

Warren County, Ohio

HAZARD MITIGATION PLAN

November 2025



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RECORD OF CHANGES

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INTRODUCTION

As outlined in the federal Disaster Mitigation Act of 2000, any local jurisdiction seeking certain federal disaster assistance and hazard mitigation funding must maintain an up-to-date disaster mitigation plan to remain eligible. Renewal of this plan must be completed every five (5) years to remain eligible and encourage the continual awareness of mitigation strategies. Additionally, for the National Flood Insurance Program (NFIP) communities within Warren County to be eligible for future mitigation funds, those communities must adopt the County's HMP.

Hazard mitigation can be defined as the sustained actions taken to reduce or eliminate long-term risks to people and their property from hazards including natural or man-made disasters. Hazard mitigation planning is a proactive process built on assessing the hazards and applying effective strategies to complete preventive measures. It involves multiple stakeholders from Warren County jurisdictions and the State along with blending the public and private sector goals, objectives, and actions.

PLAN HISTORY

In 2007, Warren County developed and adopted its Hazard Mitigation Plan, as required by the Disaster Mitigation Act of 2000. The 2007 HMP provided a high-level overview of the hazards affecting the community. This plan identified the following hazards: wildland urban interface fires, drought, extreme temperatures, dam inundation, severe storms, and flooding. The 2007 plan also included a vulnerability assessment and mitigation actions to decrease the impacts of these hazards to the community.

The update to the Hazard Mitigation Plan in 2015 contained many of the same elements of the 2007 HMP, however, through the use of new research and information methods such as GIS mapping, the planning committee created a more comprehensive plan that focused on natural hazards and the limited resources available to apply to mitigation efforts.

In 2020, the Hazard Mitigation Plan had a similar function to its ancestors, however the planning team focused more on education and collaboration with local jurisdictions, schools, businesses, and organizations to create mitigation strategies that will benefit local jurisdictions and reduce risk locally and to the county. The planning team designed a thorough approach to provide factual, evidence-based information on hazards, and to solicit comprehensive information and feedback from county stakeholders to determine mitigation priorities and strategies for action.

The 2025 Hazard Mitigation Plan will continue to have similar themes as its predecessors, and focus on education and collaboration with jurisdictions, schools, businesses, and organizations to develop, implement and encourage mitigation strategies designed to create resiliency throughout the county.

PLAN OVERVIEW

As Warren County expands and changes, challenging vulnerabilities must be addressed. Warren County will face numerous hazards in the future, both natural and man-made, and these hazards can result in disasters that impact citizens, businesses and all levels of government. Over time, factors such as global warming and weather pattern changes can influence the frequency and intensity of weather events. By identifying hazards and taking appropriate steps to mitigate future vulnerabilities, growth and change can be done in a positive manner that will lessen the impact of future hazard events.

The main overall goal of the 2025 Warren County Hazard Mitigation Plan is to significantly reduce injuries and loss of life, and to minimize damage to structures and property from disasters. Additionally, it is intended to reduce disruptions to society, better integrate hazard mitigation programs and policies, reduce the number of repetitive flood loss structures, and promote education and outreach activities to create a culture of preparedness and hazard mitigation for Warren County businesses and residents. As such, this plan is comprised of seven (7) sections, which detail the methods, analysis, and discussion surrounding the various hazards that threaten Warren County and its jurisdictions. These sections are as follows:

1. This **Introduction** provides a discussion about the general background, purpose, and goals that Warren County wishes to achieve throughout the development and implementation of this plan. This section also includes a summary of the Plan's contents.
2. Section 1, **Community Profile**, describes Warren County's history, geography, topography, climate, population, economy, housing, land use and development trends, and critical infrastructure. Additionally, it includes information regarding the demographics of Warren County and each of the jurisdictions participating in this plan.
3. The process for the development of this plan is detailed in Section 2, **Planning Process**. This section includes details about the process used to develop this plan, including a description of who participated, how the community was involved, which hazards were included in the plan and why, as well as the meetings and outreach activities undertaken to engage stakeholders.
4. Section 3 contains the **Hazard Identification and Risk Assessment**; the process in which all hazards affecting Warren County are identified and prioritized, and vulnerabilities from the identified hazards are assessed.
5. Details regarding each hazard are listed in Section 4, **Profile of Each Hazard**, including the definition of the hazard, and historical occurrences and associated damages that have taken place in Warren County.
6. The goals, strategies, and actions for the county are outlined in Section 5, **Mitigation Strategy**. Additionally, updates to projects and actions from the previous Warren County Hazard Mitigation Plan (2020) are listed.
7. The final section of this plan, **Plan Maintenance**, provides a summary of the proposed plan adoption and integration, and the process of evaluating and updating the plan.

The resulting Warren County 2025 Hazard Mitigation Plan will be submitted to the Ohio Emergency Management Agency (Ohio EMA) and subsequently the Federal Emergency Management Agency (FEMA) for their review. Following the agency review, the jurisdictions will then review the plan for adoption. This hazard mitigation plan serves as a helpful tool for citizens, policymakers, local businesses, and other local stakeholders who all share a public interest in keeping Warren County as safe and resilient as possible.

1. COMMUNITY PROFILE

The Community Profile summarizes Warren County's history and existing environmental and socioeconomic conditions. Environmental and socioeconomic factors include geography, topography, climate, population, economic, housing, and land use and development trends.

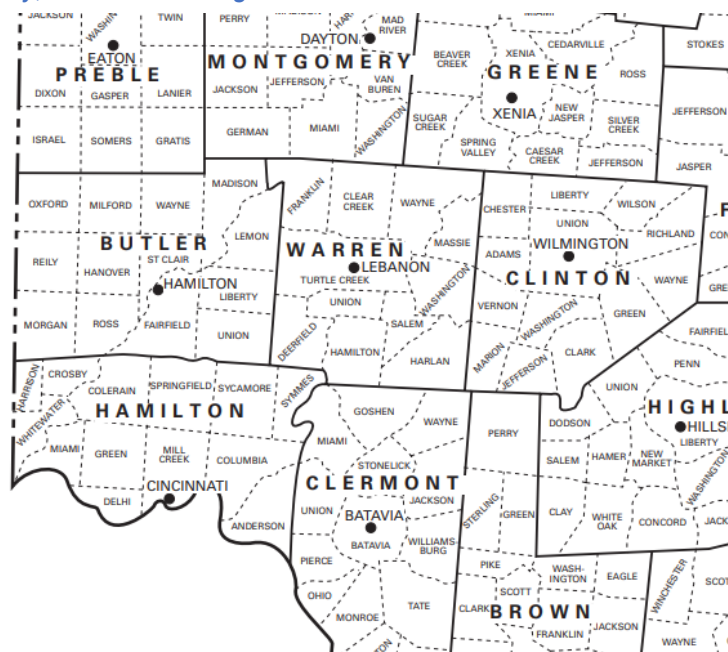
1.1. BACKGROUND

Warren County is located in southwestern Ohio, and has a total land area of approximately 400 square miles. It is bounded by Montgomery and Greene counties to the north, Butler County to the west, Clermont and Hamilton counties to the south, and Clinton County to the east.

Warren County was established March 24, 1803, by an act of the first General Assembly in Chillicothe, Ohio. This same act gave the county its name in honor of General Warren, who distinguished himself during the Revolutionary War. Warren, Butler, and Montgomery counties were formed from territory formerly included in Hamilton County. Warren County was originally made up of three (3) principal land subdivisions. The Virginia Military District comprised the eastern half, the Symmes Purchase made up the southwest corner, and the Congress Lands were in the northwest corner. Warren County was originally divided into four (4) townships: Franklin, Wayne, Deerfield, and Hamilton Townships.¹

The county seat is in the City of Lebanon. The Warren County Board of Commissioners is the legislative and executive body of the county, and is made up of a three (3) member board of elected officials that serve four (4)-year terms. The Warren County Commissioners hold title to all county properties, serve as the sole taxing authority for the county, and control county purchasing. Most importantly, the Warren County Board of Commissioners is the budget and appropriating authority for the county government, which includes all county agencies and elected officials (Sheriff, Auditor, Treasurer, Courts, Emergency Services, Telecommunications, etc.).

