations network;

- And to see the preservation of the county's rural character and development of the majority of residential, commercial, and industrial in areas where public services are already available or nearby.

Discussions with development leaders indicated that Champaign County has a severe shortage of housing for its workforce. The last subdivision was built in 1989, and the City of Urbana is the only municipality with subdivision regulations. Frequent single-family homes are being built on individual lots in rural areas, resulting in many single-driveway entry points onto highways that can be dangerous from a traffic perspective. This strategy for development of single-family housing does not facilitate the installation of infrastructure, such as public water and sewer lines, or other utilities, for a larger growth. If subdivisions were built instead of single homes, there would be an ability to provide infrastructure and utilities rather than septic systems and wells. The broader picture housing development approach would facilitate economic development and, at the same time, be able to preserve high-quality farmland for agricultural purposes.

Low and moderate-income housing is also in dire need. Some development leaders estimated a need for 1,500 to 2,000 housing units to meet the current need for additional housing with current prospective industrial development. There is a current housing project nearing finalization that includes 513units consisting of 132 single family homes, 75 patio homes, 114 townhome units and 192 apartments., but this has taken several years to find a suitable developer and make arrangements to begin construction. With housing options tied so closely to development agreements, it is almost impossible to seal new business deals without being able to identify housing for the potential workforce.

Housing shortages are complicated by the fact that Champaign County is a short drive from the Columbus metropolitan area, so workers from Franklin County are very willing to locate in Champaign County and drive every day to work in Columbus. When landowners are willing to sell individual lots for homes, combined with no available subdivision housing, the number of new homes that pop up on the frontage of farmland is extensive. This then leads to difficulty for the county and municipalities to provide adequate utilities and infrastructure.

While the Champaign County EMA is not officially part of the economic development committees or regulation-developing bodies, planning participants continually cited example of how the negative consequences of disasters and mitigation efforts to prevent future damages are, in fact, included in all activities. The City of Urbana spoke about working with the EMA and a private multi-family housing property owner to resolve flooding issues that were brought to their attention in the course of developing the 2019 Champaign County Multi-Hazard Mitigation Plan. The city has worked to support the landowner through modification of stormwater management systems, and the property owner has funded and completed multiple steps in reducing flooding by facilitating adequate drainage on the property. While there was no organizational model for that collaboration, and certainly no requirement for any of the entities, the situation was resolved and is no longer a problem through a simple, collaborative

approach. Stakeholders repeatedly said that “everyone knows everyone else in Champaign County”, and through that characteristic, much work is achieved.

The widespread participation in LUC-RP is conducive to collaboration and cooperation as individuals sit across the table from their counterparts to discuss mitigation efforts. Leadership of LUC-RP was extremely active in mitigation planning and facilitates the inclusion of strategies into further work. The director of the Champaign Chamber of Commerce was also invested in the mitigation planning, and serves as a courier of purposes and intents of the mitigation plan into development efforts.

The land use in Champaign County has not changed significantly since 2018. Low intensity developed area is up by one percent, and forested area is down by 2.5 percent. However, grasslands are up by almost a percent. All other categories, including agriculture, remain almost the same as five years ago. None of these changes are significant enough to alter the implications from specific hazards or threats, and will certainly not change how the residents of the county are affected by incidents.

Population overall is slightly less in 2020 than it was in 2010. The decrease is just over five percent, and is attributed to the significant need for housing, especially moderate income, affordable housing. With ample housing available in adjacent counties, especially Union County, stakeholders felt Champaign County workers reside in the Marysville area more commonly than they did five or ten years ago. This is being addressed by the housing plan for affordable but nice housing development for potential homeowners and families. They also attributed a small part of the decrease to the closure of Urbana University in 2021, and indicated that an anticipated new occupant for the properties may bring that population number up again. This includes an estimated 500 students and staff from the former university. In contrast, the Ohio Office of Research projects population numbers at 36,840 in 2030 and 35,890 in 2040, continuing the decline in population by small, regular percentages.

The 2023 Ohio County Profile for Champaign County, released by the Ohio Office of Research within the Ohio Department of Development, lists estimated population at 38,709 which is just five residents less than the 2020 census used for reference in this plan. Almost all data was very similar to the 2021 report; there was almost half a percent increase in the amount of land used by higher-intensity development, and land used for crop production was not quite one percent less. There was in excess of a 3% increase in the families living in poverty, but median income raised by over $2,700. Housing units decreased in number by almost fifty, which is not a trend that growth and development leaders in the county want to see.

Goals from the community development group that are consistent and complimentary to mitigation efforts include the development of new and better housing that is in proximity to existing services and utilities. When people live in better homes that have the utilities that are needed through public services, their losses in disasters are less and easier to repair. Housing that is built according to current construction and occupancy standards is more resilient. According to the profiles, housing development has been only single-family units; however,

stakeholders indicated that multi-family affordable and moderate-income housing is a current development goal, in addition to the development of more single-family affordable low-to-moderate income housing.

The addition of additional manufacturing and industrial growth is always a goal with Champaign County development professionals and jurisdictions. Sutphen Corp recently located in the county, and added numerous jobs for local residents. Stakeholders spoke about attracting more similar businesses to the county, but in doing so, increasing the already-prevalent need for decent housing. They are working to address both needs hand-in-hand.

Although these slight changes in the profile data are noted, it is anticipated that disaster-related response and recovery has not changed and will not change much due to these demographic differences. As housing is improved, building codes and regulations will help ensure that new residential growth is relatively capable of withstanding the wrath of storms common to Champaign County. Enforcement of codes and assistance to builders is in good working order. There was no input that indicated social services and health-related capacity, or public safety capacity, would be endangered or less effective should growth occur as desired. It is believed that county and municipal capabilities, even in consideration of climate changes possible in the ensuing decades, would be hampered or unable to successfully handle the consequences of community growth.

There is some question about the accuracy of the 2020 US Census due to the pandemic and how data was collected; however, any inaccuracies are not expected to affect vulnerability in the coming five years or more.

2.2 HAZARD IDENTIFICATION

Champaign 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 the county and examine hazard events that have previously occurred in the county.

Climate change was not listed as a specific hazard, but was incorporated into the discussions about all hazards, and applied as it relates to Champaign County. Strategies were considered in the context of how changing weather patterns and presentations would affect the incidence, circumstances, and outcomes of a particular impact. For example, as rain falls faster and more intensely, flooding was expanded to include surface runoff, flash flooding, and surface flooding. Consideration for how increased rainfall, and resulting increased runoff, would affect Champaign County was given. The effects of hard, pounding rain and pooling on surfaces causes additional rapid surface drainage which worsens surface stress and topsoil erosion. All of these kinds of effects were considered in the context of what is happening now, and the plan has been modified to include those changes. Therefore, climate change in an implied part of every hazard, and will be continually assessed as this plan is implemented and later updated.
In developing this assessment, the Champaign County Hazard Mitigation Planning Team analyzed the hazards and risks present throughout the county. Because of the impact on

residents, they discussed all hazards, not just natural hazards. The identified hazards are as follows:

- Dam Failure (for a limited part of the county where dams are present)
- Drought and extreme heat
- Earthquake
- Flood
- Hazardous Materials Spills and Releases
- Invasive Species – townships only; agricultural threat
- Power Outage
- Severe Thunderstorms, including rain, hail, wind, lightning
- Tornado and/or Windstorm
- Winter Storm and Extreme Cold

Some natural hazards were excluded from this plan because they pose no risk to Champaign County. Table 2-20 identifies these hazards and explains why the hazard is not relevant to the county.

Table 2-20: Excluded Hazards

Excluded Hazard	Justification
Coastal Erosion	The county has no open coastline.
Land Subsidence	No history of damages
Mud/landslide	Elevation not conducive to this hazard
Tsunami	Geographically impossible
Volcano	Geographically impossible
Wildfire	Insufficient forested area
Hurricane	Not a potential hazard

Champaign County has a relatively brief history of federal disaster declarations and assistance. While Ohio has received more federal disaster declarations than the list below, Champaign County was not significantly affected by many of them. The county has received thirteen federal disaster declarations over the years. Most recently, Champaign County was included in a 2012 declaration following a derecho event, and again included in the 2019 COVID Pandemic declarations. The following table lists declarations that included Champaign County.

Table 2-21: Federal Disaster Declaration History

DR/EM Number	Incident Date	Incident Type(s)
EM 3457-OH	March 16, 2020	Ohio COVID Pandemic
DR-4507-OH	January 20, 2020	Ohio COVID-19 Pandemic
DR-4077-OH	September 20, 2012	Severe Storms & Straight-line Winds
EM 3346-OH	June 29, 2012	Ohio Severe Storms
DR-1805-OH	September 14, 2008	Severe Wind w/Hurricane Ike
EM-3250-OH	September 14, 2005	Hurricane Katrina Evacuation
DR-1580-OH	February 15, 2005	Flood, Winter Storm

EM-3198-OH	December 22, 2004	Ohio Snow
DR-1580-OH	December 22, 2004	Severe Winter Storms, Flood, Landslide
DR-1065-OH	August 7, 1995	Severe Storm, Flooding
EM-3055-OH	January 26, 1978	Winter Storm
EM-3029-OH	February 2, 1977	Ohio Snowstorms
DR-90-OH	January 23, 1959	Floods

To understand the risk posed by natural hazards in Champaign County, it is important to examine the characteristics of each hazard and evaluate local 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 Champaign County's history with each.

2.2.1 Climate and Weather

To meet the requirements of mitigation planning, the potential effects of climate change are discussed in each of the hazards to which it applies. The Climate Mapping for Resilience and Adaptation website information was discussed as part of the stakeholder meetings, and the reactions are appropriate to that data and other data that was anecdotally included by participants.

How storms occur and the impact on the community is changing. Stakeholders reported various differences in thunderstorms, windstorms, and precipitation in general. Most participants felt that rain falls in more intense storms now and with greater amounts at one time, rather than gentle rains that came frequently in past years. They felt that the wind is stronger than it used to be, and blows more consistently than they remember in the past. In general, stakeholders felt that winters are less harsh, not as cold, and have less snowfall. The say little change in drought, although they said periods between rainfall episodes are longer than they used to be.

Data suggests that there is also a change in temperatures, although local stakeholders did not feel this change is remarkable in Champaign County. They did report that cool weather lasts longer into May now than it used to, and that the warm-up to summer-like temperatures often does not happen until June. There are still cool spells in June, but there are warmer days in between the cooler ones, whereas May is generally consistently cooler than in the past.

Champaign County stakeholders felt that climate change will have less of an effect locally than in more metropolitan areas. Located in the midst of west central Ohio where there are no major cities very close by, and few carbon-dissipating industries with robust operations, they feel climate change will impact them in a slower and less profound manner than metropolitan areas closer to Dayton, Columbus and Cincinnati. With a total county population lower than many major cities, the county's contributions to pollution and environmental causative activities are far less than in a Franklin or Cuyahoga County. Therefore, climate change was considered a less imminent threat than in many other counties.

Stakeholders did recognize changes in storm patterns and the specific outcomes of major weather fronts. Almost all participants felt there is a profound increase in tornado activity this year, even considering that detection and monitoring has increased in capability to detect funnel clouds, rotation and debris fields. Those changes are discussed within each hazard described in the following section. Many of their comments were consistent with climate projections, only to a lesser degree with fewer drastic changes.

Data is according to the Climate Mapping for Resilience and Adaptation (CMRA) website. This tool is consistent with the USGS and NOAA datasets. Projections can be expressed in tracts similar to the Economic Justice Screening Tool and Building Code Adoption Tracking, but the following table is a countywide projection.

Table 2-22: Climate Projections per CMRA – Champaign County OH

	Prior 1976-2005	2015-2044 Low	2015-2044 High	2035-2064 Low	2035-2064 High	2070-2099 Low	2070-2099 High
EXTREME HEAT							
Annual Days max temperature > 90	16.9	27.7	31.0	38.8	48.7	49.7	83.2
Annual days with max temperature >95	5.8	7.0	8.7	12.7	18.3	19.1	46.3
Annual day max temp >100	1.0	1.1	1.7	3.0	5.3	5.6	20.0
Annual single highest max temperature >105	0.1	0.1	0.1	0.4	1.0	0.8	7.6
Annual single highest temperature	94.7	98.2	98.7	99.9	101.5	101.4	106.5
Annual highest max. temp avg. over 5 days	90.3	93.7	94.3	95.4	97.0	97.1	102.0
Cooling degree days	774.4	1111.8	1159.2	1302.8	1466.6	1486.6	2144.5
DROUGHT							
Average annual total precipitation	38.3	40.3	42.0	40.2	40.8	40.3	42.0
Days/year with precipitation	198.2	193.3	189.7	194.3	193.2	193.3	189.7
Day/year with no precipitation	166.9	171.8	175.4	170.8	172.0	171.8	175.4
Max # consecutive dry days	11.5	12.5	13.3	12.1	12.3	12.5	13.3
Annual day max. temp. >90	10.9	49.7	83.2	38.8	48.7	49.7	83.2
Annual days max. temp >100	0	5.6	20.0	3.0	5.3	5.6	20.0
WILDFIRE							
Days/year no precipitation	166.9	171.8	175.4	170.8	172.0	171.8	175.4
Max. # consecutive dry days	11.5	12.5	13.3	21.1	12.3	12.5	13.3
Days/year with precipitation	198.2	193.3	189.7	194.3	193.2	193.3	189.7
Annual days max temp >90	10.9	49.7	83.2	38.8	48.7	49.7	83.2
Annual days max temp >100	0	5.6	20.0	3.0	5.3	5.6	20.0
FLOODING							
Average total precipitation	38.3	40.3	42.0	40.2	40.8	40.3	42.0
Days per year with precipitation	198.2	193.3	189.7	194.3	193.2	193.3	189.7
Max number of consecutive wet days	12.8	12.9	12.8	12.7	13.0	12.9	12.8
Annual days with precipitation >1 inch	3.2	4.2	5.2	4.1	4.3	4.2	5.2
Annual days with precipitation >2 inches	0.2	0.3	0.4	0.3	0.3	0.3	0.4
Annual days with precipitation >3 inches	0.0	0.0	0.1	0.0	0.0	0.0	0.1
Annual days > 99th percentile precipitation	4.8	6.4	7.9	5.5	6.1	6.4	7.9
Days with max temp <32	33.8	18.5	10.9	21.4	19.2	18.5	10.9

2.2.2 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. Dams can also be created for recreational purposes. They can be composed of earth, rock, concrete, masonry, timber, or a combination of materials. Dams are classified according to an assessment of hazard potential, specifically low, significant or high hazard. Low hazard dams that fail would likely cause no loss of life, few economic or environmental losses, and damage would likely be confined to the owner's property. Significant hazard dams may cause economic or environmental damage, disruption of lifeline facilities, or impact other entities. High-hazard dams, upon failure, are expected to cause a loss of human life, in addition to economic and environmental damage, and disruption to lifeline services.

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, and many are classified as low-hazard dams. A large number of dams are classified as significant hazard, and some are considered high-hazard. Failure of a large, high hazard 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

Should the amount of rain that falls, or ice melt after significant winters, increase, dams could be at increased risk of failure. Holding back an increased amount of water, especially when upstream melting or drainage is taking place, puts more stress on the structure and increases the chances of failure. Over-topping of the structure could occur under conditions of long-lasting heavy precipitation with saturated soils and waterways already full of draining water. Repeated additional stress through ongoing waves of heavy rainfall places extra wear and tear on structures, and could potentially decrease the lifespan of a structure, or require additional

maintenance and repairs. Earthen dams could deteriorate faster due to the erosive nature of gravitational drainage. The engineering requirements for dams that hold water back within a waterway could increase as stress on those structures increases. This hazard could be impacted by upstream communities; however, the watershed is made up of mostly farmland. This effect is not anticipated by Champaign County officials to be remarkable.

Extreme drought could negatively impact a wastewater lagoon through excessive evaporation and causing natural imbalances and chemical changes. More evaporation would be reasonable to expect, further depleting the water content. Algal bloom is more robust in hot weather, and the presence of phosphates and other contaminants could cause treatment problems.

The National Inventory of Dams (NID) identifies the dams across the United States. The NID Data Dictionary (2021) defines critical verbiage associated with that resource. Each dam has an identification number and name. The owner, dam condition, and filing of an Emergency Action Plan (EAP) is described. Other information utilized include the dam classification (high-hazard, significant hazard, etc.) and the inspection date and condition of the dam. The dam is described in the context of size and capacity, and the river or stream that feeds the structure is identified. The nearest municipality is identified. While significant detail about the dam is included on this site, for the purpose of this mitigation plan, the basic information is used.

Dams are classified by the potential magnitude of a breach. "High Hazard" indicates that failure of that particular structure would probably cause the loss of human life. Economic, environmental, and lifeline losses are probable as well, although the loss of human life probability is the only required indicator for high-hazard classification. "Significant" indicates that the loss of life is not anticipated, but there would be economic, environmental, and lifeline losses should a breach occur. "Low" hazard indicates the losses would likely be limited to those of the dam owner.

The National Levee Database identifies the same information for levees in all states. There are no levees identified in Champaign County.

According to National Inventory of Dams, there are nine dams in Champaign County. The Stroman Lake Dam is the only structure considered a high-hazard dam, and is located in Concord Township. Stroman Lake is a recreational body of water used for boating and skiing, and is privately owned. Significant hazard dams include East Fork Buck Creek Structures IV-A, I-B, III-A, II-B, all owned by East Fork Buck Creek Conservation District and intended for flood risk reduction. All four are located in Union Township south of the Village of Mutual. Kiser Lake Dam is owned by the Ohio Department of Natural Resources, Division of Parks and Watercraft for recreational use. It is located in Johnson Township. Runkle Farm Pond Dam and Shore Lake Dam are also significant hazard dams, and are owed privately for recreational purposes. Williams Lake Dam is a low hazard dam owned privately for recreational purposes. These three are located in Johnson Township.

Stroman Lake Dam

Strohman Lake Dam is classified as a high-hazard structure, and has a height of 37.6 feet and a length of 630 feet. It was constructed in 1958 and stores 448 acre-feet of water over 29.7 acres. In 2003, BBC&M Engineering designed and managed repairs to the dam, then owned by current owners Jacob and Terrie Conley. It lies on a tributary to Nettle Creek, and is illustrated on Map 2-XX in the southwest corner of Concord Township by the green dot. The drainage area and downstream area is farmland and some homes. The dam was last inspected by ODNR on November 20, 2019 and was deemed to be in satisfactory condition. There is an Emergency Action Plan on record that includes identification of inundation zones and notification procedures for nearby vulnerable structures. The EAP has been shared with the Champaign County EMA, and joint procedures for notification and activation of assistance have been developed. The owner attended mitigation meetings, and communicates regularly with the Champaign County EMA Director. He maintains engineering and technical assistance to keep the dam in satisfactory condition and to quickly repair any deficiencies found in inspection or by incident. The dam is inspected regularly by professional engineering services.

Inundation of nearby properties and protection of lives is a significant focus of the EAP for Stroman Lake Dam. The incremental risk is primarily downstream vulnerability to overtopping, malfunction or mis-operation. It is not anticipated that loss of the dam pool would impact the upstream waterway. For precipitation to cause overtopping, there would have to be over six inches of rain in a very short time-frame because Stroman Lake is large enough to hold significant rainfall, and Nettle Creek is of adequate channel capacity to hold water upstream. The worst-case scenario would be heavy rain and mechanical failure of the dam, resulting in catastrophic inundation of nine homes, several roadways, and numerous outbuildings. There is no identified residual risk at this time, nor is there any unacceptable risk to the public as the dam exists today.

Details for this inundation incident projections include the following: Zimmerman Road is anticipated to be inundated within fifteen minutes of dam failure, and one home on Zimmerman Road would also be inundated in that time frame. Two other structures, one an outbuilding on Zimmerman Road and the other a home on Lonesome Road, would experience inundation within half an hour. Two homes on Smith Road and Neal Road could experience inundation within 45 minutes; US 36, a home on Zimmerman Road and one on US 36 could be inundated within an hour. Homes on US36, Runkle Road, Nettle Creek Road, OH-560, Old Troy Pike, and Bair Road could experience inundation within 75 – 215 minutes from the time of breach. Based upon local demographics, it would be reasonable to assume the nine homes in proximity to the dam might have up to 36 occupants, and the average home value would be higher than the average home in Champaign County. It would be reasonable to assume all the homes are fully insured and have adequate technology to receive warnings and evacuation notices. There are no known special circumstances that would negatively impact evacuation.

Cascading events are unpredictable and highly improbable, but the dam owner has considered unusual events in planning. Earthquake would be the primary catastrophic event, but would have to be of such magnitude that it would damage the dam structure itself. Heavy rainfall, again catastrophic in magnitude, could overwhelm the dam's capacity. While possible, these

are extremely unlikely and of insufficient probability to pre-mitigate the effects. There is no regional or statewide indication that either threat is likely.

The dam owner has worked with the Ohio Department of Natural Resources Dam Safety Program staff since he purchased the dam in the late 1900's. The lake was purchased for the purpose of recreation and water skiing. The owner engaged an engineering firm to assess and repair the dam in 2003. The 2019 inspection of the dam listed its condition as "satisfactory".

Before the mitigation plan was completed in 2019, Stroman Lake Dam had been classified as a Class I dam due to the number of houses and the population within the inundation zone. In 2013, the classification was reduced to a Class III dam because houses had been removed from the area, and mobile homes and recreational homes were removed as well. However, where those homes were removed, new homes were built, and in 2020 the classification was again changed to a Class I High-Hazard dam. Today, the homes in the area are relatively large, modern homes with highly developed grounds around the homes. They are single-family residences that are occupied year-round.

The Emergency Action Plan calls for notification of the EMA at any sign of a problem, and the EMA will respond with communication and evacuation assistance. "Problems" include mechanical issues, structural failure, and rainfall that would overtop and/or cause structural damage to the dam and spillway, and any other threat that might endanger the integrity of the structure.

Reduction in vulnerability is addressed by both the dam owner and Champaign County. The dam owner has put in place a notification system that begins when a problem is anticipated or noticed, instead of at the point of failure. The owner works regularly with the Champaign County EMA Director to establish, review and revise notification procedures and familiarity with the EAP. The EMA Director maintains familiarity with the plan and ensures that notifications can be issued quickly and effectively should an issue arise. The EMA Director notifies the dam owner of any incidents or anticipated events in the county that may negatively impact the dam. The owner works with professional engineering consultants to privately inspect and repair the dam, and then works with ODNR personnel to officially inspect the dam and suggest or require any modifications or repairs.

For the purpose of this plan, the owner, ODNR's Dam Safety Program supervisor, and local emergency management officials were engaged in discussion. This risk is included in "Champaign County" sections of the plan because the dam is not located within, nor do inundation zones reach any incorporated area.