Figure 1: Map of Warren County, and Surrounding Counties



Source: Ohio Department of Natural Resources: County and Township Map of Ohio

https://dam.assets.ohio.gov/image/upload/ohiodnr.gov/documents/geology/OhioTownshipMap_DOGS_2014.pdf

¹ *The History of Warren County, Ohio*, Unknown Author, W. H. Beers Company, Chicago, Illinois, 1882

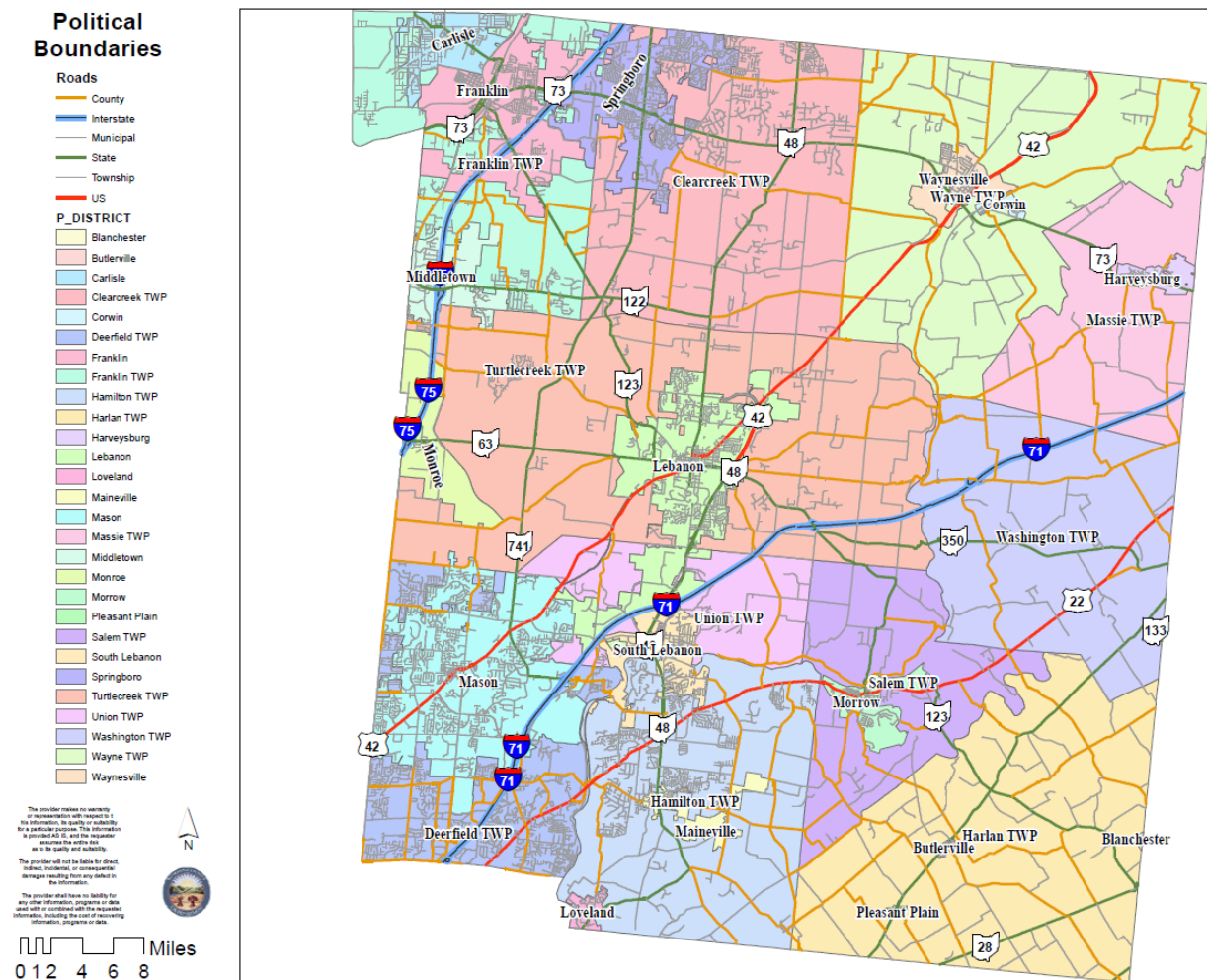
1.2. JURISDICTIONS

Warren County is split into twenty-four (24) jurisdictions, including six (6) cities, seven (7) villages and eleven (11) townships. Additionally, there are partial portions of three (3) other cities in the county.

Table 1: List of Warren County Cities, Villages and Townships

Cities	Villages	Townships
Carlisle	Butlerville	Clearcreek
Franklin	Corwin	Deerfield
Lebanon	Harveysburg	Franklin
Loveland (Partial)	Maineville	Hamilton
Mason	Morrow	Harlan
Middletown (Partial)	Pleasant Plain	Massie
Monroe (Partial)	Waynesville	Salem
Springboro		Turtlecreek
South Lebanon		Union
		Washington
		Wayne

Figure 2: Map of Warren County Jurisdictions



1.3. CLIMATE, GEOGRAPHY, RIVERS AND DAMS

CLIMATE

Warren County has a continental climate with warm and humid summers, and very cold and windy winters. Year-round it is partly cloudy. Temperatures vary over the course of the year the between 23°F and 85°F, and are rarely below 7°F or above 92°F. The average temperature for the county is 52.55°F. Source: <https://weatherspark.com/>

On average, Warren County receives approximately forty-one (41) inches of rain per year, which is more than the U.S. average at thirty-eight (38) inches per year. Average snowfall is fifteen (15) inches. The number of days with any measurable precipitation is approximately 115 days a year, and on average there are 178 sunny days per year in Warren County. The July average high temperature is around 85°F and the January average low temperature is 21°F.

Table 2: Warren County Average Climate

Climate Measurements	Warren County, Ohio	United States
Avg. Rainfall (in.)	41.3 in.	38.1 in.
Avg. Snowfall (in.)	14.7 in.	27.8 in.
Avg. Precipitation Days	115.0 days	106.2 days
Avg. Sunny Days	178 days	205 days
Avg. July High	85.1 °F	85.8 °F
Avg. Jan. Low	21.0 °F	21.7 °F
Comfort Index (higher=better)	7.2	7
UV Index	3.8	4.3
Avg. Elevation FT.	846 ft.	2,443 ft.

Source: <http://www.bestplaces.net/climate/county/ohio/warren>

CLIMATE CHANGE

According to the State of Ohio's 2024 Hazard Mitigation Plan, because of climate change, the average temperature may increase one (1) to three (3) degrees Celsius over the next several decades. Projected change in the climate models indicate a clear tendency towards increased frequency of heat waves. Further cold-air outbreaks and other extreme cold spells will still occur but with reduced likelihood. Rainfall will increase variably across the Midwest over the next several decades with potential to increase 20-30% in the spring and winter months and increase in variability of precipitation in the summer and fall months. Some other affects include the likelihood of warmer nights and possibly warmer days leading to an increased susceptibility to pests. The warming will likely cause a reduction in crop yields and the evaporation/transpiration feedback will lead to less available water resources.

Additionally, according to the National Weather Service Office in Wilmington, Ohio, the Southwest Ohio region is seeing a wetter trend and increase in occurrences of more extreme rain events. This could increase ground-level flooding, areal flooding, and flash flood events.