ODNR Dam Listing

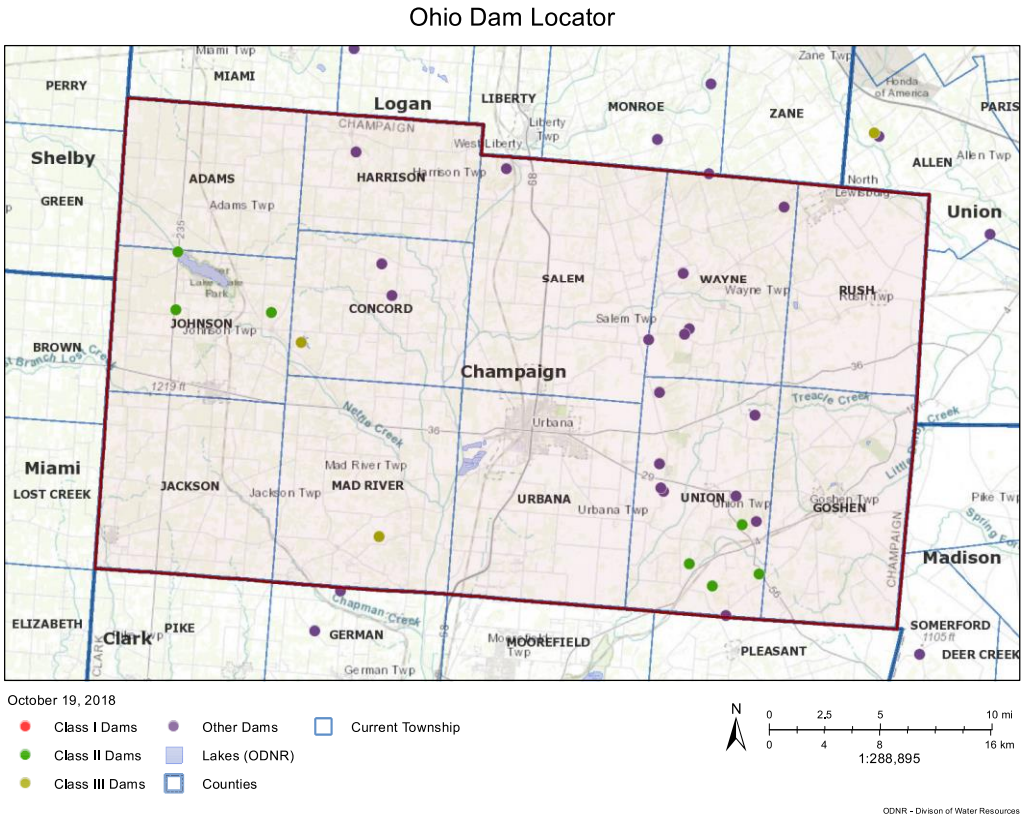
According to ODNR Division of Water Resources, there are 27 dams in Champaign County. This duplicates some of the NID listing. Class IV and Other-classified dams do not appear on the National Inventory of Dams; that resource generally includes dams categorized as Class I through Class III only.

Table 2-23: ODNR-Listed CHAMPAIGN County Dams

Name	Class	Owner	Location
Unknown Dam 0136-001	Other	Unknown	Harrison Township
Wilson Pond Dam	IV	Otto Wilson	Concord Township
Meadow Lake Dam	IV	Denton Calland	Concord Township
Cole Pond Dam	IV	Rick Cole	Salem Township
Bitzos-Bancroft Lake Dam	IV	Frank Bitzos & Robert Bancroft	Salem/Wayne Townships
Unknown Dam 0135-001	IV	Unknown	Salem Township on Logan County Line
Bahan Pond Dam	Other	Nelson Bahan	Wayne Township
Unknown Dam	Other	Unknown	Wayne Township
White's Pond Dam	Other	Noel White	Wayne Township
Schaffer's Pond Dam	Other	Lorin Schaffer or R.E. Walter	Wayne Township
Dowd's Pond Dam	IV	D.D. Dowds	Union Township
Denkewalter's Lake Dam	Other	Dr. Fred Denkewalter	Union Township
Eckert's Pond No. 1 Dam	Other	Larry Eckert	Union Township
Eckert's Pond No. 2 Dam	Other	Larry Eckert	Union Township
Whittaker Pond Dam	Other	Mary Whittaker	Union Township
Muirhead Pond Dam	Other	Stan Muirhead	Union Township
East Fork Buck Creek Structure II-A	IV	East Fork Buck Creek Conservation District	Union Township
Grimes Pond Dam	Other	Burelson Grimes	Union Township on Clark-Champaign County Line
Williams Lake Dam	III	Robert Neff	Mad River Township
East Fork Buck Creek Structure IV-A	II	East Fork Buck Creek Conservation District	Union Township
East Fork Buck Creek Structure I-B	II	East Fork Buck Creek Conservation District	Union Township
East Fork Buck Creek Structure II-B	II	East Fork Buck Creek Conservation District	Union Township
East Fork Buck Creek Structure III-A	II	East Fork Buck Creek Conservation District	Union Township
Shore Lake Dam	II	Estate of Estel Ray Shore	Johnson Township
Runkle Farm Pond Dam	II	Mark Runkle	Johnson Township
Kiser Lake Dam	II	ODNR, Division of Parks & Watercraft	Johnson Township
Stroman Lake Dam	I	Jacob and Terrie Conley	Concord Township

The following map shows the location of all dams of all classifications in Champaign County, according to ODNR.

Map 2-3: Champaign County Dams (ONDR Map)



Local Dam Failure History

According to records from Association of State Dam Safety Officials website, there are no written reports of dam incidents, breaches, or failures in Champaign County. There is a less than 1% probability of a dam incident.

2.2.3 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 droughts:

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
Socio-economic	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 rises. Between injuries, fatalities, and crop/property damage, these disasters can significantly impact the economy of a region.

Heat waves can occur in Champaign County and but the incidence is rare and the duration typically short. Extreme temperatures are considered anything above 90 degrees Fahrenheit. In the humid climate of western Ohio, these temperatures are often accompanied by high humidity. Temperatures rarely exceed the mid-90s, although the region does occasionally experience higher temperatures. 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
Average High	34°	38°	49°	60°	71°	78°	81°	80°	75°	63°	50°	40°
Average Low	21°	23°	33°	42°	53°	61°	65°	63°	57°	46°	35°	28°
Average Precipitation	3.1”	3.5”	4.3”	5.1”	5.0”	5.0”	4.2”	3.5”	3.4”	3.7”	3.4”	3.9”

Drought is not common in Champaign 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. According to the US Drought Monitor historical information, Champaign County has experienced abnormally dry conditions at some time during the year in fourteen of the past twenty-five years, and moderate drought conditions in nine of twenty-five years. There were no more severe drought incidents recorded since 2000.

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

The long-term effects of drought and heat wave according to climate change "high" level projections could increase the average minimum temperature by as much as 3.5 (F) and the average maximum temperature by 2.6 (F). While those temperatures are not within what is considered "extreme" levels, one must keep in mind these are averages created by mathematical manipulation, and therefore, there will be days that reach far above those temperatures and days that fall far below. With average highs in the low 80's in July and August, this will likely bump those temperatures to the high 80's, and will perhaps increase the number of 90 (F) plus days as well. Evaporation will increase as temperatures rise, worsening drought when rainfall becomes minimal. Those days place stress on electrical systems to fuel environmental systems, and stress the water supply to feed vegetation and crops, as well as providing additional potable water for people and animals. To the contrary, the growing season is anticipated to increase by up to fifteen days, enabling higher production and opening the door to crops that used to need more time to grow than Ohio weather permitted. The stress on the electrical grid as demands grow could be significant, causing outages and interruptions in service. Should high degree days occur simultaneously while a period of no precipitation accompanies it, there would be stress on crops, reducing yields, and livestock that could potentially cause loss of animals. Pestilence may increase as might infestations of nuisance weeds because insects and weeds tend to thrive in hot, humid weather. Hot and humid weather is difficult for people with medical issues, especially respiratory or cardiac issues; therefore, this potential increase may negatively affect the elderly and medically-dependent part of the community, as well as others with economic disadvantages. ClimRR did not list a high projection fire index, but the low projection index decreases from 9.6 to 8.5 in their data. Participants did discuss field and ditch bank fires, and felt that hotter, drier weather would slightly increase those risks. When wheat and other grains and forages are growing, or are cut and drying before baling, the risk of field fires increases in hot, dry weather. Sparks from trains are more likely to cause a field fire under those conditions.

Changes in the last five years relevant to drought and extreme heat are subtle. Vulnerability to drought and extreme heat changes affect an aging population as stated in the demographics section of the Hazard Identification and Risk Analysis, with much of the population living in rural areas being elderly. While in general the population in the small villages is decreasing, all of the villages have experienced increases in the average age of the population, which makes a higher

percentage of the population susceptible to heat injury when temperatures rise, especially if combined with a power outage.

The increasing likelihood of drought through a changing environment could potentially affect the water supply, endangering the elderly (and others) when considering potable water sufficiency; however, the major water source is the Maumee River that is robust, deep and wide and carries large amounts of water. Those who live in service areas for distributed water have less risk than those who obtain their water from private wells. This might be off-set by the fact that as people in the small villages pass away or move into long-term facilities, the number of people at risk decreases. Younger people are not moving into the villages in any significant number, so there has not been and is not expected to be an increase in population in the villages in CHAMPAIGN County.

Local Drought/Extreme Heat History

While droughts are rare, Champaign County has been affected 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 did affect CHAMPAIGN County, but not to the extent that it did other areas.

In June, July and August of 1999, little rain fell from May through June. Water restrictions were enacted in several communities, but crops were not adequately hydrated in the early stages of the growing season. Dry soils persisted through July and August when much of the needed rainfall missed fields in champaign County. Crop yields were believed to suffer a 30% reduction, but there was no determination of actual dollar amounts of loss.

The most recent drought to affect Champaign 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, Champaign 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, Champaign 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 identifies Champaign County's drought history according to records maintained by NCDC. Although NCDC does not identify any droughts that have caused property or major crop loss, the two widespread drought incidents noted above have directly impacted the county, as evidenced by anecdotal discussion with local stakeholders. The NOAA Storm Events database said that dry conditions in 1999 extended from spring into summer, and when combined with excessive heat, contributed to substantial crop loss. Scattered rain did not alleviate drought conditions. In 2019, a combination of high temperatures and high humidity created heat index values in the 105-degree range. No Losses were recorded for either this or the drought incident in 1999.

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

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

2.2.4 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 the following 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 significant 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."

The Ohio Seismic Network lists 26 earthquakes in Ohio between January 1, 2024 and March 10, 2024. None of these occurred in Champaign County. The strongest one was a magnitude of 2.2 in Lake County. Most of these were in the far northeast part of Ohio. There are two earthquakes on record in Champaign County; one was a 4.7 magnitude event on June 18, 1875 just west of Kiser Lake on the Adams – Johnson Township line. The other was a 3.5 magnitude quake on the Urbana – Union Township line on June 19, 1843.

Ohio has experienced more than 800 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. The far northeast corner of Ohio has the most earthquakes, with Lake County showing 163 earthquakes of record in the Ohio Earthquake Database. In the past five years, there have been three earthquakes greater than 4.0 in Lake County. One occurred in 2023, one in 2022, and one in 2019.
Near Champaign County, Shelby County has the strongest history of earthquake with 39 on record, as long ago as 1876 and as recent as 2020. Logan County has had four earthquakes

(1931-1994), and Clark County has had one (1980); Miami, Madison and Union Counties have no earthquakes on record.

There is one seismographic station at Kiser Lake in Champaign County.

Local Earthquake History
Records from the Ohio Department of Natural Resources indicate that Champaign County has experienced two earthquakes with epicenters in the county. These earthquakes were moderate in magnitude, ranging between 3.5 and 4.7 on the Richter scale. Both occurred in the late 1800s. There is no documented evidence of structural damage in the county. Shelby County to the northwest and Logan County to the north have both experienced several minor earthquakes, ranging in time from the late 1800s to the mid-1900s. Like the Champaign County incidents, these occurrences have been low in magnitude and caused no structural damage. Union, Madison, Clark and Miami Counties, the other adjacent counties, have no earthquake history.

Table 2-26: Champaign County Earthquake History

Date	Location	Magnitude	Modified Mercalli
6/18/1875	Adams Township	4.7	VII
6/19/1843	Urbana Township	3.5	IV

2.2.5 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. Water that lays on the surface and is not absorbed into the soils is considered surface flooding; this can occur on concrete or other impervious surfaces, roads and streets, parking lots, or other large areas. Water that ponds and takes an extended period of time to drain even though it is laying on top of soil is considered areal flooding.

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 breeches, 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 mild to moderate risk for Champaign County. The county's flood risk is largely attributed to the flat terrain that makes drainage difficult.

Water drains into two main watersheds in the county. Each watershed is made up of multiple sub-watersheds associated with key ditches and streams. The Scioto River watershed covers the eastern side of the county that flows south and eventually into the Ohio River. This watershed includes the Spain Creek-Big Darby Creek, Proctor Run- Treacle Creek, Headwaters of Treacle Creek, Headwaters of Little Darby Creek, Barron Creek-Little Darby Creek, and Spring Fork drainage areas.

The Mad River watershed area includes the Turkeyfoot Creek-Great Miami River, Indian Creek, Mosquito Creek, Leatherwood Creek, East Brach Lost Creek, Little Lost Creek-Lost Creek, West Fork Honey Creek, East Fork Honey Creek, Donnels Creek, Storms Creek, Chapman Creek, Nettle Creek, Anderson Creek, Muddy Creek, Lee Creek, Glady Creek-Mad River, Kings Creek, Dugan Run, Headwaters Buck Creek, Moore Run, Bogles Run – Mad River, Clarence J Bown Lake – Buck Creek, and East Fork Buck Creek sub-watersheds.

Champaign County sits at the highest point, near the beginning, of each of the two watersheds. These drainage areas in Champaign County have the capacity to move relatively large amounts of runoff and drain the areas quickly, making flooding a less serious problem. These creeks,

ditches and streams allow water to move quickly and effectively to lower lands. Much of the riverine flooding along the way is confined mostly to agricultural land or riverbanks that are known to flood, or to areas that are situated along the waterways and lying in the flood risk areas.

Flash flooding is as much of a risk as riverine flooding because rapid or heavy rainfall amounts have difficulty in draining as fast as precipitation falls. During heavy rainfall events, the flat terrain or poorly absorbing soils prevent water from draining quickly, increasing the potential for flash floods. Some areas can have flooded streets and roads, houses might have water in basements or yards, and businesses are surrounded by water-filled parking areas and spaces. Parks and other recreational areas can 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 within a given time period, 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.

Local Flood History

Data from NCDC indicates that CHAMPAIGN County has been impacted by 44 flood events since 1950. Of these incidents, thirty-two were considered flood events and twelve were categorized as flash floods. Collectively, these events have caused $163,000 in property damage. Because of the number of rivers, creeks, and streams, flooding is a countywide hazard and can affect nearly all jurisdictions. The entire county is vulnerable to flash flooding. Woodstock, Mutual and St. Paris do not have designated flood risk areas within their jurisdictions. While Urbana has some flood zones along ditches, the majority of the flood zone in the county lies along Mad River, and travels through Mad River, Concord, Salem and Harrison Townships. The most significant flood plain is west of SR 68 as it flows between West Liberty in Logan County and Tremont City in Clark County.

Only one incident has occurred within the past five years. Most incidents have caused less than $5,000 in damages. One of the more damaging and costly floods occurred on June 1, 1997 when a system of thunderstorms moved across southern and central Ohio. These storms brought heavy precipitation onto ground that was already saturated, causing streams and creeks to overflow. The eastern part of Champaign County was the hardest hit. An apartment complex was evacuated in North Lewisburg and several roads were washed out. Flooded roadways were a problem across the county. In total, Champaign County received nearly 5 inches of rain in less than 24 hours and suffered $75,000 in property loss. On January 4-5, 2005, a stationary front stalled across central Ohio and dropped heavy rain across the region for nearly 24 hours. Because the ground was already saturated from recent snowmelt, the additional four inches of rain caused widespread flooding. The event caused more than $600,000 in damage across central Ohio. In Champaign County, property damage was limited to $20,000 but many roads were flooded.

Table 2-27: CHAMPAIGN County Flood/Flash Flood History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Flood	32	$54K	0	0	0	$1.69K
Flash Flood	12	$109K	0	1	0	$9.08K

Flooding is considered a moderate risk in Champaign County. This risk includes riverine flooding, surface/areal flooding, and flash flooding. The county's combination of flat and rolling terrain and the number of rivers, streams, creeks, and ditches contribute to the local flood risk. Flooding is a countywide hazard and can affect nearly all jurisdictions. Champaign County experiences a combination of types of flooding.

The soil types in Champaign County are mostly poorly drained soils that retain water for a period of time, and that are prone to surface drainage in the absence of engineered tiling systems. With heavy or hard rain, the soils can become hardened and water runs across the surface into swales and ditches. In the flatter areas, some swales and French drains have been installed to guide and direct wastewater to the creeks and ditches. Some roadways have ditches alongside the pavement to contain runoff from the roads. Some production land areas are tiled; these areas are the flatter and more productive soils that produce grain. The county has facilitated drainage in some areas by installing what is referred to as a "county tile" which is a drainage main that is maintained by the county engineer. Other more rolling areas that make up ditch-bottoms and waste land along waterways are grazing land for cattle and other livestock, and natural habitat due to the frequent flooding and standing water.

Flash flooding occurs in much the same way. There are many roads that are closed after heavy rain due to a low-lying bridge, or a winding turn in the road that is flooded over in one section or another. The water collects quickly in these areas as it runs across clay soils that harden and drain poorly. If ground is frozen or already saturated, this occurs very quickly. This can last for several days, impeding transportation and movement of goods and services within the county for an inconvenient length of time.

Flood damage in Champaign County could include damage and destruction of physical buildings, infrastructure, crops, and livestock. Residential structural damages could include 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, storage buildings, equipment, and machinery. Grain bins 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. This damage would result in large amounts of debris to manage, including finish, structural, and foundation materials. It is unlikely that loss of life would be attributed to

flooding. If a death were to occur, it would likely be the result of two or more combined threats, such as lightning, tornado, or driving into standing water.

Participants in the planning process stated that precipitation averages may not have changed much over the past decade, but some stakeholders felt that rain falls harder, faster, and more intensely in some of the more recent storms. This causes flash and surface flooding to increase because drainage systems are not able to carry the water away as fast as it falls. Areal flooding increases for the same reason, but is displayed by standing water in fields when streams are full and flowing. As the upper levels cool during the colder months, freezing rain and sleet can be more damaging that just rain. In other months, hail can do more damage than pelting rain, and should the hail amounts increase, damages could surge. Plants can be shredded, roofs ruined, and cars damaged, as a few examples of expanding hail potential. All stakeholders said the flooding – no matter the type – does not last for a long time.

Projections for future rainfall estimate a rise in annual precipitation by two to four inches per year. If this increased rain comes gradually, the effects might be minimal. Additional nuisance weeds and more robust plant growth may be the most observed effects. If it comes gradually, there will be time to increase stormwater management systems as they are replaced and repaired. Should this come abruptly, flooding could worsen slightly. In an area where the land is almost completely flat, drainage could be more difficult and farmers may choose to tile more fields. Having a comprehensive tiling plan in place would manage this well. There is more debris washed into waterways with heavy, rapid downfall, and since crop debris already poses a problem, this could worsen it. This could necessitate more frequent cleaning of waterways, and the need for increased bridge spans and dry dams. Cleaning culverts and storm basins could be more necessary than ever. Because this is likely to occur gradually, participants felt that engineering standards would change as conditions change, and floodplain regulations would be modified along the way.

In the past five years, there have been no significant changes in flooding in Champaign County; there have actually been very few incidents of flooding at all. The only change, based upon input from stakeholders, is that rain falls faster and harder, and makes surface flooding more profound for a short period of time. The growth in agriculture may have had an effect on agricultural runoff, and is likely the reason for an increase in the amount of crop debris making its way into ditches, streams, and catch basins. There are remaining effects of Emerald Ash Borer as dead and diseased trees continue to fall during storms, creating excess debris for jurisdictions to clean up.

There have been no changes to major roadways or streets in Champaign County over the past five years, so there is no increased flooding due to infrastructure improvements; however, ODOT has recently released information several improvement programs. Upcoming projects include pedestrian and bicycle improvement to South High Street in Urbana; Bridge rehabilitation including Super-plasticized Dense Concrete overlays, patching, deck edges, pier encasement and other improvements across all state highway bridges; North Main Street

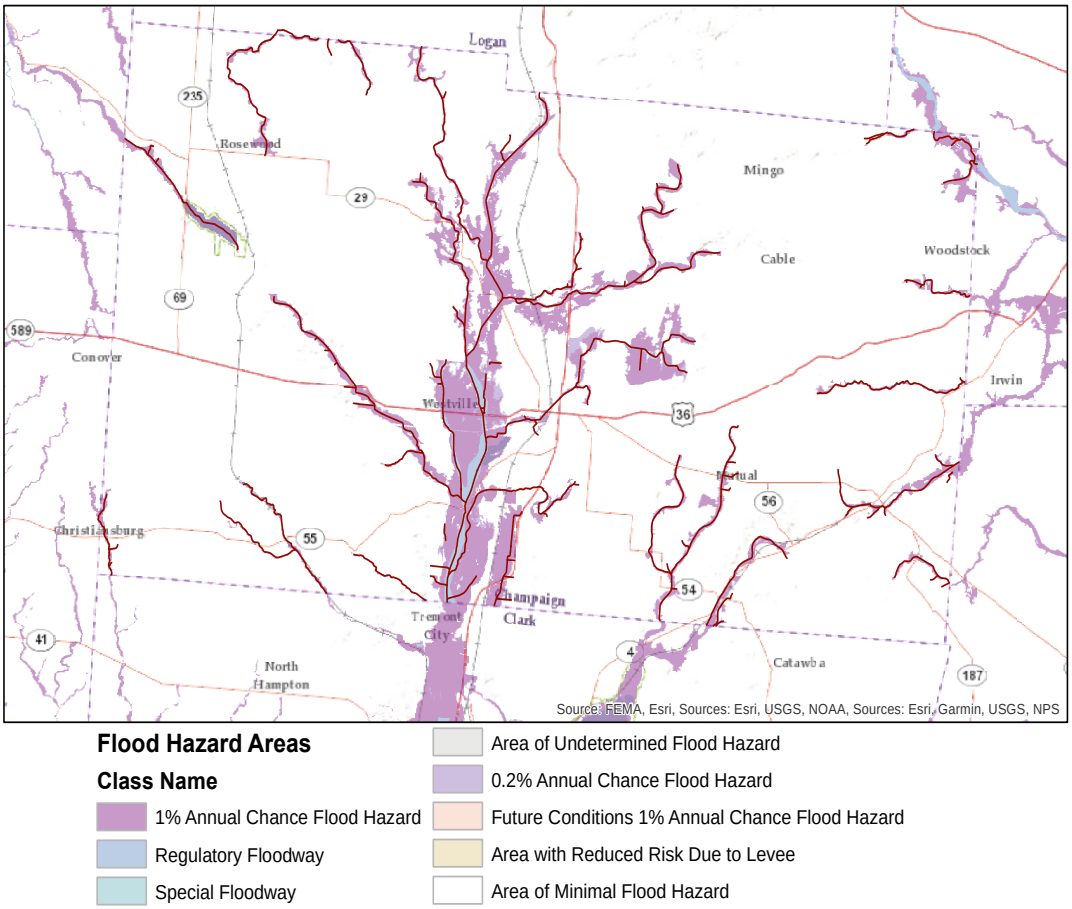
resurfacing and safety upgrades in Urbana, other bridge replacement and preservation project, Urbana Trail improvements (bike trail crossings), and culvert replacements across the county.

No major construction projects on highways or properties have occurred over the past five years; therefore, the flood risk remains very similar to the past in that regard. The scheduled construction projects do not affect flood management negatively. No new subdivisions, commercial retail centers, big box stores, or manufacturing plants have been added.

Grain farmers have installed some field tile, and plans have been shared through Soil and Water Conservation District. Tile installation is done considering watersheds, but can change the natural drainage in some cases. Because of that, tiling plans are communicated to the Soil and Water Conservation District and submitted for plan approval.

Floodplain Mapping and National Flood Insurance Program
Champaign County's floodplain maps were updated in 2009 as part of FEMA's Map Modernization Program. The current floodplain maps became effective 11/18/2009.

Map 2-4: CHAMPAIGN County Floodplain Map



Floodplain Mapping and the National Flood Insurance Program
CHAMPAIGN County's Flood Insurance Risk Maps were updated in 2009 and remain in effect. There is currently no scheduled date to update the current flood plain maps.

Champaign County Commissioners passed Special Purpose Flood Damage Prevention Regulations that serves to reduce the incidence, consequences and vulnerability to flooding applicable to all areas of special flood hazard within the county. These regulations were prepared by the CHAMPAIGN County Regional Planning Commission and first adopted in April 1987. They were amended several times and last adopted on March 23, 2006, effective April 23, 2006.This resolution adopted the present FIRM and establishment of floodplain maps. This full document is attached as Appendix E Special Purpose Flood Damage Prevention Regulations.

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

Table 2-28: National Flood Insurance Program Participation

Community	Init FHBM Identified	Init FIRM Identified	Curr EFF Map Date	Reg-Emer Date
CHAMPAIGN County	12/23/17	04/03/85	11/18/09	04/03/85
Christiansburg	01/25/74	11/02/84	11/18/09 (M)	11/02/84
Mechanicsburg	02/01/74	09/01/86	11/18/09 (M)	09/01/86
Mutual	n/d	11/18/09	(NSFHA)	05/13/83
North Lewisburg	04/05/74	12/07/84	11/18/09 (M)	12/07/84
St. Paris	06/07/74	11/18/09	(NSFHA)	05/29/79
Urbana	06/07/74	04/03/84	11/18/09	04/03/84
Woodstock	Not a member of NFIP; Not Sanctioned			

All jurisdictions that participate in NFIP have floodplain within their jurisdiction in Champaign County have a floodplain manager. The Champaign County Engineer is available to assist other jurisdictions with floodplain regulations, updates, assessments of effectiveness and regulation changes and improvements. Below is a list of those individuals, by jurisdiction.

Table 2-29: CHAMPAIGN County Floodplain Managers

Jurisdiction	Name/Position	Address	Post Office
CHAMPAIGN County	Stephen McCall County Engineer	PO Box 38187	Urbana OH 43078
Christiansburg	Theresa Rae Lewis, Fiscal Officer	PO Box 115	Christiansburg, OH 45389
Mechanicsburg	Gregory Kimball, Mayor	28 N. Main St.	Mechanicsburg, OH 43044
Mutual	William Brown, Mayor	6097 State Route 161	Mechanicsburg, OH 43044
North Lewisburg	Robert Yoder, Village Administrator	PO Box 343	North Lewisburg, OH 43060
St. Paris	Spencer Mitchell, Administrator	135 W. Main Street	St. Paris, OH 43972
Urbana	Preston Carter	205 S. Main St.	Urbana, OH 43078
Woodstock	No Designated Floodplain Manager		

Communities that are participating in the National Flood Insurance Program (NFIP) are required to adopt and enforce regulations and codes that apply to new development in Special Flood Hazard Areas (SFHAs). These local floodplain management regulations must contain, at a minimum, NFIP requirements and standards that apply not only to new structures, but also to existing structures which are Substantially Improved (SI), or Substantially Damaged (SD) from any cause, whether natural or human-induced hazards.

According to 44 CFR 59.1, Substantial improvement means any reconstruction, rehabilitation, addition or other improvement to a structure, the total cost of which equals or exceeds 50 percent of the market value of the structure before the start of construction of the improvement. Likewise, substantial damage means damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. SI/SD requirements are also triggered when any combination of costs to repair and improvements to a structure in an SFHA equals or exceeds 50 percent of the structure's market value (excluding land value).

$$\frac{(Cost\ to\ Repair) + (Cost\ of\ Improvements)}{Market\ Value\ of\ Structure} \geq 50\ Percent$$

Enforcing the SI/SD requirements is a very important part of a community's floodplain management responsibilities. The purpose of the SI/SD requirements is to protect the property owner's investment and safety, and, over time, to reduce the total number of buildings that are exposed to flood damage, thus reducing the burden on taxpayers through the payment of disaster assistance. SD/SI requirements are enforced by the local floodplain administrator and monitored by the Ohio Department of Natural Resources (ODNR) Floodplain Management Program during Community Assistance Visits. If a local floodplain administrator is overwhelmed by the number of SD/SI inspections after a large event, ODNR has developed a network of building code officials that are trained in conducting SD/SI field determinations. Help with SD/SI inspections can be requested through the county emergency management agency director.

For more information regarding Substantial Improvement and Substantial Damage, county officials can refer to FEMA's Substantial Improvement/ Substantial Damage Desk Reference, P-758 or contact the ODNR Floodplain Management Program.

The current flood map is illustrated on Page 40 of this document as Map 2-5 CHAMPAIGN County Floodplain.

Repetitive and Severe Repetitive Loss Structures

One property has been identified as repetitive loss or severe repetitive loss property inside the City of Urbana. It is a severe loss property that is a business/non-residential property. There are no other identified repetitive or severe repetitive loss properties across the county. For this property, there have been four separate loss incidents.

Table 2-30: Repetitive & Severe Repetitive Loss Properties

CHAMPAIGN County Rep Loss and Severe Rep Loss Structures					
Jurisdiction	**Total RL/SRL Structures**	**RL Structures**	**SRL Structures**	**Total Losses**	**Total Paid**
Urbana, City of	1	**0**	**1**	**4**	**$71,665**
• Business/Non-Residential	1	0	1	4	$71,665
Countywide Total	1	0	1	4	$71,665

Additional repetitive loss and/or severe repetitive loss structures may exist in Champaign County and not have been available or known at the time this was researched.

2.2.7 Hazardous Materials Incidents

A hazardous materials spill or release occurs when a hazardous substance breaches its container. Releases can occur within facilities that store and use hazardous materials and during the transport of these substances. Hazardous materials are stored in numerous types of containers, including drums, cans, jars, pipes, and other vessels. Some releases are incidental and can be safely cleaned up by on-site facility personnel. An incidental release does not threaten the health or safety hazard to the immediate area or greater community because of the small quantity that is released. A release that requires action by first responders or agencies outside of the spiller's facility is considered an emergency response.

Every hazardous material is unique and can be toxic, flammable, explosive, or corrosive, as well as any combination of those threats. When a hazardous substance is released into the environment, it can negatively impact the safety and health of the community by contaminating the air, water, and/or ground. To protect the community, evacuation from the facility or area surrounding the spill may be necessary.

Dangerous chemicals can be hauled in a variety of ways, involving different types of containers and haulers. State and federal regulations provide guidance and regulation in the transportation of chemicals in a quantity sufficient to pose a hazard. These regulations are enforced by law enforcement and transportation officials. The majority of chemicals are transported by highway and rail, but on occasion there are chemicals flown on cargo planes. Counties generally do periodic commodity studies to determine was is hauled through and inside their county; refer to the Champaign County LEPC for specific details.

Accidents on highways and roadways can cause the vehicles carrying substances to overturn, collide with other vehicles, or to ignite and burn. The runoff as a liquid spreads, the vapors as a chemical dissipates, or the flash point and burning of a substance can expose those nearby to extreme danger from both traumatic injury and chemical absorption. These vehicle accidents compound the vulnerabilities of people and the environment to include both traumatic injury due to the crash or kinetics of the incident, and the negative effects of absorbing the chemical that is thrown into the atmosphere, waterways or soils.

Rail incidents are a growing concern as major derailments have occurred elsewhere in Ohio and other states. The hauling of highly flammable and toxic materials on the railroads is increasing. The trains that move through the county are up to three miles long, and are staffed with minimal personnel. Crossings can be blocked for long periods, and there is no responsiveness to local lack of access by the railroads. Communities cannot open crossings for emergency needs, let alone other necessary traffic access. While there are not large numbers of trains compared to other counties closer to terminals in Ohio, there are approximately 135 railroad crossings in the county. Approximately 67 are in Urbana; 14 in St. Paris; 17 in Mechanicsburg; 5 in Woodstock; and the remaining 32 in the unincorporated areas of the county. Sixty-five crossings are marked by cross-bucks and 29 have gates. Seventeen are near an intersection. According to PUCO, there has been one fatal rail incident in the past eight years, and that was in 2017. Champaign County does not have other identified rail incidents.

Industrial and residential exposure to hazardous substances can also involve both trauma and exposure. Most incidents involve the breech of a container or the undesirable combination of chemicals that results in a lethal substance. These spills and leaks can occur in businesses, homes, and industries or anywhere else that hazardous substances exist.

No infallible reporting system for hazardous materials incidents exists. Many times, incidents of non-lethal exposure are not recognized as an emergency. For example, old thermometers are dropped and mercury is spilled, swept up, and thrown in garbage unless individuals know of the risks. They do not always know, and thus those kinds of incidents go totally unreported.

Industrial reporting is gauged by regulation. Spills involving reportable quantities are documented according to regulation. Smaller less significant spills often go undocumented unless someone is hurt and requires medical attention. Large industrial spills and leaks are investigated by local hazardous materials teams, regulators, and government responders.

Table 2-31: Hazardous Material Classifications

Class	Description
1	Explosives
2	Gases
3	Flammable liquids and combustible liquid
4	Flammable solid, spontaneously combustible, and dangerous when wet
5	Oxidizer and organic peroxide
6	Poison (toxic) and poison inhalation hazard
7	Radioactive
8	Corrosive
9	Miscellaneous

Champaign County has some risk for hazardous materials incidents. The county is home to some manufacturing and industrial sites that manufacture or utilize hazardous substances. These substances are transported across the county on many state, and local roadways and rail lines. The majority of these transportation routes pass through municipalities and populated

areas in Champaign County, increase the population's risk for exposure. The areas inside villages and the city where multiple state routes intersect, or where railroad tracks cross streets are vulnerable areas. As units hauling hazardous substances navigate their way through the municipalities the opportunity to make a wrong turn, not see a small vehicle, or catch a low-lying wire or pole is present.

All state highways in Champaign County are two-lane roads. In some areas, farm implements and other heavy equipment use the highways but travel at slow speeds. Passing on two-lane highways in slightly rolling terrain leads to crashes, and this is probably the highest risk of a hazardous materials spill locally.

Champaign County is also vulnerable to farm chemical accidents, including anhydrous ammonia, fertilizers, pesticides, and other chemicals used on farms like petroleum products, heating gases, and lubricants and cleaning compounds. Additional risk includes the type vehicle used in transportation, including but not limited to farm equipment, small trucks, pickup trucks, and wagons.

Local Hazardous Materials Incident History

According to records maintained by the Champaign County Local Emergency Planning Committee, they have historically experienced mostly minor hazardous materials spills. These incidents involved vehicle accidents on the many roads or highways in the county, equipment failure in operation or during distribution of a chemical (such as agricultural application of chemicals), industrial spills during manufacturing, failure of containers to effectively hold the substance, or accidental mishandling of a hazardous substance.

Local Hazardous Materials History

According to the Pipeline and Hazardous Materials Safety Administration (PHMSA), Champaign County has experienced 8 hazardous materials spills or releases on highways or rail between 1978 and now. These incidents all occurred at a location with an Urbana zip code, likely because of the concentration of highways in central Champaign County. All incidents except one were associated with highway transportation by a commercial carrier. The substances being hauled were mostly petroleum-based products or anhydrous ammonia. Losses were minor, with a range from zero to $1,300 per incident. There were no deaths or injuries associated with the PHMSA data.

Champaign County LEPC maintains additional records on hazardous materials spills in the county. For the most recent year, 2024, there have been four hazardous materials incidents, all of them minor involving mostly property damage associated with the spiller. Incidents includes spillage of 150 gallons of diesel fuel by a vehicle operator, a livestock manure spill incident where several thousand gallons of liquified manure was released, a natural gas release associated with a trash compressor, and a second release of petroleum-based fuels by a semi-tractor rig. There were no injuries or deaths.

Hazardous materials incidents are a countywide hazard and can affect all areas and jurisdictions. The populated jurisdictions along highways are particularly vulnerable to this

hazard because of their proximity to the major roadways on which these substances are transported. Communities where railroad tracks and crossings are present have an even more enhanced risk due to rail presence. Where railroad tracks, highways, and bodies of water are in close proximity to one another, the threat of a hazardous materials spill is enhanced. Should a derailment occur, the spillage could contaminate waterways. An incident nearby a school, hospital, or other institution could be catastrophic.

2.2.8 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 not invasive; fewer than 100 species are actually considered 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 2-32 identifies the invasive species across these categories that have the greatest impact in Ohio.

Table 2-32: Invasive Species in Ohio

Aquatic	Insects and Diseases	Plants, Weeds & Shrubs	Terrestrial Wildlife
Asian Carp	Asian Longhorned Beetle	Japanese Honeysuckle	Feral Pig
Curlyleaf Pondweed	Emerald Ash Borer	Japanese Knotweed	Unwanted/Exotic Pets
Hydrillia	Gypsy Moth	Autumn Olive	
Round Goby	Hemlock Wooly Adelgid	Buckthorns	
Ruffe	(HWA)	Purple Loosestrife	
Red Swamp Crayfish	Walnut Twig Beetle	Common Reed or	
Sea Lamprey	Spotted Lanternfly	Phragmites	
White Perch		Reed Canary Grass	
Zebra Mussel		Garlic Mustard	
		Multiflora Rose	
		Bush Honeysuckles	
		Japanese Stiltgrass	
		Kudzu	
		Japanese Barberry	
		Callery Pear	
		Oriental Bittersweet	
		Apple of Peru	

	Canada Thistle Cressleaf Groundsel Giant Hogweed Grapevines Johnsongrass Kochia Marestail Mile-a-Minute Musk Thistle Oxeye Daisy Palmer Amaranth Poison Hemlock Russian Thistle Shattercane Wild Carrot Wild Parsnip Poison Ivy

Invasive Species Risk Assessment

Champaign County has many wooded areas and large numbers of trees along with rolling and flat terrain. These wooded areas are vulnerable to damage from invasive species. The flat terrain contributes to high winds that can easily down dead or diseased trees that have been impacted by an invasive species. These fallen trees become storm debris, and fall onto homes, cars and trucks, businesses, and anything else in the way. They also fall into rivers and streams, further impeding drainage and clogging waterways with excessive debris.

While ash trees have been affected by disease in recent years, Ohio is rich with all kinds of trees that could be affected by another invasive species in the future. Forested areas and waterways could also be impacted by invasive plant and animal species. Any infestation would cause extreme damage to the county. Invasive species is a countywide hazard that can affect all areas and jurisdictions.

Damage from invasive species difficult to quantify because it does not generally affect buildings or other structures. The cost comes from the cleanup phase, including removal and disposal of diseased trees and vegetation, repair of property where fallen trees cause 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 cost can be extremely high, costing jurisdictions hundreds of thousands of dollars.

Climate change could significantly affect this hazard. Invasive species, according to various experts, may increase if temperatures become warmer and precipitation amounts increase. Insects and plants generally thrive in hot, humid, wet weather. Some plant diseases also thrive in hot weather. Dependent upon the specific species, changing climate conditions could facilitate tree disease which increases debris after storms and property damage due to falling trees. It could also decrease farm yields, increase livestock pestilence, and endanger

vegetation. Warmer waters promote unwanted results like algal bloom and invasive water species. Algal bloom in rivers is sometimes a problem, and an increase would worsen that situation and perhaps negate some of the efforts farmers and ecologists have taken over the past few years to improve water quality and protect the rivers.

There is no known effect that the past five years' development activities have had on invasive species, and no known effect that future development may have on invasive species. There was some conversation that increased housing development may force nuisance wildlife out of certain areas, but would also push them into other less-densely populated areas. This could potentially have a negative effect on rural areas, further forcing people out of the country and into the cities.

Local Invasive Species History

The most recent invasive species to impact locally is the Emerald Ash Borer (EAB). EAB is an ash-tree killing insect native to Asia that 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. Wood County and northwest Ohio were ground zero in the EAB infestation; EAB was initially identified in northwest Ohio before spreading 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; the Ohio Department of Agriculture lifted the quarantine on movement of ash wood in 2011. The infestation is no longer spreading but there are thousands of dead and diseased trees that must still be removed. The process to remove these trees will take years and be a significant expense for land owners, including government agencies and municipalities. From a disaster perspective, the massive numbers of dead trees create an increased risk for property damage from high wind events. Dead and diseased trees are weak and more susceptible to wind damage than healthy trees. Along waterways, diseased trees also increase flood risk as they fall into and block streams, impeding water flow.

Other invasive species that are currently under quarantine in parts of Ohio include the Gypsy Moth, Walnut Twig Beetle, Asian Longhorned Beetle and the Spotted Lanternfly.

Some stakeholders discussed potential pine tree disease, elephant weed, garden crest, water crest, marestail, foxtail barley, and phragmites. They reported army worms killing lawns and grass in multiple areas. The general opinion was that some insects are coming in rail cars from other parts of the United States, transplanting new species when the cars sit waiting to be unloaded, or the infested cargo is shipped to receiving parties.

All county jurisdictions have experienced significant effects from the EAB infestation. As diseased trees along rivers and streams have died, they have fallen into waterways, impacting drainage and the flow of water. Although many of these have been removed, many remain and continue to cause impediments to waterflow. 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. County and municipal street and road departments have aggressively removed diseased trees

along the public right-of-way. This has been effective at reducing the impact on utility lines and other infrastructure but has been a significant financial burden for jurisdictions. Public agencies are also not able to remove trees from private property. Individual landowners are responsible for removing dead and diseased trees from their personal property. Because this does not always occur, there are still hundreds of dead and diseased trees that will continue to cause problems across the county.

Nuisance wildlife is problematic in some areas. Coyotes are a concern because they feed on any prey they can find, endangering family pets, small livestock and children. Some streams are blocked by beaver dams. This causes debris to collect above the dams and obstruct the flow of water through the waterway. Deer have become so prevalent and so conditioned to humans that they are present in yards, parks and other recreational areas in numbers never seen before. They do significant damage to farm crops such as soybeans and corn, and they damage young evergreens and trees as they rub their antlers on the seedlings. They often destroy yards, landscaping and shrubs by running through it and tramping it down. Geese are increasing in number, and they are aggressive and dirty. Their droppings, believed to be toxic, cover sidewalks and recreational areas across the county. Wild turkeys are growing in number, and again, interfere with recreational and personal property use. Ferel cats are present in most areas, and multiply by the hundreds every few months.

As the climate changes, if temperatures rise, humidity increases and rainfall hits new highs, insects and other invasive species may become more of a problem than they are now. Insects tend to thrive in hot weather, and weeds grow in the same. These changes exacerbate invasive species problems. If the food supply for nuisance wildlife is limited, their presence in residential and recreational lands will increase. It will become harder for them to find food, and the danger to pets and other small animals will grow. Insects and animals not indigenous to Ohio may migrate into the area, adding to this problem in an area that is developing and growing considerably. This could become more serious as areas are created for recreation.

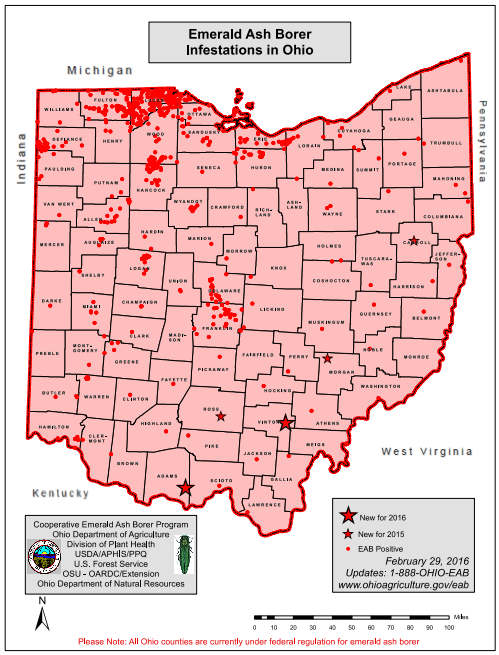
Local Invasive Species History

Invasive species are present in most counties, but become noticed when a product of value, a natural resource, or human-utilized areas are impacted. Incidents are noticed when plants or trees begin to die, crops are negatively affected, or residential areas are infested. At that point, identification of the invasive species is made and treatment programs begin to control or eradicate the pest or plant.

Residents use lawn care chemicals to control weeds and pests in lawns, landscaping and gardens. Farmers use spraying systems to eliminate weeds and pests that negatively impact crops. Homeowners use chemicals to eliminate pests. These chemicals are often controlled substances. Farmers become certified to use pesticides and herbicides, homeowners have to sign for certain chemicals or hire a licensed applicator to use them, and businesses are not allowed to use chemicals that would negatively affect customers and products for sale.

Sometimes the history of an event is marked by the compensating actions taken. For example, the management of mayflies along lake shorelines is to turn off the lights that draw the mayflies to land during their mating season, when they come onshore. At other times, the evidence of infestation is after a storm when debris has to be cleaned up. Increased debris is often the consequence of an infestation, as it was during the EAB incident in Ohio.

Map 2-5: Emerald Ash Borer Infestation Map



2.2.8 Power Outage

A power outage is a short-term or long-term loss of electric power to a particular area. Power failures can be caused by natural events, such as damage to transmission lines caused by high winds, or non-natural events. Electro-magnetic pulses caused by severe solar storms can interfere with power transmission if the energy from flares on the sun reach local earth surfaces. Non-natural contributors to power system failures can include equipment failure, transformer failure, animals, vandalism, or intentional damage. Systems failures can range from a temporary outage of less than a few hours to long-term, multi-day outages. Short-term outages are inconvenient but generally not a significant risk to the community.

Outages that last for several days, to months or more, however, can cause major disruption and harm to a community as compensatory capabilities are stretched beyond resources. Fuel sources for generators, the ability for generators to carry out all power-based critical services, and the stress of being power-deficient cause human suffering and extreme inconvenience that closes businesses and inhibits daily life activities.

While electrical system failures can occur because of a weather event or human-caused problem, breakdown of this critical utility can also occur independent of another hazard. When this happens, it is often the result of system overload or lack of improvements, updates, and maintenance to the

system's infrastructure. Residents and businesses rely on electricity to support basic daily functions. When the system fails or service is interrupted, the effects are felt immediately. Populations with special needs, including children, the elderly, and those with serious medical conditions, suffer the most during electrical system failures.

Power failures do not generally cause significant structural damage, but power-based equipment and electronics can be damaged or ruined, depending upon how the outage occurred. The greatest risk for physical damage is from broken distribution lines, poles, and substations. The most significant impact is the hardship for the people and businesses affected by the outage, including the potential economic impact. If businesses are unable to operate for several days or longer until power is restored, the negative effect would quickly ripple across the community. Individual losses are generally limited to the loss of food that must be refrigerated, and perhaps medicines stored at home that require cooling. The loss of air conditioning for people with respiratory conditions can be life-threatening, and without a long-term capability to operate medical equipment, those with serious medical needs are at risk of dying.

A long-term outage, lasting months, potentially due to major disruption or destruction of the power grid, could be devastating. The activities of daily living are dependent upon electricity for most people, and only those able to survive in the most austere conditions would come through a long-term outage successfully.

People and businesses rely on electrical systems to support essential services and basic daily functions. Without power, telecommunications, utilities, public works, and other critical systems are non-functional. If backup power generation is available, some systems may be maintained, at least on a partial basis.

Power outages are a countywide hazard and can affect all areas and jurisdictions.

Power providers are listed in Table 2-12 on page 2-12, and are again discussed in "Energy Lifeline" starting on page 2-80. Generally speaking, as stated in the lifeline section, outages are short in duration in Champaign County. An unquantified number of residents have generators, and although some public generators need repairs and replacement due to age, there is a basic capability to provide essential services through generator power. Extended outages provide the greatest vulnerability because there would be difficulty in providing long-term, widespread shelters or warming/cooling stations across the county. Most shelters identified by Red Cross are not generator-equipped. Most of the public schools have some generator capacity, but tend to be more critical-component capable than overall total facility capable.

Vulnerability to a lack of power could increase with climate change as more demand is placed upon the power grid, and outages cause more discomfort. If temperatures rise in the summer to above 90 (F), especially in a heat wave of several days or weeks, people with medical problems will require air conditioning at an increasing rate. This will be a widespread issue, placing regions at risk for power failure or the need to "brown-out" power for conservation of generation capabilities. More severe storms may place more debris on power lines, interrupting service more unless additional measure to mitigation pole damages is

implemented. Power companies may have to use damage-resistant poles, transformers and sub-stations at all locations should a significant change in storm characteristics take place. Buried power lines may be required in more places, adding cost to home and business construction.

Development could have an effect on power outages as the demand for electricity increases. With an already-burdened power grid, the overall demand for more power could be detrimental unless there are regional plans to increase the capacity of the power grid. Charging electric vehicles, powering additional layers of technology, and providing power for an increasing number of homes and businesses could overwhelm the capacity to create energy.