GEOGRAPHY

Warren County covers approximately 400 square miles, composed of rolling till plains with local end moraines. The highest elevation of 1,362 feet in Clearcreek Township, with other elevations plummeting to much lower levels with abruptness in only a few points of the county. The county contains fifty (50) different soil types, the majority of which are poorly drained clays and well-drained loams. The county is situated in the ecoregion known as the Eastern Corn Belt Plain. There are two (2) distinct types of Eastern Corn Belt Plain topography located in Warren County: Loamy High Lime

Till Plains and pre-Wisconsinan Drift Plains. The majority of the county is comprised of Loamy High Lime Till Plains.

The western, northern and northeastern portions of Warren County contain the ecoregion known as Loamy High Lime Till Plains. This ecoregion contains soils that developed from loamy, limy, glacial deposits of Wisconsinan age. These soils typically have better natural drainage than those of surrounding ecoregions. Beech forests, oak-sugar maple forests and elm-ash swamp forests once grew on the nearly level terrain. Today, corn, soybean and livestock production are widespread.

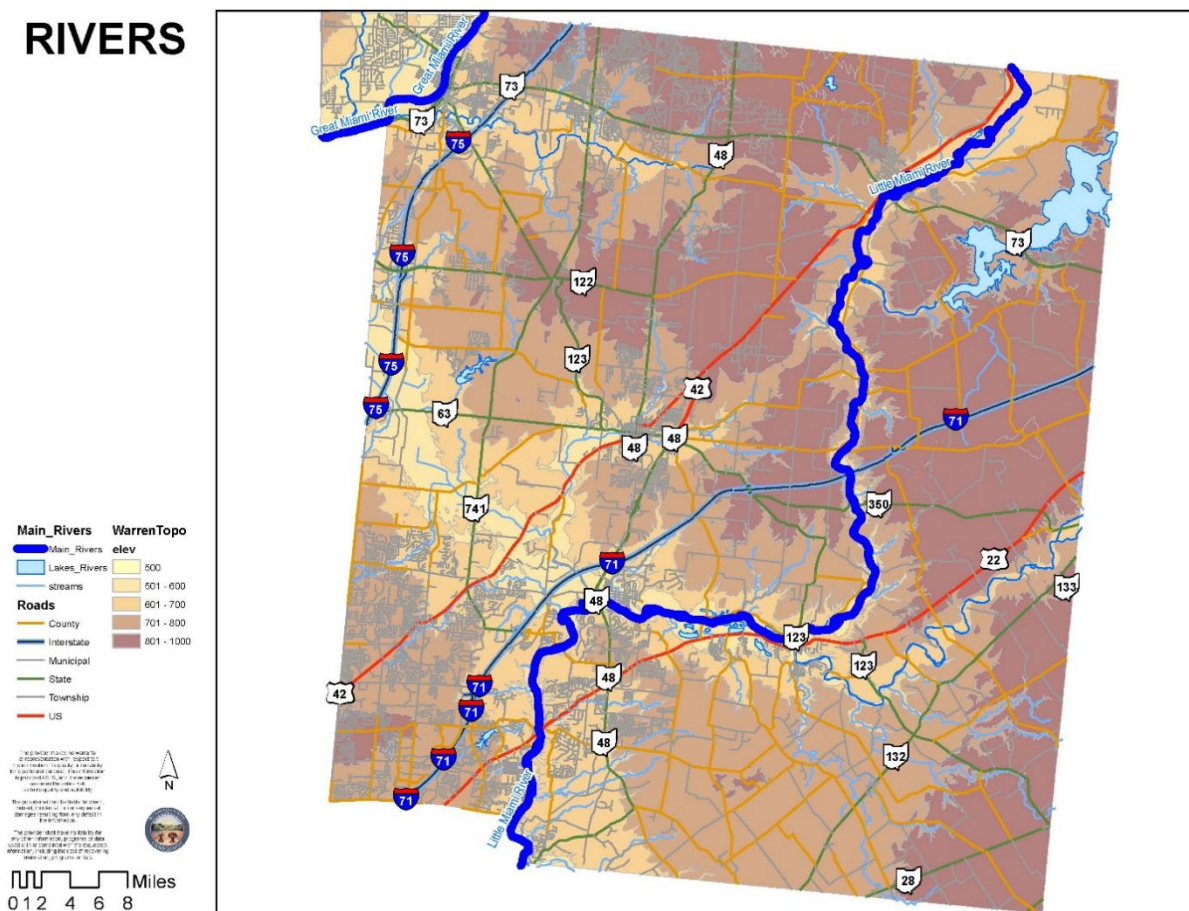
The central and southeastern portions of Warren County contain the pre-Wisconsinan Drift Plain ecoregion. This ecoregion is differentiated from the surrounding ecoregions by its deeply leached, acidic, pre-Wisconsinan till and thin loess and widespread areas of nearly flat, very poorly drained soils with fragipans. In addition, some dissected areas occur. Originally, beech forests and elm-ash swamp forests were dominant. Today, soybeans are common and are well adapted to spring soil wetness. Corn, tobacco, and livestock farming also occur.