Local Power Failure History

CHAMPAIGN County has experienced some extended power outages but there were no indications that this is confined to a specific area of the county. While power was generally described as "highly dependable", an equipment or weather event could change that reliability. Most recounts of power outages were incidental, and stakeholders reported due to an equipment failure, temporary emergency situation, or a weather event.

One incident was discussed. In September 2008, the county was impacted by a major power outage. As the sub-tropical remnants of Hurricane Ike traveled north from the Gulf of Mexico, heavy winds affected significant portions of the Midwest. In Ohio, the sustained 75 mph winds caused an estimated 2.6 million power outages. While some outages were brief, more than 300,000 people were without power for more than a week. Businesses were shut down, leading to significant economic loss.

On June 29, 2012, the area again experienced power outages as the result of a major storm system when a derecho moved across the Midwest and Mid-Atlantic states. This massive storm system caused power outages across two-thirds of Ohio; more than one million people were without power, some as long as five days.

While more jurisdictions have generators than five years ago, there is still a significant vulnerability to power outages. Many elderly and people who are dependent upon durable medical equipment do not have the financial ability to have a generator. Many jurisdictions need to at least add to their generator pool to be able to function well during an extended outage. Many generators are old, outdated or too small. Plans to have fuel for generators must be developed because some jurisdictions don't have this done, putting them at risk for not being able to use generators as needed.

Some areas in Champaign County require the use of sump pumps to move storm water so it does not flood homes, businesses, and industrial areas. Some jurisdictions have enough of a need for significant power generation that a portable generating system is needed.

There is no official comprehensive history of power outages in Champaign County. The history is based upon the anecdotal contributions of stakeholders and the news history available digitally.

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.

Champaign County experiences numerous thunderstorm events each year. The majority are mild or moderate in severity and include a combination of 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. Lightning damages can occur countywide and have been recorded in the weather events data. There can be casualties due to lightning, especially if the storm hits suddenly and with little warning, or if the lightning is an isolated lone-standing weather event. 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, Champaign County has experienced 178 thunderstorm events with 108 days experiencing property damage. Nearly sixty of these incidents included hail but only one included lightning as reported hazards. Thunderstorm wind and heavy rain were, by far, the most prevalent hazards, and were present in a majority of the historical weather events.

During the past five years, thunderstorm wind has caused all the damages attributed to hail, lightning, heavy rain and thunderstorm wind. Thirty-two events have caused $234.6K in damages; while some events have caused low losses, none of the recorded events have caused no damages. Hail, however, caused no financial loss according to the events database. There were no lightning or heavy rain events.

It is not believed that development activities have had any effect on the countywide vulnerability to severe storms and thunderstorms, including rain, hail, lightning and wind. Minor improvements in storm drains and other infrastructure may have resolved some issues in specific locations. Otherwise, there has been no significant change for any village or the county as a whole.

Local Severe Thunderstorm History

According to NCDC records dating back to 1950, Champaign County has experienced 178 thunderstorm events with 108 days reporting property damage. Nearly sixty of these incidents included hail but only one included lightning as reported hazards. Thunderstorm wind and heavy rain were, by far, the most prevalent hazards, and were present in a majority of the historical weather events.

Table 2-33: CHAMPAIGN County Severe Thunderstorm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Severe Thunderstorm*	133	$1.143M	0	0	1	$8.59K
Hail	43	$38.00K	0	0	0	$0.88K
Lightning	1	0	0	0	3	0
Heavy Rain	16	0	$1.00K	0	0	$0.06K

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

During the past five years, thunderstorm wind has caused all the damages attributed to hail, lightning, heavy rain and thunderstorm wind. Thirty-two events have caused $234.6K in damages; while some events have caused low losses, none of the recorded events have caused no damages. Hail, however, caused no financial loss according to the events database. There were no lightning or heavy rain events.

2.2.9 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 chart was taken from FEMA's website, and indicates the type of damages per Enhanced Fujita Scale tornado classification. Tornadoes in Champaign County have historically been an EF-2 or lower.

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 Champaign 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 strongest to date was an EF-3 in 1973 that was on the ground for 19.2 miles but did on $2,500 in damages.

While tornadoes do not occur frequently in Champaign County, they can cause moderate to severe damage. Tornadoes are a countywide hazard and can affect all areas and jurisdictions.

Should weather events become stronger under the premise of climate change, tornadoes in Ohio are anticipated to come in clusters and increase in speeds, according to input from plan participants. What has typically been an EF-0 or EF-1, could easily rise by one or two categories. The formation of multiple funnels in one general front can strike multiple parts of

the county simultaneously, challenging the capacity to respond and significantly increasing the damages to property, loss of property and even loss of life. The need to begin using wind-resistant building materials would help property on the periphery of the primarily damaged area, but would not save property that is directly hit. Local tornadoes come with rain, hail, lightning, and straight-line winds, so it would be reasonable to assume all of those damages may increase as well. That would result in more damage to trees, endangering green space and destroying vegetation that would take decades to replace. In a county with little change in elevation, there would be less likelihood of inconsistent damages within neighborhoods, resulting in simply more damage over the entire county.

Stakeholders do not believe that vulnerability to tornadoes has changed in the past five years, nor has any development activity or goal changed the risk of the villages or the whole county to tornado damage.

Local Tornado History

Champaign County has experienced occasional tornadic activity. With only 7 events between 1958 and 2023, and one in 2024, tornadoes are not frequent. In 1999, the Middletown area in Wayne Township experienced structural damage to houses and mobile homes and tree damage. Mutual had manufactured home and tree damage in 2014. Trees, house siding, barns, and garage doors were damaged in the Lippincott area in 2022. In 2023, Christiansburg had mostly tree damage and debris from one tornado. The tornadoes in Champaign County have ranged from and EF-0 to an EF-3.

Table 2-34: CHAMPAIGN County Tornado History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Tornado	7	$762.5K	0	0	4	$108.93K

Ohio ranks among the top states in injuries, fatalities, and property damage from tornado events. At the time this plan is being developed, Ohio is one of the states with the most frequent, highest numbers of tornadoes in 2024. While it is believed that new and more effective detection is responsible for some increase in the number of recorded tornadoes, it is believed that there are significantly more tornadoes in 2024. There have also been more incidents with multiple tornadoes and funnel clouds in a given area that in years past.

According to the NOAA Storm Prediction Center, as of June 15, 2024, there have been 71 tornadoes in Ohio in 2024 alone. One is illustrated on the site's mapping tool as having occurred in Champaign County, east of Urbana and south of North Lewisburg in April 2024. There are no damage estimates available at this time. There are no hail or wind events recorded on this site for 2024 although nearby counties have been affected by all these threats.

2.2.11 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 an outcome of wind hazards in Ohio in the areas with essentially flat terrain like Champaign County. Because the soils provide fertile farmland, efforts have been sustained to use available acre of land for crop production. Land that was once wooded and lush with vegetation has been cleared and windbreaks have been removed to increase the amount of land available for productive; therefore, when winds cross the wide expanse of farm fields, the topsoil blows away. Much Champaign 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.

Champaign County flat topography makes it vulnerable to damage 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 Champaign County, wind-only incidents are rare. NCDC has no recorded wind-only events since 1950.

Although participants in the plan update felt that winds have increased noticeably in frequency and consistency, the climate change predictions do not support that opinion. Overall, climate change predictions to not anticipate much change in winds. Participants felt there was more damage done by straight-line winds today than in years past. They felt the average wind is stronger than in the past. Stakeholders felt that windstorms are more common now, and that wind speeds of 35 to 50 miles per hour are frequent. Those are not necessarily tracked by the weather service because they are not considered a "storm". Stakeholders said there is almost no damage from windstorms for the most part.

Nothing in the past five years related to land use, development trends, infrastructure improvements, or regulation has changed the countywide or village vulnerability to windstorm

damages. Stakeholders felt that tree=trimming was the most effective preventive action they could take.

Local Windstorm History
Although infrequent, high wind events can occur independent of other hazards. The most significant windstorm in Ohio occurred on September 14, 2008 when the remnants of Hurricane Ike moved across Ohio. Damage across Ohio exceeded $500,000,000 but there is no recorded damage history in Champaign County.

There were no strong wind events listed in the NOAA database since 2018. There were three high wind events, one in 2019, 2021 and 2022. In March 2021 winds gusted at 50-60 miles per hours, with an isolated gusts of 70 miles per hour. Most losses were limited to tree damage.

Table 2-35: CHAMPAIGN County Windstorm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Strong Winds	0	0	0	0	0	0
High Wind	12	$4.762M	0	0	0	$396.83K

2.2.12 Winter Storm
A winter storm is a weather event that includes several winter weather hazards, such as extremely cold temperatures, wind, snowfall, sleet, ice, or freezing rain. These storms can develop anytime between late fall and early spring.

An ice storm is a specific type of winter weather event. An ice storm occurs when temperatures fluctuate as precipitation falls and rainfall becomes freezing rain or sleet as temperatures drop. This can cause ice to form on trees, utility lines, roadways, and other surfaces and lead to power outages, downed trees, and hazardous road conditions.

A blizzard is the most serious type of winter storm; it is characterized by sustained winds or frequent gusts of 35 mph or greater and falling or blowing snow that reduces visibility to less than ¼ mile. Both of these conditions must be present for at least three hours for the event to be considered a blizzard.

Extremely cold temperatures can also be a winter weather hazard, with or without the presence of snowfall, ice, or other hazards. While there is no exact definition for ‘extreme cold’, these incidents are characterized by extended, multi-day periods of air temperatures or wind chills well below freezing. In CHAMPAIGN County, the coldest month, January, has an average low temperature of 20 degrees Fahrenheit. An extreme cold event would be temperatures at or below this level for an extended period of time.

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 non-blizzard winter storm event often begins with warmer air followed by very cold temperatures and heavy precipitation. Because weather systems move into Ohio from the south and west, initially warm air can cause temperatures to hover at the freezing mark, causing ¼ "to ½" 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.

An 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 Champaign 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 snow drifts 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.

Because of the livestock operations that are common in Champaign County, blizzards and winter storms 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 Champaign County, winter storms are a countywide hazard and can affect all areas and jurisdictions. The most common winter storms include a combination of multiple winter weather 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. Extremely 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.

Champaign County typically experiences multiple winter weather events every year, although stakeholders felt that the frequency and severity of winter storms is diminishing. These incidents are rarely severe enough to cause property damage.

Champaign County has experienced 117winter events since 1950, per NCDC records, that include blizzard, cold/wind chill, extreme cold or wind chill, ice storm, heavy snow, sleet, winter storm or winter weather. Collectively, these incidents have caused $546,000 in property damage. Seven of these incidents have been considered ice storms and two were classified as extreme cold events; one event was categorized as a blizzard. The reported losses were all from the 1990's with $500K in a single event in January of 1996, mostly attributed to roof collapses after thirty hours of heavy snowfall piled on top of snow-laden roofs.

Because climate change predictions call for warmer temperatures, Ohio is bracing to have less snow and ice. The diminishing severity of winter would potentially affect the growing season, extending it slightly before and after traditional times. The warmer, wetter winters may initially result in higher farm yields and new crops to northwest Ohio, but eventual increases in temperatures beyond comfort zones may negate that effect. The hibernation habits of some wildlife may lead to changes in those populations and a negative impact on nuisance damages they cause or their unwelcome presence in communities when fewer and fewer die during long, hard winters.

The past five years' vulnerability to winter storms and blizzards has not changed. Considering any development, land use changes, regulations or infrastructure changes, none have affected the likelihood or degree of damages experienced due to winter storms.

Local Winter Storm History

Only two winter weather events recorded by NCDC caused significant property damage in Champaign County. Both were winter storms, with one occurring on January 2, 1996 and the other on January 6, 1006. The first was a heavy snow with forty mile-an-hour winds, causing drifting and blowing snow. The second was a blizzard with dry and powdery snow blown around by high winds. There were some roof collapses, and travel was difficult. Artic air moved in toward the end of the storm, costing two people their lives, both in counties near Champaign County. This storm was dubbed the "Blizzard of '96" because it was widespread and severe like the one eighteen years prior.

For much of Ohio, the most significant historical winter weather event is the Blizzard of 1978. Champaign County was 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 the Dayton area, slightly over a foot 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, forcing businesses and schools to close until roads could be cleared. Throughout the region, 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 on record in Ohio, resulting in 51 deaths across the state and the call-out of 5,000 Ohio National Guardsmen to assist communities.

The Blizzard of "78 does not appear in the NOAA Storm events Database.

There were 29 winter weather events listed in the NOAA weather database since the beginning of 2018. None of these caused any recorded damages and there were no casualties. There were four recorded winter storms, twice there were extremely cold temperatures and low wind chill, and one ice storm. Twenty-two times the event was listed simply as winter weather without any quantifying description.

Table 2-36: CHAMPAIGN County Winter Storm History

Hazard	Total Incidents	Total Property Loss	Total Crop Loss	Total Deaths	Total Injuries	Average Loss/Incident
Winter Storm	25	$525K	0	0	0	$21K
Winter Weather	74	0	0	0	0	0
Blizzard	1	0	0	0	0	0
Heavy Snow	8	$1K	0	0	0	0<$1K
Extreme Cold	2	0	0	0	0	0
Ice Storm	7	0	0	0	0	0

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 including the municipalities in their conclusions, the municipalities took into account only their individual jurisdictional perspective on each hazard. Therefore, county mitigation strategies were based on 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.

Champaign County is susceptible to social losses and resiliency challenges. Identification of those who need extra help in the wake of disasters can be difficult in rural communities because of resistance to asking for help, strong desires for independence, and less obvious external signs of need. Many people simply do not want to ask for help, even if they need it badly. Those who endure residential instability or borderline homelessness, a lack of dependable transportation, or the need for extensive healthcare and treatment are often silent populations in Champaign County. With an aging population common to most rural areas in the state, and underserved and disabled populations who would need extra help, Champaign County social services and advocacy groups could be overwhelmed by a large-scale incident in spite of the fact that people across the county willingly step up and help one another. Because the county has a relatively small population compared to many other counties, some social services are delivered by area office locations in primarily a three-county area of Logan, Union and Champaign counties. This makes delivery of services, maintenance of local volunteers, and access to assistance for those without vehicles slightly harder.

Although the culture of rural populations is one of significant self-reliance and self-sufficiency, Champaign County lacks the extensive public services like mass transit, large food distribution programs, extensive behavioral health resources, and services for children and elderly in high demand situations. If a large portion of the population is negatively affected by a widespread disaster, there will be a shortage of volunteers to staff the response, and organizations like Red Cross may set up shelters and services in centralized areas instead of in individual communities. Service centers would most likely be established in Urbana, again requiring transportation for intake and services, something local residents may struggle to do under extreme circumstances.

CHAMPAIGN County is likely to experience resource gaps in any large-scale disaster, just as any other rural county would experience. As a small county with significant rural population, first responders are mostly volunteers who have limited availability and equipment. Depending upon the time of day when a disaster strikes, many of these volunteers may not be available because they are at their fulltime jobs. While many volunteer firefighters, EMTs and other responders work inside Champaign County, their daytime obligation is to their employer. They sometimes wear emergency response hats at that full-time employer's location, and therefore cannot, even with special laws supporting volunteerism in Ohio, leave their jobs to respond. Special response resources and additional crews accessed through mutual aid may not be close by when needed, or may be tied up responding to other areas. Unless an incident is limited in impact to Champaign County, they are unlikely to command a remarkable response from higher

levels of government. Champaign County could easily find itself alone in serving its own catastrophic needs.

Champaign County and the various bodies of local government are filled with community-minded active individuals who often wear multiple hats. The church volunteer may also be the township trustee who also works for the county highway department. The village fire chief or mayor may also work out of town, and when home, fill various roles as school volunteer, church leader, and be the parent of several children with a spouse who also works out of the county. This places an extreme burden on volunteer capacity, first responder capacity, and overall ability to be self-sufficient in times of need.

The vulnerabilities in CHAMPAIGN County are nearly the same today as in past years. There have been few changes in comprehensive planning, land use planning or regulation that affect the individual or collective risk analysis. The county is decreasing slightly in population, and although there are a few new businesses, those often use structures that housed a business that ceased to operate. The development trends and goals are not ones that will likely increase vulnerability. Creating affordable housing, increasing broadband access, identifying sustainable agricultural practices, improving infrastructure, and improving regulations are actions that will lessen vulnerability and improve resiliency.

All this taken into account, CHAMPAIGN County is highly resilient. Their work ethic and self-sufficiency are significant, and they are generally highly participatory in meeting their own needs. They have a strong tendency to take care of their neighbors. Their farm community is resourceful and willing to help neighbors, as are populations in the municipalities. They have the ability and desire to make the most of the resources they have, and to provide the leadership and inspiration for their own recovery.

2.3.1 Underserved Populations and Social Vulnerability Considerations

According to Data USA (https://datausa.io/profile/geo/champaign-county-oh#housing), CHAMPAIGN County median value of housing is valued at $166,900 which is 0.592 times smaller than the national average value. When housing markets were sometimes doubling in value in 2019 and 2020 elsewhere in the United States, CHAMPAIGN County homeowners saw the value of their property rise by 13.8%, taking the average value of a home from just $146,700 to the current value. The home ownership rate in CHAMPAIGN County is 76.3%, compared to a national average of 64.8%. Of the percentage who own their home, 63.3% have a mortgage on that property, making them vulnerable to inflation, rising property taxes, and loss of financial stability.

The percentage of residents living below the poverty line is 9.25%, below the national average of 12.5%. Females age 25-34 are the largest group living in poverty, followed by females between 55 and 64 years old. The most common ethnic group affected by poverty in CHAMPAIGN County is White, followed by Native American and Bi-racial people.

Approximately 4.93% of the county's residents have no health insurance; 55.2% have employer-provided coverage and the rest obtain coverage from Medicare, Medicaid, military benefits, or non-group health insurance policies.

Discussions included identification of services that assist persons with emotional, mental and addiction needs. The Mental Health, Drug and Alcohol Services Board of Logan and Champaign Counties provides funding and support to the independent providers of behavioral services in Champaign County. There are crisis counseling and service providers, therapists for behavioral, mental and emotional conditions, and addiction services. There are multiple support groups for various situations. Many services are provided within Champaign County, but others are delivered online or at locations in one of the other counties.

The Urbana Champaign County Senior Center provides services for the elderly in the county. They provide social activities that include classes, clubs, travel, and special events throughout the year. Outreach services include a food pantry to qualifying elderly, a monthly mobile food pantry, telephone services to welfare checks and information, and a certified counselor available to answer questions. They serve a lunch at the Senior Center once a week.

The Champaign County Board of Developmental Disabilities provides assistance for children and adults with disabilities. These include early intervention, autism and sensory resources, community education and outreach, and service and support assistance.

2.3.2 Demographic Risk Assessment Tools

Recently created by the federal government, various tools exist online to assist is assessment of risks and vulnerabilities in the United States. Tools that were used for information include the National Risk Index, the Justice40 Initiative Screening Tool, and a Neighborhoods at Risk developed by Headwaters Economics, among others.

National Risk Index

The National Risk Index (NRI) was released in 2021. It can be found online at https://hazards.fema.gov/nri and a report was created for Champaign County, Ohio. This geospatial tool assesses risks and vulnerability for all counties across the USA. The NRI estimates the likelihood that a given hazard may strike a specific area, and then estimates the value of property, daily activities, or lives lost in a worst-case scenario. It also views losses in the context of social vulnerability, taking into account factors like economic status, disabilities, or other special needs. The NRI then assesses the community resilience based upon community characteristics and threat levels. The extensions then can be combined to draw estimates and conclusions about how a specific community may fare, and what needs may be, after a disaster occurs.

Champaign County was assessed on the NRI as "Very Low" risk with reference to vulnerability to natural hazards. This data is expressed in the national context, comparing Champaign County, Ohio to the national averages. The national average percentile is 25.74; Champaign County rated at 25.00 within the State of Ohio. Additionally, compared to the rest of the

country, Champaign County's anticipated annual loss is very low, social vulnerability is rated at very low, and community resilience is rated as very high. While this data gives a very broad picture of how Champaign County compares to other counties, there were disagreements with some of the statements that risk was "very low" or resilience was "very high" or social vulnerability was "very low". Speaking in the context of the county and its management of disaster consequences, stakeholders felt that their localized perspectives were more accurate, and more in sync with local capabilities to respond and serve survivors.

Table 2-37: NRI Hazard types, expected annual loss and exposure values

Hazard	Expected Annual Loss Rating	NRI Score	Total Exposure Value	Annualized Frequency	Expected Annual Loss
Cold wave	Relatively Low	43.8	$456,411,170,163	0.8 per year	$40,348
Drought	No Rating	0.0	$0	0	$0
Earthquake	Very Low	59.4	$456,749,857,000	0.060% chance/yr.	$237,865
Hail	Very Low	26.8	$456,411,511,695	3.7 per year	$34,987
Heat Wave	Relatively Low	53.8	$456,411,170,163	0.8 per year	$102,104
Hurricane	Very Low	28.9	$456,147,276,452	0 per year	$41,074
Ice Storm	Relatively Moderate	82.4	$456,274,036,020	0.8 per year	$317,916
Landslide	Relatively Low	21.9	$37,131,186,244	0 per year	$21,900
Lightning	Relatively Low	58.9	$456,274,377,552	71.1 per year	$133,851
Riverine Flooding	Relatively Low	52.7	$10,440,373,646	1.5 per year	$501,063
Strong Wind	Relatively Low	49.1	$456,411,511,695	2.5 per year	$356,599
Tornado	Relatively Low	50.6	$456,411,511,695	0.3/year	$1,140,293
Wildfire	Very Low	10.5	$51,126,806,633	>0.001% chance/yr.	$3,758
Winter Weather	Relatively Moderate	61.0	$456,411,170,163	2.8 per year	$86,294

The NRI full report for Champaign County is attached as Appendix D.

Climate and Economic Justice Screening Tool (CEJST)

This tool, developed in 2021, identifies indicators of underserved and over-burdened populations. It uses eight categories, including climate change, energy, health, housing, legacy pollution, transportation, water and wastewater, and workforce development. Those communities that are designated by this tool are given advantages in the receipt of Justice40 Initiatives that address climate, clean energy and related areas.

The census tract that includes the northwest quadrant of Urbana, and parts of Salem, Mad River and Concord townships is the only area considered disadvantaged. This area was designated as low income, and found to have high energy costs, a lack of green space for residents and eleven percent of the residents having less than a high school diploma or an equivalent. These factors all indicate higher than average rates of disadvantaged and underserved populations.

All other census tracts in Champaign County are not considered disadvantaged.

Neighborhoods at Risk by Headwaters Economics

This tool provides census tract information about vulnerable people and neighborhoods, and provides projections regarding climate change. This will allow identification of underserved populations and persons with special or extra needs by census tract within the county. Significant and applicable findings that cause groups to be more vulnerable to disaster loss are shown in the following table.

Table 2-38: Special Populations

Characteristic	Population
People in Poverty	3,512
Families in Poverty	746
People in “deep” poverty	1,582
Families with Children in poverty	456
Single mother families in poverty	338
People >65 in poverty	456
Households receiving assistance	2,951
Occupied Rental Homes	3,698
Occupied Mobile Homes	913
People of Color & Hispanics	2.690
Lack English speaking fluency	37
Over 65 years old	7,270
Over 80 years old	541
Under 5 years old	2,067
No High School Diploma	2,348
Over 65 y/o living alone	1,816
Single female + children	1,262
No Car households	764
Persons with disabilities	5,268
Persons without health insurance	1,889

Resilience Analysis and Planning Tool (RAPT)

This portal allows the user to obtain detailed demographic information about the community, and to identify groups of residents that would need extra help in a disaster. Users can obtain specific information, like addresses, of the identified resources. It provides the following information as part of the CHAMPAIGN County, Ohio data.

Table 2-39: RAPT Analysis of Population

Characteristic	Percentage
Population age 65 or older	18.27%
No high school diploma	8.81%
Disabled, all ages	14.82%
Do not have a vehicle	4.42%
Limited English ability	0.36%
Single parent household	24.49%
Households without smart phones	15.26%
Mobile home residences	6.57%
Persons without specific religious affiliation	70.53%
Below Poverty Level	10.19%

RAPT also provides the location of various critical facilities, including one hospital in Urbana, one urgent care center, no dialysis centers, six pharmacies, and six nursing homes in the medical area of resources. It shows the name and address of 22 places of worship inside the county. It shows ten public school locations (some on a common site); there are six fire stations and three police stations. Twenty-four SNAP (food assistance) sites are marked. It shows five wastewater treatment facilities.

This tool will allow emergency managers to instantly spot resources and identify the address of various important sites. The demographic data will enable decision-makers to determine the methods of warnings and notifications, shelters, and other special services for underserved populations.

Summary
These various pieces of data are consistent from one tool to another, and most find their foundational information in the 2020 US Census. While overall information has been listed in this section, specific community-based data will appear in each community's vulnerability statement because every community is slightly different. Overall, these tools provide a solid method for Champaign County to identify likely locations of urgent need based upon demographic information, and can quickly identify underserved populations that need extra effort and critical resources rapidly when a serious incident occurs.

2.2.4 Comprehensive Social Vulnerability and Capability Assessment

Social vulnerability was recorded by census tract rather than jurisdiction because the tools used for this are arranged that way. The factors listed in the table below were considered the most relevant factors pertaining to mitigation according to Neighborhoods at Risk by Headwaters Economics. The statistics shown are what is cited in the online document and are approximate because census tracts and county lines are not always exactly the same.

Census Tract #102 includes the far northwest and western border of the county, including Rosewood, Grandview Heights, Millerstown, and the villages of Christiansburg and St. Paris as well as Adams, Johnson and Jackson Townships.

Census Tract #115.01 is the northern border of the county, and includes Springhills, Salem Ridge, Northville, Eris, Kingscreek and Lippincott. It covers most of Harrison, Salem and Concord Townships.

Census Tract #104 includes the northwest section of Urbana, and is bordered, generally speaking, by State Route 36 on the south and State Route 68 on the north. It includes small portions of Concord, Salem, and Mad River townships. This is the only tract designated as disadvantaged.

Census Tract #106 includes the part of Urbana south of US Route 36 between South Edgewood St. and Lewis Moore Drive, across Powell Avenue, and south along Shortcut Road. The eastern border is South Dugan Road. It includes part of Urbana Township.

Census Tract #105 includes the northeast quadrant of Urbana, bordered by School Street on the south, S. Dugan Road on the east, and includes a very small portion of Urbana Township.

Census Tract #101 includes Mingo, Middletown, and Cable and most of Wayne Township.

Census Tract #115.06 includes the villages of North Lewisburg and Woodstock, as well as Fountain Park and Crimville. It includes Rush Township and the northern part of Goshen Township.

Census Tract #115.05 includes Mechanicsburg and the remainder of Goshen Township.

Census Tract #115.04 includes the Village of Mutual and most of Union, Urbana, and Mad River Townships. It includes Powhatten, Catawba Station, Highland Hills, Springbrook, Valley View and Reynolds.

Census Tract #110.01 includes most of Mad River Township as well as Terra Haute, Nettleton, Westville.

Table 2-40: Social Vulnerability by Census Area

Characteristic	101	102	105	106	104	115.06	115.05	115.04	115.01	110.01
Population	1,980	6,652	3,835	3,994	3,560	3,135	3,276	5,290	4,433	2,560
Disabilities	267	686	693	499	604	537	427	774	552	229
< 5 y/o	116	228	186	364	135	299	307	210	56	166
> 65 y/o	326	1,152	741	815	689	506	473	1,158	807	603
Rental Units	66	493	719	390	709	325	428	161	317	90
Mobile Homes	19	186	0	0	113	116	47	321	101	10
Limited English	4	5	6	0	0	0	5	0	0	0
HH w/no Car	4	60	209	113	109	40	116	84	29	0
Fam. in poverty	54	82	133	70	149	41	57	160	0	0
No health insurance	247	297	149	223	207	72	124	228	271	71

Sheltering for residents when displaced from their homes is a significant vulnerability for all of Champaign County. Historically Red Cross has provided sheltering capabilities using local churches and other public facilities. However, churches are at risk of closing because church participation has decreased over recent years, and those facilities without air conditioning and generators may not be able to be used. Historically, churches have also fed the masses, and they have funded utility bills and rent deposits and provided other financial and household support for disaster victims. With two-thirds of the residents likely to not have a strong church affiliation, that reduces the connection between disaster survivors and church resources. Red Cross is suffering from a lack of volunteers, just like other organizations, and they are sometimes hard pressed to operate shelters in rural communities. The void in capability includes not only a lack of facilities that are suitable, with shower, feeding and sleeping areas as well as generator power, but also includes the supplies and volunteers to operate shelters. There are schools that are well-equipped and likely to be available, but there are no supplies or trained volunteers to run them.

Stakeholders discussed non-English speaking workers who are located in CHAMPAIGN County, or who travel through the county on state highways on a regular basis. Farm workers from Haiti and Central American countries are commonly part of the H-2-A program that provides a variety of workers and researchers on local farms. Logistics services utilize Russian workers for long-haul trucking operations that travel through the county, frequently on various state highways in the county. Although communication with truckers can be challenging because they come from a base far away from Champaign County, the farms who employ international workers generally have interpreters on the farm to respond and translate.

Local schools and county Job and Family Services work with homeless and economically disadvantaged residents. All schools have a designated person who works with homeless students and children. All have intervention specialists who work with students that have special needs or social vulnerability.

Group homes that house individuals with disabilities are not easily identified and located; they are individual homes with a 24/7 caregiver, and they provide housing for a few individuals at a time. There was no estimated number of these homes shared in meetings. Recovery houses are sponsored and serviced by licensed organizations, and are more easily located, when necessary, through the local mental health board. Relocation for the individuals is problematic due to individual needs as well as a lack of transportation. In spite of providing robust senior services and assistance programs, elder abuse and neglect numbers are on the rise, and this is another situation that would not be improved or lessened in the wake of a disaster.

Stakeholders summarized populations at most risk as first, the elderly. All agencies that serve the elderly reported an increase in services provided and requests for even more services. While these agencies meet regularly and network on a daily basis, it is impossible to meet all needs and service requests. They see consistently increasing isolation and hardship in elderly individuals, couples and families. While an informal network of residents looks out for each other in a farm community, and younger ones check in on older ones, keeping up is getting

harder every day. In a disaster, this could be overwhelming. Although CHAMPAIGN County is a very resilient area because neighbors help neighbors, the egress of younger generations is negatively impacting this at a rate slower than neighboring counties. Some homes and farmsteads are being purchased or rented by people moving in from other areas who are not as friendly and familiar as they used to be.

Children, especially those with special needs, fill the second group of special concerns because finding the services to help them is difficult and sometimes dependent upon agencies based outside the county. Healthcare stakeholders reported that the number of grandparents raising small children is extremely high, and this is increasing every day. Many families with children do not own their own home, and the high rental numbers make those residents at risk for deteriorating and deficient housing, adding to their disadvantage. The health department provides vaccinations for all children and provides local clinics in many communities to help, but there are many other areas of need for the children in the county. Abuse and neglect statistics are on the rise, and this will only get worse in a disaster.

The economically impoverished have challenges in obtaining necessary life-sustaining services too. Just less than 5% of the population has no healthcare coverage and are expected to self-pay for care. These are often those who can least afford to do that, so they go without healthcare. Social services staff reported that more and more families are giving up health insurance to be able to pay for necessities. Reduced benefits for behavioral healthcare impacts this as well, and prevents many people with emotional and mental health problems or addictions from requesting and obtaining care. None of those issues improve under the stress of disasters, and stakeholders anticipate this being a problem area should there be a large-scale incident.

Non-English-speaking populations are minimal for residents, but temporary workers that live in nearby counties, or those that are passing through the county, are on the rise. The H2-A program has not brought large numbers of workers to Champaign County to live, there are many who reside in Clark County to the south where there is more adequate housing available. The primary group is Haitian and they speak French and French-Creole with some English. It is also noted that some commercial truck drivers are non-English speaking but there is no prevalent language among this group. Some have little ability to communicate in English, and tend to rely upon their smartphone for any translation. Local responders and dispatchers have been able to use virtual translation applications to communicate during emergencies.

In summary, stakeholders reported that social needs are on an upward trajectory in Champaign County. While providers felt they are “keeping up”, they said that federal funding for underserved and disadvantaged populations needs to keep increasing for them to continue adequate services. In the event of a disaster, these needs will all be amplified, and they doubt that current funding will begin to meet the actual needs.

Disaster sheltering is a concern should there be a widespread, regional need for overnight shelter operations. Red Cross is active in Champaign County, but has very limited numbers of

local volunteers. A regional disaster would be difficult for them to staff. Should a widespread incident like a power outage cause mass evacuations and sheltering, Champaign County would have to rely upon churches and schools to provide neighborhood shelter locations, but the equipment for shelters would be a challenge without Red Cross resources.

Much of the fire and EMS service in Champaign County is provided by volunteer departments. The City of Urbana Fire Department is the only full-time 24-hour staffed fire department. The average age of the volunteers is ever-increasing, and is probably an average of 55-60 years old now. Younger people are not joining fire departments for a variety of reasons. Volunteerism is at an all-time low in fire service in Champaign County, just as it is across the entire State of Ohio. Retention of fire officers is incredibly difficult. People work out of the county, they work long hours, their jobs do not accommodate leaving to fight a fire or respond to a disaster. Daytimes when volunteers are working are exceptionally difficult to staff, and it may take five different departments to fight a house fire nowadays.

Providing special rescue services is difficult, but Urbana Fire Department does have specialized capabilities. While their personnel are full-time paid employees, they also have a hard time retaining workers. Training younger and newer individuals is getting harder because younger workers are not inclined to volunteer to gain experience, or to work for low wages before they come to a city like Urbana. With this shortage in the availability of workers, it is even more difficult to find adequate numbers to train in hazardous materials response, technical rescue, or specialty areas because of the extensive training, personal commitment, and cost of outfitting an individual for specialized work.

EMS services are difficult to provide as well. Urbana Fire is fully staffed, but the volunteer departments struggle with staffing. The departments attempt to provide advanced protocols and services, but that level of care requires significant training for volunteers. This is a disincentive to new personnel, and makes retention of current workers difficult. Many new workers demand wages higher than can be paid, and thus they move on to larger cities and metropolitan areas outside Champaign County.

Because two house fires or multiple EMS calls at one time could overwhelm county resources, they have aggressively developed and utilized mutual aid agreements with surrounding counties. They use the statewide mutual aid programs as well, and rely upon regional specialty resources for unique or high-tech needs. They use the structural rescue teams from Toledo and Lima. Local departments work together well, and joint operations are generally smooth and effective.

Champaign County lacks sufficient technology for emergency workers. All departments use the MARCS system of two-way communication, but there is no backup system should MARCS become overloaded or have technical problems. There are no drones available to the county to aid search and rescue efforts, to collect data for damage assessment, or to survey hazards not accessible by foot or vehicle. They can call in special resources from other areas, specifically Dayton or Columbus, but sometimes lack the information to easily identify where those

resources are located. In many ways they are forced to work harder because they lack more efficient methods due to financial constraints.

There are basic residential building regulations in Champaign County that include those required by the State of Ohio. Aggressive codes have not been adopted for residential development, but commercial development is enforced by Champaign County's Building Department and the City of Urbana, when appropriate. The City of Urbana does residential inspections and has codes that apply to homes, but the villages have not yet adopted residential codes. All commercial property is required to meet State of Ohio building codes, and those codes are enforced.

Located close to Dayton, Ohio, Champaign County has many resources for supplies in disasters. Locally there is access to food distributors that provide adequately for the county. There are multiple distribution centers for major retailers in Dayton, and those are utilized to provide life-sustaining supplies and equipment. To the north, two major home improvement companies have warehouses in Findlay, and there are multi-product warehouses and distributors in the general area with tremendous stock of life-sustaining supplies. Toledo, Perrysburg, Bowling Green, Findlay, Lima, and Columbus are other locations where critical resources can be found.

Medical resources for resilience come mostly from the Dayton area, and perhaps from Springfield. Medical helicopters come from Dayton, Lima and Columbus to serve the county. Dayton, Springfield, Bellefontaine, and other network hospitals can back up Champaign County Mercy Hospital as needed. The medical centers in Dayton are very accessible to Champaign County, and several ground transport services are in place to assist with patient movement. Multiple providers of durable medical equipment and medical supplies are available, and many in proximity to Champaign County, making service during disasters feasible.

The county has multiple generators on hand for extended power outages, but some are perhaps worn enough that stressful use may cause them to fail. The number of generators is adequate so long as they operate without repairs or replacement. Amateur radio volunteers can assist with communications when towers are down, or when power is out. Local fuel supplies are fairly redundant, but often limited to gasoline. The county keeps its own supply of fuel for emergencies.

To summarize, Champaign County is most capable of maintaining Health and Medical and Communication Lifelines through existing resources and regular external providers. Energy Lifelines may be impeded by forces beyond Champaign County's control if power generation fails or if distribution lines are destroyed in mass. While providing food and water would likely be handled by the county, having the staff to provide organized shelters to a large portion of county residents would significantly tax the county's ability to meet needs, but Red Cross is a potential resource for them to do this. Extensive demands on fire service and emergency medical services would be extremely difficult for the county. They have suffered from a lack of volunteers to staff fire and EMS companies, just like most other Ohio counties. Transportation Lifelines could be unmet unless the schools were able to step up and fill the void even though

there is significant capability within the county's transit program. Therefore, Safety and Security, Transportation, and Food, Water and Shelter Lifelines may cause some difficulty. An extensive hazardous materials incident would require Urbana Fire to fully mobilize quickly, and to obtain assistance from other county departments. Champaign County could call in outside resources very readily, making the Hazardous Materials Lifeline less difficult to maintain. All in all, Champaign County is robust in their intent to take care of themselves, and in spite of limited resources, they are rated as highly resilient and self-sufficient. This characteristic will serve them well in any significant disaster.

2.3.5 CHAMPAIGN COUNTY

Threats that were identified to be relevant and appropriate to Champaign County included dam failure, drought and extreme heat, earthquake, flood, hazardous materials incidents (highway, rail or fixed facility), invasive species infestation, power outage (including widespread and long-term outages), severe thunderstorms (including tornadoes), severe, and severe winter storms.

Champaign County mitigation planning participants identified the risks associated with severe thunderstorms as the county's biggest threat, especially since storms seem to be getting slightly more intense and stronger. This high-rated hazard includes specifically severe thunderstorms that bring heavy rain, hail and lightning; associated power outages; high winds that include straight line winds as well as tornadoes. These storms deliver extremely difficult rescue situations, an overabundance of damage assessment needs, and excessive debris management challenges. These severe storms can disrupt daily activities, damage or destroy property, and cause significant loss of revenue and income.

As a rural county, the damages can be significant but the likelihood of receiving outside financial recovery assistance is limited because the number of and value of uninsured property is not likely to be high enough to warrant declarations and activate assistance programs. That factor places extensive recurring cost of repairs and replacement on individuals, families, and small businesses, as well as insurance companies that then raise premiums and deductibles for everyone to cover the losses of some.

While sometimes severe thunderstorms develop over the plains and move into Ohio with strength and gusto, other times they develop suddenly with little warning time before damaging cells strike the county. The traveling fronts enable weather forecasters to give advance warnings, telling Champaign County residents to watch the weather and expect the development of severe storms. At other times, weather prediction centers are able to issue warnings about twenty minutes in advance with some degree of accuracy; other times there is not that much warning time because the development is rapid.

Storms can develop rapidly for several reasons. Champaign County temperatures in the spring and fall can change quickly as weather fronts move in, sometimes within hours. This facilitates the rapid development of all types of wind as air rises and falls, especially when the storms have already moved across the Great Plains and strengthened. There are also times when fronts combine and divide, causing an increase in magnitude or an increase in the number of

storm cells. There is little structural interference with cells due to the flat and unwooded terrain, and storms frequently grow in severity and size.

Most of these severe storms include high wind, heavy rain, and sometimes lightning and hail. On occasion they develop into high-powered cells that include rotating tornadoes and strong straight-line winds. Because tornadoes in Ohio generally have a relatively narrow pathway, part of the county can easily be affected by a tornado while the rest of the county gets just heavy rain and wind, or straight-line wind damage. In the more severe cases, damages spread consistently through the county. Other, more concentrated storms cause damages that can be confined to one part of the county or another. Trees are downed, structures are damaged, grain operations and other outdoor equipment facilities are destroyed, and there could be an excessive amount of tree debris strewn across the county. Crop damage could be extensive, especially when hail occurs. Hail is a major risk to corn and other crops and can easily destroy entire fields. If grain crops are flattened by wind or hail, there is little that can be done to restore them and the farmer can suffer significantly reduced yields, and therefore income, from even a brief severe storm.

Tornadoes are part of severe thunderstorms. When there is abrupt temperature change, rotational winds develop and tornadoes are born. These columns of damaging wind in the county rotate generally at speeds of 85 – 150 miles an hour, generally, and can devastate a farmstead or neighborhood in minutes. People, livestock and business assets are entirely vulnerable to destruction in this case. Tornadoes in the general central western part of Ohio range from an EF-0 to an EF-3, but any strength of tornado is possible. The most likely are EF-0, EF-1 and EF-2 tornadoes.

There is deep concern over mobile homes in the county and their easy destruction by any high wind or tornado combination. While many are located in mobile home parks, some are individual units on a separate lot. In either setting, these homes are extremely vulnerable to wind, both sustained and bursts, that knock them off foundations, rip of roofs, and destroy the units beyond repair. Due to light construction, there is little, if any, resistance to tornadoes and sharp downbursts of straight-line winds. In a direct hit, a mobile home will be destroyed and anyone inside at the time is very likely to be killed.

Damages from any of these storms include flash flooding of streets, highways and rural roads. Surface flooding in heavily paved areas or low-lying areas allows for ponding of runoff. Properties can be inaccessible due to flooded driveways, roads that are flooded over, or debris cover that prevents passage. In a gently rolling topography, the low-lying areas flood first. Intense rain, or rain that totals two to three inches in a day or two can cause significant road flooding. If the storm comes in the spring when the ground is frozen, the flooding can be severe because the water cannot percolate into the soils and all becomes surface runoff, flooding fields, roads, and even basements and driveways to homes. When temperatures rise and precipitation is combined with snow and ice melt, the rivers overflow, the creeks and streams far out-reach their banks, and flooding is widespread. People lose the use of their property, farmers cannot easily feed pastured livestock, and roads are closed. When flooding is extensive,

the county struggles to be able to mark all the closed and flooded roadways due to not having enough signage.

These severe storms and heavy precipitation can cause damage to buildings, including roof, siding, and window breakage and flooding of lower floors and basements. Storm water that is unable to drain naturally ends up in basements, under the foundation of mobile homes, and even seeps through foundations and washes away the supporting soils around buildings. Roadways deteriorate under the constant water, and berms become drainage pathways for pavement runoff. This eventually affects the pavement itself, causing edge deterioration, potholes, and cracks in the surface of the roads.

Severe windstorms, while extremely rare, are devastating and were ranked second. The derecho of 2012 that affected western Ohio could be devastating to Champaign County. Severe winter storms were ranked third. Both of these hazards bring damage to property in the form of roof, siding and window damage as well as downed trees and other vegetation. The many farms in Champaign County experience heavy damage to grain silos, transfer systems and bins, and farm equipment. Barns are damaged, and livestock is exposed to the elements. Crops are damaged and as a result the yields are significantly reduced or destroyed. Agriculture experiences severe losses, and this has a profound negative effect on the economy of the whole county. The wind takes power lines, and sometimes communications lines, down in a hurry. If the storm is long-lasting, no repair work can begin until winds subside. Clean up is difficult and tedious. Without power, all kinds of negative consequences prevail.

Severe winter storms can begin as rain and ice, turn to sleet or freezing rain, include high winds, heavy precipitation, and blizzard conditions. While not typical, an extremely severe winter storm that lasts for two or three days can cripple Champaign County for a week or more. Schools close, businesses close and transportation is severely impaired. The most lasting and daunting damages are those caused by wind; this is either downed power and communication lines, or blowing and drifting snow that makes keeping road passable difficult.

The vulnerability to winter storms was exemplified through stories about the Blizzard of ’78 and how Champaign County was simply shut down for an extended period of time until snow could be removed from highways and private property, utilities restored, and damages to structures repaired. Those memories are easily rekindled when several inches of snow falls, winds kick up, and visibility disappears. Roads become drifted and impassable, power outages occur, and daily activities are interrupted. Schools close, highway accidents increase in frequency, and people are unable to get to work or other commitments in Dayton, Columbus or locations within the county. With manufacturing giants such as Honda in the county, this causes a great deal of financial strain and loss in addition to property damage as people try to navigate impassable roadways.

Planning participants ranked power outages as their fourth highest concern. Most of these outages are the consequence of severe storms and/or wind, but the outages can occur due to many reasons. Vehicular crashes, equipment failure, and other technological failures can cause

outages as well. Recent solar storms can interrupt electrical services, and there is continual media coverage of the country's failing power grid. If temperatures rise under changing climates, the demand on the power system will increase and the grid may not be able to support the increased demand. Additionally, the power grid in Champaign County is aging, and with that becomes more vulnerable to failure even though private owners are constantly repairing and upgrading their systems. Cyber-attacks and terrorism threaten our power grid nationally, and Champaign County recognizes that threat.

When power fails, everything stops in Champaign County. Alternate power supplies are limited, and most business and personal activity is based upon electrical service. Not all critical facilities are generator powered, including emergency shelters. Some of the generators that are in place need to be upgraded, or replaced. Without generators, a return to normal daily activities and function is slow, expensive, and tiring. The most vulnerable people in Champaign County – the elderly, disabled, poor and sick – are the ones who suffer the most when the power goes out. They may live in the less resilient homes, and be more vulnerable to an outage. This would place significant demand upon the county to provide for a large number of people in an extended power outage. If a solar storm or attack of some sort were to obliterate the grid, a long-term outage could last for months. This would be extremely difficult for many Champaign County residents.

The weather in Champaign County requires the use of heating or air conditioning for most of the year. Temperatures in the spring and fall are so varied that few days are comfortable without one or the other, making power outages very uncomfortable and disruptive. When power is out, farmers are unable to care for livestock, operate grain systems, feeding equipment, and conduct regular operations in their farm shops. Just like other business and industry, they are severely crippled by the lack of electrical power. This can cause the loss of farm products, disease in livestock, and damage to grain and other crops. Planning team participants were very concerned about power outages for all these reasons.

Riverine and flash flooding was rated fifth, closely following the severe weather incidents. Although flooding was ranked lower, the damages caused by heavy precipitation often occurs during those severe weather events. It can be difficult to separate the hazards because they often occur simultaneously and increase damages in an overall perspective.

Flooding is a concern in some areas; in some locations, basements can fill with water, destroying appliances, furnaces, other mechanical systems, and possessions. Crop debris clogs sewers and makes water drain poorly. Cemeteries are strewn full of crop and lawn fodder and have to be cleaned up. Some houses have no recourse, and suffer loss of use, damage to foundations, and destruction of all contents. Debris in yards, on roadways, and simply cluttering and clogging everything is common once floodwaters recede.

There are many areas in the county where farm fields are tiled, at least to some extent, which helps facilitate drainage. Much of the tile, especially those referred to as "county tiles" are old and of clay composition. Over the years, the constant wear and tear on the tiles due to

excessive drainage and heavy equipment driving over them has deteriorated the condition of the tiles. The broken tiles do not carry water away and ponding results as the water drains gravitationally instead. There are several locations where railroad track s and underpasses have tile that is old and undersized, and this causes back up of water. Although the county engineer has replaced culverts and bridges with upsized structures, the broken tiles diminish the effectiveness in some areas.