RIVERS

Warren County has two (2) major drainage basins: the Great Miami River and the Little Miami River. There are also streams that drain into other parts of the county, these include Caesar Creek, Todd's Fork, Second Creek, Little Muddy Creek, and Clear Creek. The county contains approximately 62,800 water acres, which consists of about 3,450 acres of lakes, and approximately 320 linear miles of streams and rivers. The Little Miami River was the first river in Ohio proposed for protection under the Federal Wild and Scenic Rivers Act, with planned areas for canoeing, picnicking, and camping.

Figure 3: Depicts Warren County Rivers

RIVERS



Warren County has thirteen (13) Class I dams. Of these thirteen (13) dams, four (4) of them are situated along Caesar Creek Lake. The other nine (9) are spread out across the county. Four (4) of these dams are privately held, and two (2) of which do not have approved Emergency Action Plans. In total, Warren County is home to 167 dams, including those that are exempt, unclassified, or abandoned. Many of the 167 dams are situated along tributaries to creeks and were created for recreational purposes.

ONDR Class	Count
Class 1	13
Class 2	15
Class 3	14
Class 4	48
Other	77
Total	167

Ohio Dam Locator

The map displays the state of Ohio with its county boundaries and major townships. Dam locations are marked with colored dots: purple for 'Other Dams', green for 'Class II Dams', yellow for 'Class III Dams', and red for 'Class I Dams'. The map also shows major roads, water bodies, and elevation contours. A legend in the bottom left corner identifies the symbols used. A scale bar in the bottom right corner indicates distances in miles and kilometers. The date 'January 14, 2025' is printed in the bottom left corner.

January 14, 2025

1:288,895

0 1.75 3.5 7 mi
0 3 6 12 km

Legend:

- Current Township
- Counties
- Lakes (ODNR)
- Other Dams
- Class III Dams
- Class II Dams
- Class I Dams

Ohio Department of Natural Resources/Division of Water Resources, Esri, HERE, Garmin, USGS, NGA, EPA, USGS, NOAA, NPS

ODNR - Division of Water Resources

1.4. INFRASTRUCTURE: TRANSPORTATION, RAIL, PIPELINES, AND UTILITIES

MAJOR THOROUGHFARES

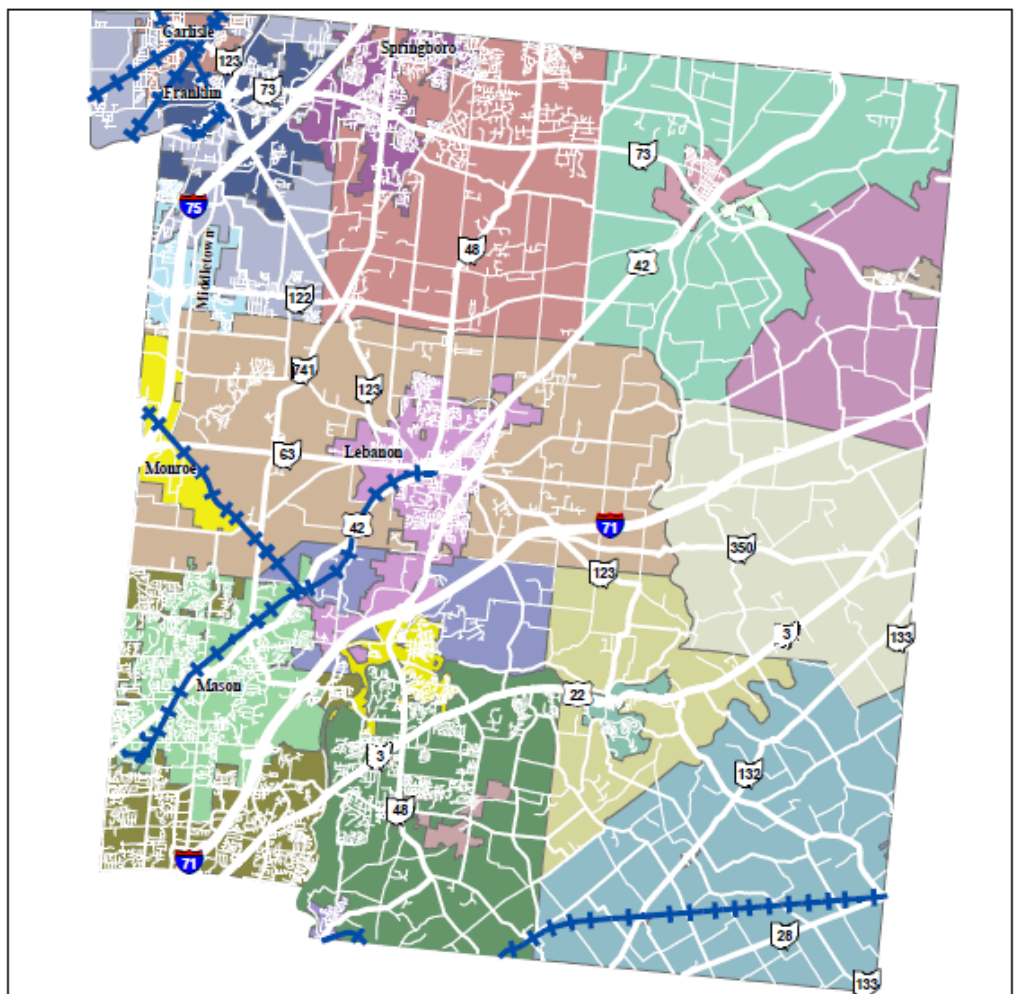
Warren County contains many major roadways including Interstates (I), U.S. Routes (US), and State Routes (SR). Notably, there are two (2) Interstate highways that run through the county, including I-75, running from the northwest corner of the county, and I-71, which runs from the southwest corner to the northeast. There are also two (2) U.S. Routes; US-22 and US-42. Additionally, ten (10) State Routes run through the Warren County, including SR-3, SR-28, SR-48, SR-63, SR-73, SR-122, SR-123, SR-132, SR-350, and SR-741. These major thoroughfares are depicted in Figure 5.

RAIL LINES

There are three (3) major freight rail lines that run through Warren County: CSX Transportation, Norfolk Southern, and Indiana and Ohio (formerly Genesis and Wyoming) Railroad. CSX and Norfolk Southern mostly converge in the northwest portion of the county, and Indiana and Ohio runs through the southeastern portion of the county. Additionally, the City of Lebanon operates a historic passenger rail line on the Lebanon Mason Monroe (LM&M) Railroad.