There are only 21 miles of ditch on county maintenance so property owners are responsible for maintaining many ditches and streams. This leads to inconsistency in the maintenance both in quality and methods, and an inconsistent monitoring of damage due to heavy precipitation or rapid flow of water. Some owners don't have the capability to maintain the ditch that flows through their property, so it gets clogged with debris and obstructions., and backs up regularly into yards and basements. Others maintain their ditches very well and do not have many flooding problems. In some areas the county has installed tiles many years ago to facilitate this drainage, and the tiles that lead to the ditches are old, cracked and collapsed. Sometimes these tiles cause more water back up into surface ponds than they prevent due to deterioration.

There are no storm sewer districts in the county and limited options for the county to manage drainage. Improvements in the rural and unincorporated areas are nearly impossible; within municipalities, storm water is by the individual jurisdiction. This causes a lack of consistency and collaboration in storm water management practices.

Hazardous materials incidents are of moderate to low concern in Champaign County. While they are fortunate to have a great deal of manufacturing in the county, most of it does not involve hazardous materials. They do have farms that use anhydrous ammonia and other agricultural chemicals, which are often transported by tractor along county and township roads. The low volume of traffic allows this to result in few spills and releases due to crashes. A hazardous materials incident inside Urbana, especially on the city square, could result in a significant evacuation, but other than that area, most incidents would have low impact. There is always the remote possibility of an incident near a school or a hospital, or near the tri-county jail in Mechanicsburg, that would cause a difficult evacuation. This would affect the entire county as evacuees were transported and housed, secured and cared for, and the cleanup meant that there would be extensive traffic and activity that would interfere with daily activities. Should a spill occur in proximity to a waterway, or if the runoff from a spill were to reach a waterway, there is concern of contamination. If this happened during heavy precipitation or after a heavy storm, the draining runoff could facilitate the contamination of a waterway.

Drought and excessive heat are not of high concern. So long as electricity flows, the county can operate, as high temperatures do not usually exceed 90 degrees Fahrenheit. Schools and healthcare residential facilities that are not air-conditioned suffer in these situations and either close or make adaptations. Extended hot spells can be very disruptive. If the water supply is sufficient and power stays on, the county can adapt and avoid damages. Some livestock may need to be brought inside, and a few crops may fail. Field fires can become common in

extended dry spells, and since fire departments must haul water to fight these fires, the losses can be extensive as they struggle to get enough water fast enough to get the fire under control. Otherwise, damages are more of an inconvenience than actual loss.

Invasive species ranked low, but remains on the radar of county stakeholders. Most of the Emerald Ash Borer-affected trees have long been removed so there not current tree issues. However, that changes quickly and if other invasive species that affect pines, maples, and oaks that are starting to surface in Ohio migrate to the county, that situation could change quickly. The Spotted Lanternfly and poison hemlock are currently identified in the county, among other nuisance vegetation, plants and insects. A severe wind incident could quickly damage any tree affected even slightly by tree disease, and cause a major debris management issue. Clearing roadways and public property after significant numbers of trees were to fall could be extremely expensive, causing financial distress for jurisdictions as well as individuals. For the moment, zebra mussels in waterways do cause a few problems, such as near North Lewisburg. One factor in concern is the potential for increasing rainfall and higher temperatures in the future; under both conditions, plants thrive, including noxious weeds and unwanted plants.

Dam failure is of low concern since the dams in the county are, by and large, privately owned unclassified structures on private property. There is one location where a dam breech would cause loss of life and significant property damage, and that is Stroman Lake Dam near Zimmerman Road in Concord Township. This dam is discussed in detail in Section 2.2.2. There are also several significant hazard dams that are described in that section as well. With these dams being privately owned, the county is vulnerable to the quality of maintenance and repair the owners achieve, and they must maintain communication to continually assess the county's vulnerability to dam failure.

Earthquake is not of high concern even though neighboring Shelby County is home to a high percentage of the earthquakes that have affected Ohio over the years. Very few rumbles from those have been felt in the county, and there is an extremely low incidence of damages. If an earthquake were to occur that was of damaging nature, the sewer lines, water lines, underground utilities, and buildings of masonry or stone would be the most damaged. Roads could be significantly damaged, and bridges and culverts would be unsafe or destroyed.

Champaign County stakeholders did not feel that land subsidence, cold wave or water quality emergencies were relevant to Champaign County and that there was little vulnerability to any of these threats

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Table 2-41: Township/Unincorporated Area Hazard Rank

Rank	Hazard
1	Severe Thunderstorms
2	Tornado or Windstorm
3	Winter Storm
4	Power Outage

5	Flood
6	Hazardous Materials Incident
7	Drought & Extreme Heat
8	Invasive Species
9	Dam/Levee Failure
10	Earthquake

32.3.6 Jurisdiction Vulnerability

Champaign County has many common factors across the county, but each municipality considered its own unique vulnerabilities based upon the characteristics of the jurisdiction. Most villages are a combination of residential, commercial and industrial properties. While the townships are primarily agriculturally based, the villages have other industries, retail and distribution, and professional services within their limits. The following section describes how each community ranked each hazard, with "1" being the most disruptive and concerning. The symbol "n/a" means that particular hazard is not applicable to that particular community.

Christiansburg

This village of just over 500 residents occupies one-quarter of a square mile in the far southwest corner of Champaign County. There are 235 houses, three businesses, and one bank, but no fuel/gasoline stations inside the village. According to the 2020 US Census, there are 505 residents of this village. It is in Jackson Township, and sits right at the county line with Clark and Miami counties.

Severe storms, including windstorms, severe thunderstorms, tornadoes, and severe winter storms interfere with daily activities. These extreme but somewhat frequent incidents damage roofs, siding, windows, and outbuildings. Trees are damaged or destroyed, creating significant amounts of debris that sometimes falls onto homes and other buildings. When ice in involved in winter storms, residents must clear sidewalks and driveways and streets must be salted or brined. Without that maintenance, vehicle accidents occur and people are injured. Any of these can cause schools to close, business to temporarily shut doors, and customers to cancel or not come for services. Christiansburg can become isolated due to blocked roads and highways, and due to excessive debris blocking streets and roads. A tornado could be devastating to the village, quickly putting them in a position of needing assistance from Champaign County and/or other jurisdictions. Their seventeen-mile distance from Urbana would make transporting injured residents to hospitals a very difficult task amid poor road conditions and heavy precipitation or wind. Power outages would likely come as a result of these storms, as would breaks in communications and other utilities. A derecho, without the precipitation, could be just as devastating as a tornado. Therefore, they ranked the "storm" threats in order of likely and possible damage severity and lifeline disruption.

Christiansburg planning participants rated power outages as their fourth greatest concern. The village is not adequately equipped with generators for a long-term outage, and is somewhat isolated from other municipalities. Without power, it would be difficult to maintain daily

activities and care for families. The fire department has a generator, and their station could be used as a shelter for residents. The village infrastructure includes a water system that sources water from wells which are considered stable and very dependable; this system is generator powered. There is a modified sewage treatment system where each house has a holding tank for sewage where the liquids are pumped off and sent to a treatment plant in the village. Areas in town have storm sewers, and others do not, and those drain gravitationally. There are two retail stores available for limited supplies, one inside the village and one just outside village limits.

Flooding was a moderate concern incident because the village does not have complete coverage by storm sewers, and some areas of the village drain gravitationally into the creek. The lowest elevation is on the west side of the village near Wilson Street where the West Fork of Honey Creek flows past town. The entire south side of the village is prone to surface flooding which affects streets, yards, and some basements. While there is not much serious flooding, it restricts access, damages vegetation, and destroys utilities, water heaters, appliances, furnaces and other property in basements or lower levels when they are affected by floodwater. Residents cannot get to and from work and out-of-town relatives have difficulty coming to care for elderly in town.

Hazardous materials incident and drought/extreme heat ranked sixth and seventh of eight threats. Village residents use village water that comes from wells for water and homes have a septic system for wastewater that pumps liquids off and sends it to a treatment facility. Drought can affect the function of these systems. If the water table were to be contaminated through a hazardous materials spill or toxic chemicals, the village water source could be ruined. This would cause extreme difficulty for residents. Extreme drought could cause the village wells to produce insufficient water to support the village's population. They ranked hazardous materials incidents higher than drought and extreme heat due to the typical frequency of both threats, and the general opinion that a hazardous materials spill is more likely than drought.

While earthquake is possible, damages would be limited to structural damage to one and two-story homes, and roadway damage. Electrical supply lines would be damaged and require repair or replacement. There would be damage to their water distribution system, pumps, and water tower. While the damage would be expensive and time-consuming to replace, the likelihood of an earthquake severe enough to cause such damage is extremely low; therefore, earthquake ranked last on the list of hazards.

Although they did note an occasional rainfall that is more intense, and once in a while the dry spells are slightly longer in duration than before, Christiansburg did not note many weather changes over the past few years. They did not feel that the effects of climate change are profound.

Christiansburg is not vulnerable to dam/levee failure. They did not feel that invasive species posed any particular threat to their village.

The Village of Christiansburg ranked hazards and threats as follows:

Table 2-42: Christiansburg Hazard Rank

Rank	Hazard
n/a	Dam/Levee Failure
n/a	Invasive Species
1	Tornado or Windstorm
2	Severe Thunderstorms
3	Winter Storm
4	Power Outage
5	Flood
6	Hazardous Materials Incident
7	Drought & Extreme Heat
8	Earthquake

Mechanicsburg

This village in the southeast corner of Champaign County rated power outages as their top hazard. Power outages can occur with any storm that involves wind and/or ice or during high demand in extreme heat. Residents have endured lengthy outages and slow response in the past, perhaps because the village is at the end of distribution zones. The distribution lines are all above ground on poles and vulnerable to weather conditions. Dayton Power and Light has replaced many poles and completed an aggressive tree-trimming program but transformers are still in need of replacement and some distribution lines are still in bad condition. Residents report that storms cause the old transformers to fail, resulting in power outages. Two-way radio communication for first responders is severely impacted because the communications tower is not generator powered.

The village's primary emergency shelter is located at a local church but the church is not generator powered so there is no disaster shelter site that is not dependent upon electricity to be operational. Officials are very concerned that this is not adequate for current needs. Red Cross seems to have few volunteers, so there is concern about who and how a shelter would operate in a widespread incident, even though if Mechanicsburg were the only community hit, Red Cross could probably provide adequate service. They do feel they could easily collaborate with the county's transit system and the school district to transport evacuees if needed.

Mechanicsburg officials are concerned about tornadoes even though the frequency of this hazard is generally very low. If a tornado did occur, the impact would be severe and shelters would be necessary. Any property struck by a tornado is generally destroyed. Power poles, infrastructure, critical facilities, and equipment would also likely be impacted. Without an effective debris management policy, they are concerned about how to handle excessive amounts of tree, structural and masonry debris after a catastrophic event.

Severe storms, including windstorm, winter storm, and thunderstorms, ranked as the next three areas of concern. Keeping streets, culverts, and storm drains clear of debris in storms is difficult and costly for the village as they pay workers overtime to manage this. Windstorms

cause trees to fall, roof shingles to be damaged, and siding to be dented and destroyed. Debris blocks streets and bridges or culverts, closing off access to parts of the village and making travel difficult. Vehicles can be damaged by falling debris, and ditches are blocked by tree debris. Severe thunderstorms do all of that and more. Lightning strikes can cause fires in the village and damage property; hail damages homes, including roofs, siding and windows. Elderly and disabled residents become dependent upon the community for clean-up. Winter storms have the additional task of removing snow from sidewalks, streets, and parking areas. The combination of snow, ice, wind, and extreme cold causes roads to become impassible, school to close, power to be interrupted, and individuals to fall and be injured. The village experiences vehicle accidents, access interruptions, and business closures. Snow removal is a significant expense for the village due to the additional staff and equipment costs necessary to keep streets clear.

Flooding would also have serious consequences for the village. Little Darby Creek, which drains most of the village, is a protected waterway. Because of this protected status, officials are unable to remove the debris that blocks drainage and causes more debris to jam during high water levels. Elsewhere in town, clogged drainage tiles and other tiles and culverts are collapsing. With an old and unmapped storm sewer system, it is difficult for the village to anticipate tile collapse; instead, they wait until a depression or large hole develops as a sign that tile has deteriorated to the breaking point. In some cases, those drains are as large as 24 inches in diameter, causing a huge hole. In other areas, catch basins clog with debris and prevent water from draining away, and flash flooding fills the streets, yards, and a few basements. Because homes were constructed in flood-prone areas well before floodplain management efforts began, there are residential structures in areas that flood, including one known structure within the flood zone. Some streets and ditch banks are damaged by fast-flowing flood water; curbs and banks are washed away, some streets are closed, and a few parking areas are flooded. If power fails, sump pumps don’t work and living areas, basements, and other areas that are otherwise protected can flood. Water heaters, appliances, and furnaces can be damaged or destroyed when floodwaters overtake basements.

Mechanicsburg is vulnerable to hazardous materials spills and leaks. Several EHS-reporting facilities, including a farm cooperative and an industry, report chemicals stored and used to the Champaign County LEPC. Both facilities have anhydrous ammonia is large quantities, which poses an airborne and liquid threat. The state highways that cross the village and the tractors pulling anhydrous ammonia tanks can collide, creating an exposure risk for the community. Some officials are concerned about detours caused by hazmat spills and how this would take into consideration bridge capacity and weight limits for commercial traffic. A serious vehicle accident in the vicinity of the village’s water wells could expose the water supply to contamination if a large amount of a liquid were to leech into the soils. Residents and officials are concerned about the risk of chemical spills draining into catch basins. A more unusual concern is caused by a presence of fentanyl in the jail, and the possibility that local areas could be contaminated with this potent and deadly chemical. In a disaster, there could be unanticipated release of inmates nearing the end of their incarceration period; these inmates

would be a challenge to care for or serve because their personal history makes them inappropriate inhabitants of a community emergency shelter.

Drought and extreme heat are rare but can be very disruptive for the community. In the most extreme heat events, Mechanicsburg. Schools close when the heat index is high enough to create an unsafe environment for students and staff. The increased demand for electricity stresses the distribution system, leading to outages. Field fires are a greater risk in dry conditions and can be caused by a discarded cigarette, a lightning strike, or some other reason. These fires are difficult to fight as fire departments struggle to have adequate water supply to feed pumpers.

Hazards that rated at the bottom of the village's ranking include invasive species and earthquake. An earthquake likely, based upon history, would be low in severity and frequency. Ohio has never experienced a strong earthquake but Champaign County is close to Ohio's most-affected earthquake areas in nearby Shelby County. Most buildings are one or two stories, so it is believed the effect would be minimal. However, a strong quake could destroy homes, businesses and other structures like sewer lines, roadways, and water towers. Mechanicsburg is not susceptible to dam failure.

Stakeholders did not see much change in the impact or consequences of these threats based upon climate change. Tornadoes have been detected at a much higher rate, but that is for only the current year. They are waiting to see if that trend repeats itself, or if it is an anomaly this year. They did feel the rain was falling more intensely, and perhaps dry spells were more common. Other than that, nothing stood out to them as exceptional or different.

The village is very concerned about maintaining lifeline services in safety and security. Like most of Ohio, recruitment and retention of volunteer firefighters and emergency medical technicians is very difficult, and their rosters have suffered in recent years. To make matters worse, they have the need for more specialized rescue capabilities as grain operations and solar farms come to the area. Their rescue personnel, while less well-staffed than in the past, must be more highly skilled and trained than ever before. Mechanicsburg is not vulnerable to dam and levee failure.

Table 2-43: Mechanicsburg Hazard Rank

Rank	Hazard
1	Power Outage
2	Tornado or Windstorm
3	Severe Thunderstorm
4	Severe Winter Storm
5	Flood
6	Hazardous Materials Incident
7	Drought and Extreme Heat
8	Invasive Species
9	Earthquake
n/a	Dam or Levee Failure

Mutual

This small village is located between Urbana and Mechanicsburg where SR 161 ends at SR 29. It is just over one-tenth of a square mile in size. By far, the biggest concern of Mutual officials was the lack of outdoor warning sirens and replacement of those with wireless alert systems. Storms that move in quickly – tornadoes, high winds, and severe thunderstorms – sometimes go unnoticed by local residents. Many elderly do not use cellular phones, and do not have the technical skills to adapt to wireless technology. Therefore, storms strike before they realize they are imminent and have no time to take shelter or implement other protective actions. For that reason, tornado, windstorm, and severe thunderstorms are their primary concern.

With just over 100 residents, power outages are a concern. Outages are the result of the previously mentioned storms, as well as severe winter storms and accidents on area highways that interrupt the distribution system. Because the village is somewhat isolated from other municipalities, repair of their power lines is often a low priority.

Severe storms, including windstorms, winter storms, thunderstorms, and tornadoes, affect Mutual by damaging homes. If that damage makes the homes uninhabitable, there is no option for an emergency shelter within the village because there is no building to house that many evacuees. People would have to travel to Mechanicsburg or Urbana for sheltering.

Vehicles on property or on the state highway can be damaged by hail and wind and trees are blown down, potentially striking houses and falling on other property. Vehicles travelling through the village on SR 29 can be blown off the road or collide due to wind, rain, snow or ice. The village does not provide services, so they depend on Champaign County and Union Township to plow roads and clear property of debris.

Drought and extreme heat can place additional burden on electrical service, cause medical emergencies or an interruption in medical care for some, and compromise the function of individual wells and septic systems. The village does not provide water service so concerns about well water include drought and contamination by a hazardous spill or leak, as well as deteriorating equipment. One of the biggest concerns for the small community is the lack of a retail store in the village to provide bottled water, foodstuffs, and other necessary items for residents if they become isolated due to a storm.

Flooding in Mutual is mostly surface flooding. The center of the village is at the lowest immediate elevation so water pools on the alley ways that connect School Street to SR 29. The state highways are slightly elevated, and it's anticipated that drainage from these main roads would inundate yards and driveways before draining gravitationally. All drainage in the village is gravitational because there are no storm or sanitary sewers.

Hazardous materials incidents in Mutual are a slight concern. Because the village relies on other communities for emergency services, the detection and the initial management of an incident could be challenging. Located at the juncture of two state highways and amid farmland, the chances of a hazmat incident are reasonably high.

Invasive species, earthquake, and land subsidence are very low concerns for Mutual. Should another tree disease similar to the Emerald Ash Borer develop, more trees could be affected, and become debris after storms. Village officials do not consider this a real vulnerability. An earthquake is possible because Champaign County sits near the highest earthquake risk area in Ohio but buildings are one and two stories high so damage would be manageable. There is no public water or wastewater infrastructure but wells and septic systems could be affected. Power lines would be vulnerable and roadways would be damaged. Again, isolation is one of the most concerning consequences.

Land subsidence not considered a risk, as dam failure is not either.

Mutual has ranked the threats and hazards as follows:

Table 2-44: Mutual Hazard Rank

Rank	Hazard
1	Tornado or Windstorm
2	Severe Thunderstorm
3	Power Failure
4	Hazardous Materials Incident
5	Severe Winter Storm/Blizzard
6	Flood
7	Drought and Extreme Heat
8	Earthquake
n/a	Dam or Levee Failure
n/a	Invasive Species

North Lewisburg

The village of North Lewisburg identified severe thunderstorms, tornado or windstorms, and severe winter storms as major concerns, along with power outages and floods. Village officials pointed out that simultaneous consequences from more hazard often occur. Rarely does high wind come without heavy rain, and the consequences include interrupted power and flooding. Tornadoes come with heavy rain, high winds, and power outages.

There is no generator-equipped emergency shelter in the village and most homes do not have a basement. When power is out for an extended period of time, as happens in widespread storms, there is nowhere for residents to go that has electricity. This is life threatening for people who require regular use of medical equipment and those who need heating and cooling to remain well. Elderly and children are highly vulnerable to the impact of extreme heat and cold conditions when accompanied by a lack of heating and/or cooling.

Severe storms create significant amounts of debris. The village's picturesque landscape with shade trees and vegetation is highly vulnerable to wind. With minimal village staff, it is

challenging to collect and dispose of debris in a timely manner after the storm. Severe thunderstorms and windstorms can damage mobile homes, manufactured homes and other structures. Roofs are damaged by wind and hail, siding is dented and torn off by wind and hail, and high winds cause trees, light poles, and other objects to fall onto houses and other buildings. Vehicles and outdoor equipment are easily damaged or destroyed by wind and hail.

Spain Creek runs through the village and exposes several apartments and properties to flash and riverine flood risk. The creek is not part of the county ditch maintenance program. The village and private residents have done their best to clean debris from the waterway, but EPA regulations prevent enough clearing of debris to improve water flow during and after heavy precipitation. It does not take much rainfall at all to cause street flooding and basements to hold water. Storm sewers are not able to carry enough water away; once the water gets to the creek, the debris jams prevent it from flowing freely. It is difficult in general for the village to manage any of the debris because the financial burden of overtime and additional disposal and equipment cost is overwhelming.

Due to aging infrastructure and financial constraints, there is infiltration between storm and sanitary sewers under conditions of heavy rain, prolonged rain, and significant ice and snow melt. There is concern about hazardous materials seeping into water and sewer lines if there were a significant spill during heavy rainfall. Likewise, a water quality emergency could be an outcome if the wells or water supply were to be contaminated in a hazardous materials spill.

There is limited concern that the village's wastewater treatment lagoons could overflow during heavy rain if the precipitation came quickly and intensely. The lagoon is not large enough to be a classified dam, but officials do have some concern. The lagoons are on the edge of village limits on SR 245 in Rush Township, but they are owned and operated by the village.

The few homes that do have basements experience sewer back up as well as seepage through walls, causing several inches of flooding. Some water heaters, furnaces, appliances and other possessions are destroyed. Most yards flood and some low-lying first floor spaces are inundated with floodwater. Sometimes residents are forced to leave their homes until the water recedes. Berms on streets are damaged, vehicles are stranded, and pavement can be lifted or broken apart by the water.

Winter storms increase the burden of snow management. Plowing sufficient to keep up with drifting streets and alleys is a full-time endeavor. The extreme cold, wind, low visibility, and ice underneath the snow makes managing of streets time consuming and expensive. If winter storm conditions cause power outages, the very old and young tend to be most vulnerable. Businesses suffer because of closures, lost access, and the inability of employees to report to work due to weather. Schools are often closed due to road conditions or power outages.

Extreme heat impacts the village as does as extreme cold. These incidents can place burden on electrical service and lead to outages. Elderly, disabled, and children need environmentally controlled residences so an extended outage could necessitate emergency sheltering for

residents. The village faces the dilemma of not having a generator-equipped shelter. A water outage would worsen this situation worse by limiting the use of water during an extreme heat event. Water outages due to a contaminated water supply, in general, would impact the community abruptly because of the lack of adequate, on-site bottled water and the need to bring supplies to the village from outside sources. Any water emergency could negatively impact the ability to fight fires, especially if high wind, extreme heat, drought or very dry conditions, and a water compromise occurred simultaneously.

North Lewisburg has been impacted by tree damage from the Emerald Ash Borer but most of the ash trees have been removed. If another invasive species were to develop or find its way to the village, they could anticipate tree problems and vegetation management issues.

Village officials are concerned slightly about earthquake because of the history in adjacent counties, although an incident is not highly likely. Roads and infrastructure could be damaged or destroyed by a strong quake but residential structures are expected to withstand the forces of a mild earthquake. Trees, power lines, and other utilities could be destroyed.

Hazardous materials incidents are possible but participants rated the hazard low on the list of possibilities. The state highways that cross the village bring truck traffic and local farmers transport anhydrous ammonia through town. A collision or container failure could cause an incident but officials felt that first responders are able to handle most incidents and keep disruption to a minimum.

North Lewisburg has ranked the threats and hazards as follows:

Table 2-45: North Lewisburg Hazard Rank

Rank	Hazard
1	Severe Thunderstorm
2	Tornado and Windstorm
3	Flood
4	Severe Winter Storm
5	Power Outage
6	Hazardous Materials Incident
7	Drought and Extreme Heat
8	Dam or Levee Failure
9	Invasive Species
10	Earthquake

St. Paris

St. Paris is located on the west-central side of Champaign County and is home to slightly over 2,000 residents. Village officials rated severe thunderstorms as their greatest concern, with tornado and windstorms second. The destruction caused by both hazards is extensive, and they can pop up almost without warning. It is difficult to get people to heed warnings immediately, but that is often what is needed when protective actions are given. They felt

these storms are stronger than they used to be, and are more frequent as well. Storms involving wind take trees down, destroy roofs, siding and windows in homes and businesses, and damage vehicles. Streets can be blocked by debris, including vegetation and trees as well as remnants of homes or buildings. Hail is sometimes catastrophically destructive, ruining cars, siding on homes, and roofs in a very short period of time. Mobile and manufactured homes are particularly susceptible to damage and often fare the worst in these kinds of storms, and St. Paris is concerned about this.

Flooding is a high concern to St. Paris officials. The northeast quadrant of the village is prone to flooding as drainage flows through the Harmon Main Ditch, Sarah McMorran Ditch, McMorran Brothers Ditch, McMorran Ditch and Saint Paris Ditch. These waterways are too small for the amount of land that drains into them, and thus a back-up of floodwaters occurs. Roads are closed or partially closed, and debris collects in the area. There are no houses in this particular segment of the village but the impact on streets, roads, and clean-up efforts is significant. There are a few areas where water collects in basements, yards, and sidewalks. Recreational areas and parks are flooded and unable to be used. In extreme precipitation events, St. Paris does experience flooding inside homes. Basements are flooded and residents lose appliances, furnaces, water heaters, and possessions. Sometimes the interior flooding is seepage through the structures' walls and other times the sanitary and storm sewers back up into the homes. Outside, water spewing out of storm drains or catch basins can be observed in the heaviest part of the storm. Post-storm cleanup is difficult and some areas are inaccessible for quite some time due to standing water.

Power outages are an ominous threat, especially if the outage lasts more than a few hours, or happens in extreme weather. Planning participants said that outages are frequent and most likely caused by poor distribution lines and the village's location at the end of distribution zones. They indicated that residents endure lengthy outages when repairs are not made quickly. Critical communications are affected when power is out or towers have been damaged by wind, and this inhibits the ability of public safety crews to communicate when rescues and emergency calls are in process. Power outages cause loss of foodstuffs, difficulty heating and cooling homes and businesses, and short-term business and school closures. Residents who require regular use of medical equipment are unable to stay at home. There are generators at the school, but the village does not have a generator to power the police department where emergency communications are housed. The school serves as a shelter when power outages are extended in duration, but there is some concern about having space and services for enough residents if a significant or long-term evacuation was necessary.

Hazardous materials incidents are considered another serious concern. In addition to highway and rail lines, there are numerous pipelines in the St. Paris area. These pipelines transport natural gas and petroleum products through 6" and 8" lines. Additionally, there is a 90,000-gallon propane storage facility just outside the village. As a rural community, agricultural chemicals are also moved through town on a regular basis. There is also an agriculture facility just across the Clarke County border to the south. An incident at this facility would have a significant impact on St. Paris and the surrounding townships. All of these issues increase the

village's risk for hazardous materials incidents. With more difficulty recently in recruiting and maintaining public safety volunteers, the hazardous materials possibilities necessitate even more volunteers, and more training for each one. Today, that is a challenge across Ohio.

Winter storms bring ice, sleet, snow, and drifting that places additional burden on village services. Falls, injuries, medical emergencies, and vehicle accidents increase in extreme winter weather conditions, placing additional stress on first responders. Special populations require assistance and village crews are stretched to meet needs. The village incurs significant expense as they struggle to help residents recover and sustain village operations.

Drought and extreme heat are a high threat for elderly, disabled, medically dependent and young persons. They do not tolerate environmental extremes well, and emergency care would be necessary for many of them if a drought made ample water unavailable under extreme temperature conditions. If the power grid failed and air conditioning was not available, that would worsen the situation and possibly make it deadly.

Invasive species ranked as the lower concerns in St. Paris. Planning team participants did not feel it was a significant risk in the village but did recognize it as a possibility. They also felt that it was not a significant risk because the trees damaged by the Emerald Ash Borer have been taken down in years past.

An earthquake is unlikely but could damage all infrastructure, including water treatment, wastewater treatment, distribution lines, electricity poles and lines, and roadways, bridges and culverts. Homes would be damaged but probably not destroyed; schools, police stations and other critical infrastructure would be severely damaged.

The village is not susceptible to dam failure.

St Paris officials felt that storms are slightly stronger than they typically have been, and rain falls harder and faster than in years past. They are concerned about the number of tornadoes, especially in 2024 so far. They did not feel winter storms are as bad as they used to be, and snow amounts are lower by a significant amount. They do have concern about the number of rail and highway vehicles carrying hazardous materials, but that is caused by commerce and transportation, and has nothing to do with a changing environment.

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

Table 2-46: St. Paris Hazard Rank

Rank	Hazard
n/a	Dam or Levee Failure
1	Severe Thunderstorm
2	Tornado or Windstorm
3	Flood
4	Power Outage

5	Hazardous Materials
6	Severe Winter Storm
7	Drought and Extreme Heat
8	Invasive Species
9	Earthquake

Urbana

Urbana officials ranked severe thunderstorms, tornadoes, and windstorms as their greatest major concerns. These storms can crop up suddenly without much warning, and strike hard. Many times, residents don't have the chance to know they are coming. Severe storms damage homes, commercial buildings, vehicles and landscape. Homeowners experience roof damage, dented and bent siding, downed trees, damaged landscaping, and large amounts of debris to clean up. Mobile and manufactured homes are more susceptible to wind damage because they have a less resistant foundation and are easier to tip over and pull off the foundation. Although there are fewer mobile and manufactured homes in Urbana than in years past, there are still many that incur extensive damage. Power lines can topple in severe storms, cutting off power and leaving live wires dangling. Commercial buildings suffer structural losses such as roof damage, windows, siding, and exterior surface damage from pelting hail, high wind, or ice. Hail, ice and flying debris also damage to vehicles, and high-profile vehicles like box trucks and vans can tip over in wind and wind gusts. Trees will topple under extreme conditions, and smaller branches become flying debris that strikes buildings and vehicles, or anything else in the way.

In addition to property damage, smaller debris tends to collect in waterways and block storm drains, catch basins, culverts, and drainage ditches; these blockages prevent water from draining and cause or exacerbate flash flooding. In the most severe storms, streets can become blocked with branches and limbs that must be removed by city workers before streets can reopen. It is possible but infrequent for city workers or property owners to be injured lifting limbs or moving debris. The greatest risk to those cleaning up after storms is coming into contact with a live electrical wire.

Urbana officials are concerned about sheltering in severe storms. The city has many homes without basements, including slab construction and multi-family apartment buildings. They expressed concern for elderly, disabled, and low-income populations in the context of severe storms and storm clean up. Adequate warning and notification, protective actions, and clean-up activities can be difficult for these particular groups. They are often at higher risk due to health conditions or a lack of general resources and concern for their safety and well-being after storms is a concern of city officials.

The city is also concerned about the lack of warning and notification systems that make residents aware of dangerous weather situations. Urbana does not have outdoor warning sirens but does use an opt-in mass notification system. It is always difficult to convince all residents to sign up for opt-in notification calls, and officials are concerned about those residents who do not register. Many residents, especially older people, are not familiar with the technology necessary to use the wireless warning systems. Transient and non-residential people can be

hard to reach as well, and often do not know anything about signing up for cell phone alerts. Alternate methods of personal notification are hard to identify, and even more difficult to implement. Outdoor warning sirens are very expensive to install and maintain; therefore, warning and notification are challenging in this small rural city.

Severe weather can make communication between first responders difficult too. While the county has adopted the MARCS radio system, not all departments and disciplines are able to use it. There are some transmission problems in the county and officials are concerned that the statewide MARCS system does have the capacity to serve everyone in a catastrophic incident. In general, they are very concerned about the lack of radio communication and warning/notification redundancy, and feel that a secondary communication system needs to be developed and implemented.

Because of the major highways and thoroughfares that traverse Urbana, the city has significant risk for hazardous materials spills. Route 68 is a federal highway that crosses the center of Urbana, including the roundabout in the center of the downtown area. This roadway has especially high volume. At least 25,000 vehicles per day; at least 10% of these vehicles are trucks. When commercial traffic is combined with regular traffic, crashes can occur, creating the potential for a hazardous substance spill or leak. If this occurred in a highly populated area, evacuation would be necessary, and safe routes out of the area could be impacted and make it difficult for people to leave. While most truck and rail traffic transports farm products like grain, the exception involving a chemical could have an impact. Many types of hazardous materials, including petroleum products, agricultural chemicals, and any other material hauled through the area, could cause significant problems if a crash were to occur that caused a tank to fail or a stem to breach.

With an elderly population, and many low-income families living in poverty, a drought and heat wave could have exceptional consequences. An increasing number of elderly who are ill, disabled, or dependent upon medical equipment and medications in the city causes a higher concern for this threat. Shelters would need to be established for a long-term power outage, and that would also necessitate transportation services and medical caregivers. Many elderly no longer have family living in the area, and a larger number of residents would depend upon the city to take care of them. This would be extremely difficult, especially if the power outage accompanied the incident for several days or more.

Power outages caused by severe storms, wind, ice, or excessive demand due to extreme temperatures are high on Urbana's disaster radar. The city has identified viable community shelters but many facilities do not have generators and would be hard pressed to meet housing needs for more than a few hours. While the public schools have facilities that would be excellent storm shelters, they are not equipped with alternate power supplies with the exception of the Urbana Pre K – 8 building. Most city infrastructure is generator equipped but some generators are old or undersized and should be replaced. Because of this, their concern about power outages is high, especially if it is caused by extensive damage to distribution lines or substations.

Urbana is vulnerable to flash flooding. Streets in some sections of town drain slowly, leaving ponded water that interferes with travel for a period of time after heavy downpours. Some basements experience water from seepage through the walls and some multi-family housing units have a history of floodwater in living spaces. In the northwest section of the city, the basement and living space water issues have been improved through installation of better storm sewers and more capacity. Other areas of the city are more frequently flooded because the improvements have not been made. This flooding can cause the loss of furnaces, hot water heaters and appliances as well as possessions and furnishings in an area with concentrated population density. The parking area and helipad around the local hospital can flood during heavy rainfall, rendering that area inaccessible and unusable. The City Hall basement can flood under extreme conditions, causing operations to be relocated and materials stored there to be damaged. Some storm drains and storm sewers have been replaced, which has lessened the street flooding but there are still streets that become temporarily impassable. More infrastructure improvements are necessary, and work with private landowners should continue, as it has with the Settler's Ridge apartment complex. This property used to flood readily with heavy rain, but a new owner has worked with the city to make drainage improvements that have lessened the flooding in the last five years.

Winter storms are problematic not due to long-term damage, but due to disruption of daily activities and work, and the cancellation of school operations and other business closures while roads are cleared once the storm stops. This work is incredibly expensive. It is more expensive that in the past as the city uses more environmentally-friendly products to melt ice and snow on the roadways, and to lessen the damage done by road salt to plants, trees, and other vegetation. The loss of commerce due to severe winter storms, and the disruption to the business flow of the city are felt when severe winter storms hit.

An invasive species affecting trees or vegetation would cause debris and weakened trees, all becoming fodder and flying objects in storms. Officials have managed the Emerald Ash Borer outbreak and those trees have been removed, so they do not rank this high on their concern list. However, there are a whole host of new invasive species on a very long statewide list of potential problem-makers. If rising temperatures, heavier rain, and more humidity develop as part of climate change, this could have an effect on invasive species and make them more of a problem as they thrive in hotter, more humid environments.

An earthquake is highly unlikely but if a strong quake were to occur, damage could be significant. Infrastructure, including power lines, sewers and water lines, underground utilities, and roadways, could incur extensive damage. While there are few multi-story buildings, there are many buildings that would be vulnerable to shaking and rumbling because they are constructed of brick, stone and other masonry. Building damage could be significant. This ranked low not because there would be no damage, but, like tornado, because the incidence numbers are low.

The city is not susceptible to dam failure.

Urbana has ranked the threats and hazards as follows:

Table 2-47: Urbana Hazard Rank

Rank	Hazard
1	Severe Thunderstorm
2	Tornado or Windstorm
3	Hazardous Materials Incident
4	Drought and Extreme Heat
5	Power Outage
6	Flood
7	Severe Winter Storm
8	Invasive Species
9	Earthquake
n/a	Dam or Levee Failure

Woodstock

This tiny community ranked power outages and severe storms, including thunderstorms, wind, and winter weather events, of all type as their primary concerns. These storms often cause the power outages, placing residents in difficulty without power to operate heating and air conditioning systems, or to power critical healthcare equipment. Power outages make sump pumps and other protective equipment useless, and the damages from flooding and exposure cause loss to homeowners.

The village is vulnerable to wind damage such as roof, siding, and window damage in homes and structural damage to farm buildings, grain operations, and homesteads. The wind can cause trees to fall, blocking streets, driveways, and alleys. Rapid rainfall can cause streets to flood and houses to become surrounded by water. Homes with basements can experience some basement flooding, ruining furnaces, hot water heaters, appliances, and possessions. Driveways can be isolated from roadways, cars can be flooded in, and the highway can be covered in water. With almost completely flat elevations, water can take some time to naturally drain away.

Ice storms, wind, and vehicle accidents can also cause power outages. The village has no generators, so they are forced to go to North Lewisburg or Mechanicsburg for sheltering. There is only one small food market in town so residents must travel to purchase supplies, food, and bottled water. There is no designated shelter in the village, but there could be an agreement with the Freewill Baptist Church if necessary. The church is not generator powered so the ability to provide refuge for affected residents would be diminished in a prolonged power outage, and would simply put a roof over the heads.

It is difficult for the village to manage clearing streets amid heavy, blowing snow or huge amounts of debris. Workers are volunteers and have jobs elsewhere but work as available to meet the village's needs. Heavy debris or streets that need significant maintenance present a

big challenge to the village officials. They can become dependent upon North Lewisburg for assistance because it is the closest municipality to Woodstock.

Woodstock is an isolated rural community with one state highway that crosses town. Hazardous materials spills can result from vehicle accidents as trucks travel the area. Farmers and agricultural services haul anhydrous ammonia and other farm chemicals through town for field application and they can incur spills, leaks, and accidents as well. Woodstock is dependent upon a district fire service to manage these incidents and at times it takes expertise beyond the local capacity to handle a chemical incident. The resulting vulnerability of the air, land, and waterways is a concern, although not an incredibly likely incident.

Woodstock has little concern over changing weather patterns. They feel storms are not changing much except for occasional intense rain. They did mention that warmer temperatures, heavy rain, and humidity could accelerate the presence of invasive species such as various forms of insects.

Woodstock is not vulnerable to dam failure or invasive species.

Woodstock has ranked hazards according to the table below:

Table 2-48: Woodstock Hazard Rank

Rank	Hazard
1	Severe Thunderstorms
2	Tornado or Windstorm
3	Power Outage
4	Severe Winter Storm
5	Hazardous Materials Incident
6	Flood
7	Drought and Extreme Heat
8	Invasive Species
9	Earthquake
n/a	Dam or Levee Failure

All-hazard Approach to Vulnerability

All hazards were averaged to arrive at a county-wide vulnerability ranking. Hazard rating totals were added and divided by the number of jurisdictions that listed the hazard as valid. There was no effort to adjust the ratings according to population counts or property values. This was a rating intended to simply give the elected and appointed officials an indication of what hazards could be addressed collaboratively and how important each might be when looking at the entire county.

Table 2-49: Countywide Overall Average Vulnerability Prioritization

Hazard	Townships/Other	Christiansburg	Mechanicsburg	Mutual	North Lewisburg	St. Paris	Urbana	Woodstock	Average Score	OVERALL RANK
Dam/Levee Failure	9	n/a	n/a	n/a	8	n/a	n/a	n/a	8.50	**9**
Drought/Extreme Heat	7	7	7	7	7	7	4	7	6.63	**7**
Earthquake	10	8	9	8	10	9	9	9	9.00	**10**
Flood	5	5	5	6	3	3	6	6	4.88	**5**
Haz. Materials Incident	6	6	6	4	6	5	3	5	5.13	**6**
Invasive Species	8	n/a	8	n/a	9	8	8	8	8.17	**8**
Power Outage	4	4	1	3	5	4	5	3	3.63	**3**
Severe Thunderstorms	1	2	3	2	1	1	1	1	1.50	**1**
Tornado or Windstorm	2	1	2	1	2	2	2	2	1.75	**2**
Winter Storm	3	3	4	5	4	6	7	4	4.50	**4**

2.3.7 National Risk Index Vulnerability Assessment

The National Risk Index compares the ten census tracts in the county by hazard and establishes a vulnerability assessment for each area. This tool categorizes threats differently than Champaign County stakeholders. Most of the differences are because local stakeholders combined hazards because they do not occur as single hazards in Ohio. For example, ice storm or lightning, are separate categories for the NRI but stakeholders combined them into winter storms or thunderstorms because they do not occur separately. Therefore, as presented here, there is some editorial liberty exercised to utilize both local and federal assessments.

The following table compares the NRI single-hazard ranking in terms of comparing estimated annual losses to determine the rank of the hazard, based solely upon NRI data. As this methodology is applied to total estimated loss vs. potential structural loss vs. agricultural loss vs. population equivalency to determine the effect on people, each set of results is very different. The table below shows how, when data is manipulated in that fashion, it can result in varied conclusions. The top three hazards in each area of vulnerability are highlighted in yellow. Please note that drought is not included in the NRI data, nor are several other hazards identified by Champaign County stakeholders. These conclusions are not consistent with stakeholder input and feedback, and are presented for comparison only.

Table 2-50: NRI Estimated Annual Loss Ranking Comparison by Target Group

Hazard	Total Estimated Annual Loss	Estimated Agricultural Loss	Estimated Structural Loss	Estimated Population Equivalency
Cold Wave	9	2	11	10

Earthquake	5	Not rated	5	5
Hail	10	3	6	11
Heatwave	7	4	12	4
Ice Storm	4	Not rated	3	9
Landslide	11	Not rated	7	8
Lightning	6	Not rated	9	3
Riverine Flooding	2	1	8	1
Windstorm	3	5	2	6
Tornado	1	6	1	2
Wildfire	12	Not rated	10	12
Winter Storm	8	7	4	7

The following information is taken from the National Risk Assessment tool. This assessment establishes the county's vulnerability by census tract and broken into individual hazard categories. It includes the exposures as well as expected annual losses for various hazards.

The following tables describe exposures and expected annual losses for various components of the community.

Table 2-51: Cold Wave Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	$1,329,901,955	6,668	$30,804,498	$382	$951	$7,330	**$8,663**
39021011501	$823,414,174	4,333	$31,771,281	$237	$618	$7,560	**$8,414**
39021011504	$1,144,953,479	5,113	$24,203,761	$329	$729	$5,759	**$6,817**
39021011506	$517,088,488	3,159	$13,086,569	$149	$450	$3,114	**$3,713**
39021011001	$447,629,258	2,666	$11,476,634	$129	$380	$2,731	**$3,240**
39021011505	$556.299.051	3,262	$10,007,629	$160	$465	$2,381	**$3,006**
39021010100	$335,275,740	1,872	$10,651,772	$96	$267	$2,535	**$2,898**
39021010400	$733,641,421	3,890	$4,275,260	$211	$555	$1,017	**$1,783**
39021010500	$893,182,985	3,996	$408,901	$257	$570	$97	**$924**
39021010600	$886,187,985	3,714	$447,838	$255	$529	$107	**$891**
Grand Total	**$7,667,574,489**	**38,673**	**$137,134,143**	**$2,204**	**$5,513**	**$32,631**	**$40,349**

Table 2-52: Earthquake Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	EAL (Building)	EAL (Pop Equiv)	EAL (Total)
39021010200	$1,329,887,000	6,668	$39,009	$11,595	**$50,604**
39021011501	$893,168,000	3,996	$28,242	$7,345	**$35,587**
39021011504	$733,629,000	3,893	$25,242	$6,196	**$31,438**
39021011506	$886,175,000	3,714	$24,612	$5,940	**$30,552**
39021011001	$1,144,940,000	5,117	$22,160	$4,708	**$26,868**
39021011505	$823,405,000	4,350	$18,732	$5,463	**$24,194**
39021010100	$447,621,000	2,683	$8,498	$2,927	**$11,425**
39021010400	$517,078,000	3,159	$8,653	$2,475	**$11,129**
39021010500	$556,286,000	3,262	$8,159	$2,449	**$10,608**
39021010600	$335,268,000	1,872	$4,088	$1,273	**$5,460**
Grand Total	**$7,667,457,000**	**38,714**	**$187,396**	**$50,470**	**$237,865**

Table 2-53: Hail Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	$1,329,901,955	6,668	$30,804,498	$2,908	$296	$3,387	**$6,591**

39021011501	$1,222,953,479	5,113	$24,203,761	$2,657	$239	$2,823	**$5,720**
39021011504	$823,414,174	4,333	$31,771,281	$1,848	$196	$3,563	**$5,607**
39021011506	$517,088,488	3,159	$13,086,569	$1,211	$149	$1,541	**$2,901**
39021011001	$556,299,051	3,262	$10,007,629	$1,299	$154	$1,170	**$2,622**
39021011505	$447,629,258	2,666	$11,476,634	$1.006	$122	$1,283	**$2,411**
39021010100	$733,644,.050	3,890	$4,275,260	$1,711	$183	$481	**$2.376**
39021010400	$893.182,938	3,996	$408,901	$2,091	$189	$48	**$2,328**
39021010500	$886,188,419	3,714	$447,838	$2,075	$176	$53	**$2,303**
39021010600	$335, 275,740	1,872	$10,651,772	$$785	$88	$1,254	**$2,128**
Grand Total	**$7,667,577,552**	**38,673**	**$137,134,143**	**$17,592**	**$1,792**	**$15,604**	**$34,987**

Table 2-54: Heatwave Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	$1,329,901,955	6,668	$30,804,498	35	$16,519	$1,369	**$17,923**
39021011501	$1,444,953,479	5,113	$24,203,761	30	$12,667	$1,076	**$13,773**
39021011504	$823,414,174	4,333	$31,771,281	21	$10,735	$1,412	**$12,168**
39021011506	$893,182,174	3,996	$408,901	23	$9,900	$18	**$9,941**
39021011001	$733,641,421	3,890	$4,275,260	19	$9,637	$190	**$9,846**
39021011505	$886,187,985	3,714	$447,838	23	$9,201	$20	**$9,244**
39021010100	$556,299,051	3,262	$10,007,629	14	$8,081	$445	**$8,541**
39021010400	$517,088,488	3,159	$12,086,569	13	$7.826	$582	**$8,421**
39021010500	$447,629,258	2,666	$11,476,634	12	$6,605	$10	**$7,127**
39021010600	$335,275,74-	1,872	$10,651,772	9	$4,638	$473	**$5,120**
Grand Total	**$7,667,574,489**	**38,673**	**$137,134,143**	**200**	**$95,809**	**$6,096**	**$102,104**

Table 2-55: Ice Storm Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	EAL (Building)	EAL (Pop Equiv)	EAL (Total)
39021010200	$1,329,901,955	6,668	$54,951	$2,919	$57,870
39021011501	$1,144,953,479	5,113	$47,230	$2,245	$49,475
39021011504	$893,182,938	3,996	$33,453	$1,545	$34,998
39021011506	$886,187,985	3,714	$33,191	$1,436	$34,627
39021011001	$823,414,174	4,333	$30,840	$1,676	$32,516
39021011505	$733,641,421	3,890	$27,478	$1,504	$28,982
39021010100	$556,299,051	3,262	$21,605	$1,334	$22,939
39021010400	$447,629,258	2,666	$21,288	$1,351	$22,639
39021010500	$517,088,488	3,159	$19,367	$1,222	$20,589
39021010600	$335,275,740	1,872	$12,557	$724	$13,281
Grand Total	**$1,667,574,489**	**37,673**	**$301,960**	**$15,956**	**$317,916**

2-56: Landslide Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	EAL (Building)	EAL (Pop Equiv)	EAL (Total)
39021010200	$162,413,926	912	$1,265	$5,033	**$6,298**
39021011501	$120,371,246	658	$937	$3,633	**$4,571**
39021011504	$96,774,397	533	$754	$2,945	**$3,699**
39021011506	$74,307,449	363	$579	$2,006	**$2,585**
39021011001	$58,622,369	301	$457	$1,661	**$2,118**
39021011505	$49,536,915	307	$386	$1,696	**$2,081**
39021010100	$11,084,457	44	$86	$241	**$327**
39021010400	$4,733,106	33	$37	$184	**$221**
39021010500	0	0	0	0	**$0**
39021010600	0	0	0	0	**$0**
Grand Total	**$577,843,864**	**3,151**	**$17,400**	**$17,400**	**$21,900**

Table 2-57: Lightning Exposure and expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	EAL (Building)	EAL (Pop Equiv)	EAL (Total)
39021010200	$1,329,901,955	6,668	$1,062	$22,855	$23,917
39021011501	$1,144,953,479	5,113	$870	$16,574	$17,444

39021011504	$823,414,174	4,333	$692	$15,593	$16,285
39021011506	$8923,182,938	3,996	$696	$13,349	$14,046
39021011001	$733,644,050	3,890	$574	$13,040	$13,615
39021011505	$886,188,419	3,714	$691	$12,421	$13,112
39021010100	$556,299,051	3,262	$404	$10,163	$10,567
39021010400	$517,088,488	3,159	$357	$9,495	$9,852
39021010500	$447,629,258	2,666	$345	$8,769	$9,113
39021010600	$35,275,740	1,872	$236	$5,664	$5,900
Grand Total	**$7,667,577,552**	**38,673**	**$5,927**	**$127,924**	**$133,851**

Table 2-58: Riverine Flooding Exposure and Expected Annual Loss

Census Tract	Exposure (Sq. Mi.)	Exposure (Buildings)	Exposure (Population)	Exposure (Agriculture)	EAL (Buildings)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	6.4522	$38,297,554	243	$2,473,836	$2,748	$89,305	$36,218	**$128,271**
39021011501	9.4572	$24,178,372	164	$3,544,942	$1,735	$60,204	$51,941	**$113,880**
39021011504	0.0436	$31,370,996	232	$7,825	$2,251	$85,503	$115	**$87,869**
39021011506	5.0030	$56,771,869	88	$1,883,985	$4,073	$32,276	$27,605	**$63,954**
39021011001	4.7528	$13,186,793	64	$1,778,555	$946	$23,379	$26,060	**$50,385**
39021011505	1.1245	$3,629,510	29	$448,809	$260	$10,585	$6,576	**$17,422**
39021010100	0.0334	$19,505,353	43	0	$1,400	$15,731	$0	**$17,130**
39021010400	1.3375	$2,397,542	15	$504,148	$172	$5,419	$7,387	**$12,978**
39021010500	0.8263	$2,484,929	6	$338,575	$178	$2,167	$4,961	**$7,306**
39021010600	0.2930	$0	0	$127,433	0	0	$1867	**$1,867**
Grand Total	**29.3234**	**$191,822,919**	**883**	**$11,106,109**	**$13,764**	**$324,570**	**$162,729**	**$501,062**

Table 2-59: Strong Wind Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	$1,329,901,955	6,668	$30,804,498	$58,409	$6,820	$1,222	**$66,451**
39021011501	$1,144,953,479	5,113	$24,203,761	$45,106	$4,676	$860	**$50,642**
39021011504	$823,414,174	4,333	$31,771,281	$34,751	$4,283	$1,220	**$40,254**
39021011506	$893,182,938	3,996	$408,901	$35,713	$3,731	$15	**$39,460**
39021011001	$886,188,419	3,714	$447,838	$35,434	$3,468	$16	**$38,918**
39021011505	$733,644,050	3,890	$4,275,260	$29,489	$3,650	$163	**$33,303**
39021010100	$556,299,051	3,262	$10,007,629	$22,098	$3,015	$355	**$25,469**
39021010400	$517,088,488	3,159	$13,086,569	$20,675	$2,950	$473	**$24,098**
39021010500	$447,629,258	2,666	$11,476,634	$19,337	$2,679	$451	**$22,467**
39021010600	$335,275,740	1,872	$10,651,772	$13,406	$1,748	$385	**$15,538**
Grand Total	**$7,667,577,552**	**38,673**	**$137,134,143**	**$314,418**	**$37,021**	**$5,160**	**$356,600**

Table 2-60: Tornado Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	$1,329,901,955	6,668	$30,804,498	$147,526	$55,627	$276	$203,429
39021011501	$1,144,953,479	5,113	$24,203,761	$120,472	$39,108	$212	$159,791
39021011504	$893,182,938	3,996	$408,901	$96,229	$31,553	$4	$127,786
39021011506	$823,414,174	4,333	$31,771,281	$89,804	$35,051	$275	$125,130
39021011001	$886,188,419	3,714	$447,838	$95,475	$29,326	$4	$124,805
39021011505	$733,644,050	3,890	$4,275,260	$79,134	$30,779	$37	$109,949
39021010100	$556,299,051	3,262	$10,007,629	$59,380	$25,374	$85	$84,839
39021010400	$517,088,488	3,159	$13,086,569	$55,718	$24,944	$108	$80,771
39021010500	$447,629,258	2,666	$11,476,634	$50,117	$22,555	$112	$72,484
39021010600	$335,275,740	1,872	$10,651,772	$36,126	$14,782	$100	$51,009
Grand Total	**$7,667,577,552**	**38,673**	**$137,134,143**	**$829,982**	**$309,098**	**$1,213**	**$1,140,293**

Table 2-61: Wildfire Exposure and Expected Annual Loss

Census Tract	Exposure (Sq.Mi.)	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	0.9185	$17,084,718	101	$402,424	$270	$25	$0	**$997**
39021011501	6.4936	222,383,792	1,234	$2,250,182	$908	$88	$0	**$568**
39021011504	0.6058	$34,802,997	202	$202,304	$139	$14	$0	**$516**

39021011506	0.0871	$46,547,742	261	$6,733	$186	$18	$0	**$408**
39021011001	0.1194	$74,690,124	396	$2,064	$299	$28	$0	**$327**
39021011505	3.4619	$110,894,910	727	$1,322,059	$461	$54	$0	**$295**
39021010100	3.7567	$87,638,211	508	$1,335,459	$370	$38	$0	**$204**
39021010400	3.7394	$103,293,681	556	$1,438,631	$518	$50	$0	**$153**
39021010500	1.2943	$32,061,797	224	$505,998	$134	$16	$0	**$151**
39021010600	1.1595	$24,690,179	133	$432,940	$125	$14	$0	**$139**
Grand Total	**21.6362**	**$754,088,151**	**4,342**	**$7,898,795**	**$3,411**	**$345**	**$0**	**$3,758**

Table 2-62: Winter Weather Exposure and Expected Annual Loss

Census Tract	Exposure (Buildings)	Exposure (Population	Exposure (Agriculture)	EAL (Building)	EAL (Pop Equiv)	EAL (Agriculture)	EAL (Total)
39021010200	$335,275,740	1,872	$10,651,772	$2,365	$1,537	$35	$14,958
39021011501	1,329,901,955	6,668	$30,804,498	$9,382	$5,474	$102	$12,355
39021011504	$733,641,421	3,890	$4,275,260	$5,176	$3,194	$14	$9.583
39021011506	$893,182,938	3,996	$408,901	$6,301	$3,281	$1	$9,471
39021011001	$886,187,958	3,714	$447,838	$6,252	$3,049	$1	$9,203
39021011505	$447,629,258	2,666	$11,476,634	$3,158	$2,189	$38	$8,383
39021010100	$823,414,174	4,333	$31,771,281	$5,809	$3,557	$105	$6.636
39021010400	$1,144,953,479	5,113	$24,203,761	$8,077	$4,198	$80	$6,285
39021010500	$556,299,051	3,262	$10,007,629	$3,925	$2,678	$33	$5,384
39021010600	$517,088,488	3,159	$13,086,569	$3,648	$2,593	$43	$3,937
Grand Total	**$7,667,574,489**	**38,673**	**$137,134,143**	**$54,093**	**$31,749**	**$452**	**$86,294**

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 Champaign County's risk for each specific hazard.

2.4.1 Dam/Levee Failure Damage Profile

There is one high-hazard dam in Champaign County, and there are seven significant-hazard dams. The high hazard dam is owned privately and is located at Stroman Lake. The condition of the dam is satisfactory, and they have no indication of any kind of threat of failure at this time. There is an emergency action plan on file with ODNR and the Champaign County EMA, and the owner has worked with the Champaign County EMA to establish notification processes and to obtain assistance if the dam were ever to fail. There are regular inspections of this facility. It's professional design and management are considered adequate, and there is no failure anticipated. The inundation zone around the dam includes nice homes. The losses would reasonably be expected to include the loss of life and significant property damage.

There are seven significant hazard dams, and four of these are located at East Fork Buck Creek, built for the purpose of flood risk reduction dams by a conservation district. Kiser Lake dam is a recreational facility, as is Runkle Farm Pond Dam. Shore Lake Dam is also recreational. Kiser Lake Dam is owned and operated by the Ohio Department of Natural Resources, but the other dams are privately owned. They are all significant hazard dams that do not have emergency action plans on file.

There are several other Class IV/Other dams in the county. None of these are expected to cause any damages if they were to fail except for minor damage to the owner's property. These dams appear on the ODNR dam locator but do not appear on the National Inventory of Dams.

2.4.2 Drought/Extreme Heat Damage Profile

Champaign County can experience slight drought and occasionally experiences periods of decreased precipitation during the agriculture-growing season. The climate is moderate and does not turn arid at any time. There is not any significant 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 contribute to a series of years with higher or lower average yields due to slight dryness and late planting or harvest because of excessive rainfall.

Climate change could have a significant effect on Champaign County, especially for agriculture and the elderly or disadvantaged populations in the county. The ClimRR tool indicates that maximum average annual temperatures may rise from 2.75 (F) to 3.53 (F) mid-century, and by 5.52 (F) to 9.40 (F) by the end of the century. This translates to an annual average maximum temperature right now, in 2023, at 56.82 (F) could be as high as 66.22 (F) by the end of the century.

The detail of those heat projections includes the number of days with a heat index that is problematic. Today, there are approximately 3.2 days with a heat index over 95 (F). By mid-century that number of days could increase as far as 9.43 days with a heat index over 95 (F), and by end-of-century to 30.27.

Because Champaign County has some livestock producers, including beef cattle, dairy cattle, poultry, swine and sheep, the effects of high temperatures could be devastating to those individuals. There is limited ability to control the environment in livestock barns. Death, dehydration, and illness will be far more prevalent when temperatures soar for longer periods of time and to higher levels. If increasing temperatures are combined with less rainfall, or even longer periods of time during episodes of rainfall, the limited availability of water for animals will be difficult for farmers to manage. Most livestock water is provided by wells; if wells become dry, alternate sources of water will be through commercial providers. Livestock require hydration; the absence of adequate hydration negatively impacts growth, milk production, reproduction, and the health of the animals. The negative economic impact will be significant.

Farm crop production may be negatively impacted by higher temperatures and changes in rainfall. If rain is scant after planting or during pollination seasons, germination and maturation will not occur. If rain is extremely light or heavy, yields will be negatively impacted. If rain is excessive during either planting or harvest season, the crops cannot get planted, they don't grow when they wash away, weeds grow profusely in wet, soggy ground, and plant disease thrives on very dry or very wet conditions.

Farmsteads, as well as some rural homes, depend upon wells for water in many cases. As rainfall becomes inconsistent, wells dry up or cisterns overflow. For those water systems that pull from the ground water supply or local waterway, less rainfall up the entire watershed would result in less available water for treatment and distribution. While the average rainfall may not change much, the way in which it falls and the spread of amounts over the year will have a huge impact on household use of water. Should high temperatures occur, many rural homes are not air conditioned, and farmers who work outside don't have the ability to control an outdoors environment. The power grid would be stressed to handle such temperatures and heat index levels. Those who live with economic difficulties could find themselves unable to afford electricity at these levels. Older county residents with medical conditions may suffer due to these circumstances. Underserved and disadvantaged people may suffer more because they have so few resources, and may eventually migrate to the cities for environmental amenities. The cascading economic downturn for the county could be damaging to all county residents and businesses.

In a rural county with open fields and some wooded area, grain crops, and homesteads, fire could become an issue. If water is not generously available to fight fires, the spread of field fires across hundreds of acres in the hot, dry summer weather could be significant. Not only would those losses affect agriculture, but also would endanger the many small businesses, villages, residences and schools built out in the rural areas of Champaign County. The ClimRR wildfire projections support this prediction. Chances of field fires is already relatively high; the fire weather index will increase by mid-century. The ClimRR wildfire index rises in Champaign County from Medium to high in autumn months, and lowers from medium to low in spring.

For the purpose of loss estimates, only the major cash grain crops were considered because those crops constitute the majority of production in Champaign County. 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 Champaign County.

Based on the U.S. Department of Agriculture's 2022 Census of Agriculture, Champaign County's agriculture industry has a total market value of $228,006,000. In a drought, these commodities would all be exposed to loss. Table 2-63 identifies the value of the primary agricultural commodities in the county that would be exposed to drought-related loss. Some statistics were withheld on the farm census report to maintain confidentiality of individual producers.

Table 2-63: Drought Vulnerability Assessment

Commodity	Cash Receipts (2022)
Grains, oilseeds, dry beans, dry peas	$174,686,000
Fruits, tree nuts, berries	$687,000

Nursery, greenhouse, floriculture, sod	Not disclosed
Vegetables	Not disclosed
Cultivated Christmas trees	Not disclosed
Other crops and hay	$1,648,000
Total Crops	$188,399,000
Poultry and Eggs	$206,000
Cattle and Calves	$5,555,000
Milk	$3,552,000
Hogs and Pigs	$28,535,000
Sheep and Goats, wool, mohair, milk	$527,000
Horses, ponies, mules, burros, donkeys	$10,000
Aquaculture and Other	Not disclosed
Total Livestock	$39,607,000

2.4.3 Earthquake Damage Profile

Earthquakes are geologically possibly but very rare in Champaign County. The county has not directly experienced any earthquakes in the past. Several have occurred in the greater western Ohio region although they have all been very minor and have caused no known damage. As such, there is little data to support committing resources to earthquake-proofing structures.

Examination of the loss projections indicated that most damage would affect wood and unreinforced masonry structures, and a great majority of those would be residential or agricultural buildings. Single family homes would be more affected than other residential buildings. Of critical facilities, schools would experience most of the damage with a couple police stations. The county EOC is at risk of damage. Not much infrastructure is expected to be damaged except a couple bridges, and many electrical and water lines. Electrical lines would take the longest to repair and replace with no service to 1% of the homes at one month out.

Because of the low risk and high cost of implementing mitigation strategies related to earthquake risk, the planning team did not identify aggressive actions. As they arrived at this decision, they considered earthquake damage projections in Table 2-52.

Table 2-64: Earthquake Exposure (NRI)

Exposure	Exposure Value
Building Value	$7,667,457,000
Population	38,714

2.4.4 Flood Damage Profile

Champaign County is vulnerable to minor to moderate flood damage, mostly from flash flooding. 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. Areas along the Mad River and major creeks across the county are prone to flooding. The river is wide and deep in some spots, but most flooding occurs along the and other waterways, especially in low lying areas.

In Champaign County, damaging flooding is generally preceded by 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 because they do sit at the relative top of the watersheds. If water is unable to drain away as fast as it comes due to frozen soils or saturation, flash flooding occurs in the streets, roadways, and some low-lying properties. Most residential damage is limited to flooded basements and access issues in general. There is only one repetitive loss property in the county that is known to emergency managers.

There is some thought that tiled fields allow the runoff to reach communities at a faster pace, causing street and roadway flooding to be worse than in years past. 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, which has increased in the aftermath of the Emerald Ash Borer infestation, washes into storm drains and clogs the storm sewers in some 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 storm 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 Champaign County can include damage and destruction of physical buildings, infrastructure, crops, and livestock. With 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, as well as mobile homes. Mobile homes are of particular concern to local officials. 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 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. The force of water could damage grain bins, transfer legs, and elevator systems very easily. 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 in residential basements and ground 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.

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

Within the county's villages, some areas exist where storm sewers are of insufficient size and capacity to handle rapid and heavy downfall. 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. Stored farm chemicals are at risk of being absorbed into the floodwaters, distributed over flooded areas, or damaged an, depositing hazardous runoff in floodwater. In some areas, livestock in pastures may be at risk, 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 Champaign County would occur only under the most severe of circumstances. As the county has very logical floodplain area along the major waterways, the rainfall would have to come in catastrophic amounts to flood the entire county, and extenuating circumstances like rapid ice thaw amid heavy rainfall and snowmelt would be necessary. Specifically, 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.

It is unlikely that loss of life would be attributable primarily due to flooding. If fatalities did occur, it would likely be the result of two or more combined threats, including lightning, tornado, or driving into standing water. If Stroman Lake Dam were to overtop and break due to catastrophic rainfall, there could be loss of life within that inundation zone. Power would likely be affected, but outages in most of the county would probably be short-lived and temporary.

The NRI flood exposure numbers indicate values due only to riverine flooding, but this vulnerability assessment narrative included not only riverine flooding, but also flash, surface and areal flooding. Local stakeholders felt that riverine flooding happens rarely, but the various types of pluvial flooding are far more common and frequent. With the recent downbursts and rain bombs attributed to climate change, they felt pluvial flooding was worthy of full assessment.

The following table reflects vulnerability for riverine flooding according to NRI.

Table 2-65: Countywide Vulnerability Analysis – Flood

Exposure	Exposure Value
Building Value	$191,822,919
Population	883
Agricultural Value	$11,106,109
Total Exposure	*$202,292,028*

2.4.5 Severe Thunderstorm Damage Profile

Thunderstorms are relatively frequent but not severe in Champaign 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/or wind. Microbursts often add strong straight-line winds that destroy standing crops ready for harvest. There has seemed to be an increase in night-time storms the past couple years, bringing heavy rain overnight. These storms can develop quickly, provide little advance warning to residents, and cause significant destruction and disruption.

Thunderstorms that include hail are generally spotty and inconsistent. The fluctuating temperatures in the atmosphere necessary for hail to form do not occur frequently in western Ohio. When hail falls, damage most frequently occurs to vehicles, roofs, and siding on buildings, and depending upon the season and growth stage at the time, farm crops. Rarely is there a loss of life or significant bodily injury. Thunderstorm winds 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; at any point after stalks 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 Champaign 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.

The NRI does not specifically list exposures for severe thunderstorms. It lists hail, lightning, and strong wind, all three of which are components of a strong thunderstorm. Therefore, the following table includes those components from the NRI. There is duplication and redundancy in the exposure numbers.

Table 2-66: Thunderstorm Scenario Vulnerability Analysis

Hazard Type	Exposure	Exposure Value
	HAIL	
	Building Value	$7,667,577,552
	Population	$38,673
	Agriculture Value	$137,134,143
	Total Exposure to HAIL	**$7,804,711,695**
	LIGHTNING	
	Building Value	$7,6677,577,552
	Population	38,673
	Total Exposure to LIGHTNING	**$7,667,577,552**
	STRONG WIND	
	Building Value	$7,677,577,552
	Population	38,673
	Agriculture Value	$137,134,143
	Total Exposure to STRONG WIND	**$7,804,711,695**

2.4.6 Tornado Damage Profile

Champaign County is universally vulnerable to tornado damage. The county has generally flat terrain with 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, and most recently in Ohio, during nighttime hours. Historically, the magnitude of tornadoes in Champaign County is between EF-0 and EF-1 with over eighty percent of the incidents on record involving and EF-0 or EF-1 tornado.

Champaign County does have almost one thousand mobile homes throughout the county. Most are lived in year-round. 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.

Many farms have outbuildings that house business assets, including equipment, supplies and goods, and livestock. These buildings may be traditional stick-built wooden structures with tresses and heavy beams, or may be newer pole buildings with varying steel structure. Many of the newer buildings are large, single-story structures and are therefore very vulnerable to wind and tornado. Some of these buildings house livestock rather than equipment. Grain systems with steel bins, concrete block walls, and metal conveyor systems with multiple legs are found on large grain farms. These bins often contain very significant quantities of grain, with values in future delivery or as a commodity yet-to-sell.

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 Champaign County most frequently includes damaged roofs, gutters, downspouts, trees, and, occasionally, an 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 2-67: Tornado Scenario Vulnerability Analysis (NRI)

Exposure	Exposure Value
Building Exposure	$7,667,577,552
Population	38,673
Agriculture	$137,134,143
Total Exposure	*$7,804,711,695*

2.4.7 Wind Storm Damage Profile

Wind incidents are somewhat frequent across Ohio, including in Champaign County. The county has experienced some high wind events in recent years. While not as damaging in Champaign County as they have been in others, these events 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. Structural damage to roofs, downspouts, and siding is not uncommon.

Table 2-68: Wind Storm Scenario Vulnerability Analysis (NRI)

Exposure Type	Exposure Value
Building Value	$7,667,577,552
Population	38,673
Agriculture	$137,134,143
Total Exposure	*$7,804,711,695*

2.4.8 Winter Storm Damage Profile

Winter storm damages can potentially affect homes, businesses, and properties across Champaign County. No singular area is more or less vulnerable to snowfall or winter weather conditions than another. The flat terrain provides little landscape to interrupt or redirect precipitation. The consistent elevations allow drifting and blowing snow to create low visibility conditions on roadways across the county. Livestock operations in the county are particularly vulnerable to blizzards, ice, snow, and other winter weather hazards. Even in adverse 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. Winter storms threaten and restrict access to these properties, making winter weather a serious concern for this portion of Champaign County's economy.

Power outages can occur anywhere in the 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 in recent years. Few residential properties have buried electric lines. Major supply lines are above ground as they enter Champaign 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. Power outages are probable, frequent, and can be widespread. Farms with livestock operations are 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.

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, ice, or other winter storm-related causes. 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 2-69: Winter Storm Scenario Exposure (NRI)

Building Type	Exposure
ICE STORM	
Building Value	$7,667,574,489
Population	38,673
Total Exposure	***$7,667,574,489***
WINTER WEATHER	
Building Value	$7,677,574,489
Population	38,673
Agriculture Value	$137,134,143
Total Exposure	***$7,804,708,632***

2.4.9 Countywide Risk Analysis

Based on the available hazard and vulnerability information, Champaign 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 2-70 describes the overall scale used to score each hazard. Table 2-71 provides details on the scale used to measure magnitude. The composite scores for each hazard and their respective rank are identified in table 2-72.

Table 2-70: 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 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 warning a community has before impact 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 for local use.

Table 2-71: 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 economic impact a hazard event is likely to have on a community. The definition references the amount of time facilities are likely to be closed.

- 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 percentage of parcels potentially affected in a given 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. Some communities did not include all hazards. Those results are shown in each municipality section; those below are for the whole county.

Table 2-72: Comprehensive Countywide Risk Analysis

Hazard	Frequenc	Response Duration	Speed of Onset	Magnitud	Business Impact	Human Impact	Property Impact	Score	Rank
Severe Thunderstorm	5	4	4	2	1	2	2	20	1
Tornado	3	4	4	2	2	2	2	19	2
Power Outage	4	4	1	1	3	2	2	17	3
Winter Storm	3	3	2	2	2	2	2	16	4
Flood	2	3	2	2	2	1	2	14	5
Hazardous Materials Incident	2	2	4	1	1	1	2	13	6
Drought/Extreme Heat	1	2	1	1	2	2	3	12	7
Invasive Species	3	2	1	1	1	1	2	11	8
Dam/Levee Failure	1	2	1	1	1	3	1	10	9
Earthquake	1	1	3	1	1	1	1	9	10