Figure 5: Map of Railways and Major Thoroughfares in Warren County

Rail & Major Thoroughfares

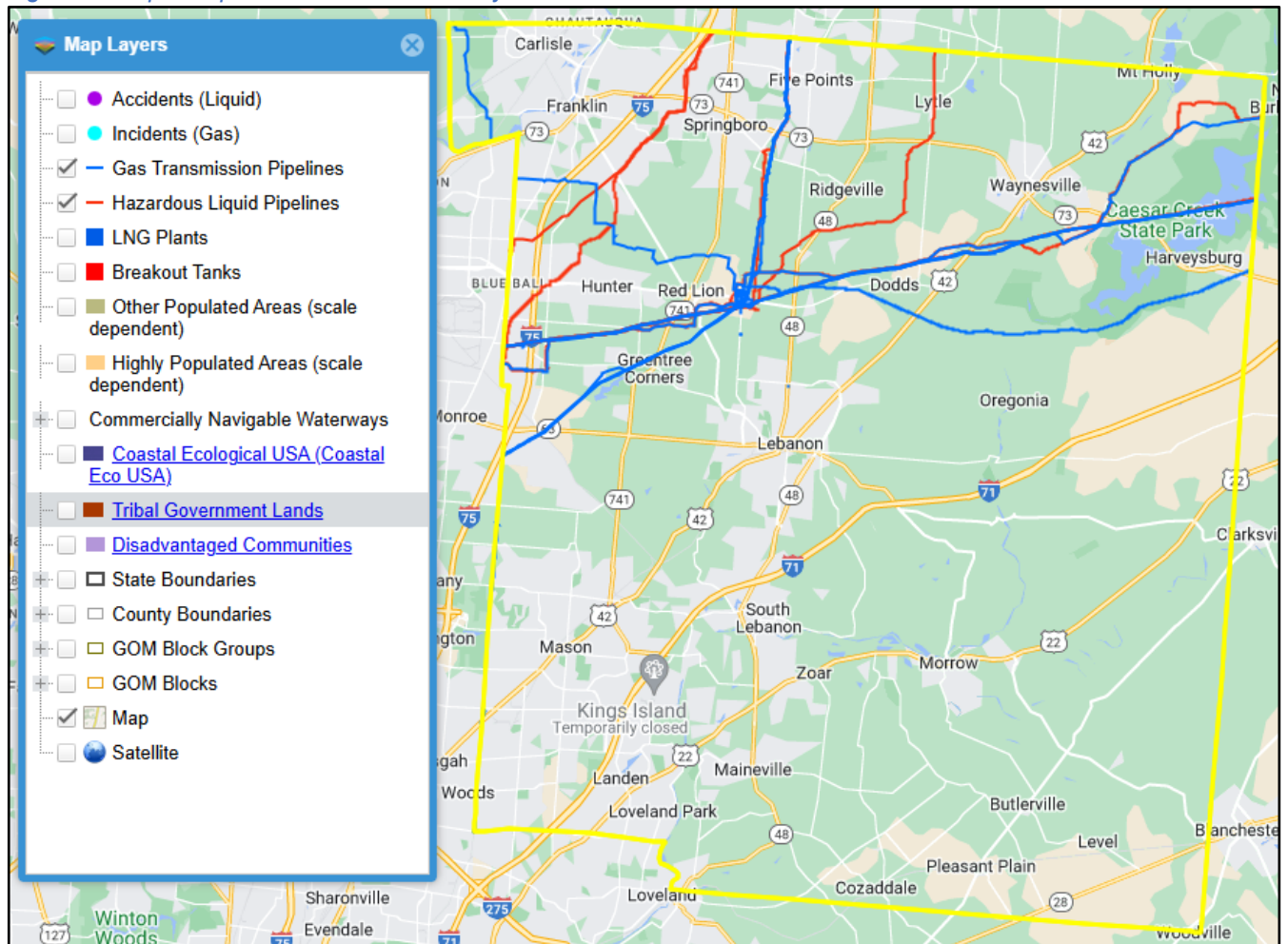


PIPELINES

The National Pipeline Mapping System Public Map Viewer shows there both hazardous liquid and gas transmission pipelines in Warren County. There are ten (10) different pipeline companies who run underground pipe through Warren County. Many of these companies have distribution points in the area of SR-122 and Hart Road. Two (2) of these companies, Enterprise Products and Enbridge Energy, have office locations in that same area. Other companies have substations or own property at that location.

**Note: Company names are accurate as of Winter 2024/2025*

Figure 6: Map of Pipelines in Warren County



Source: National Pipeline Mapping System

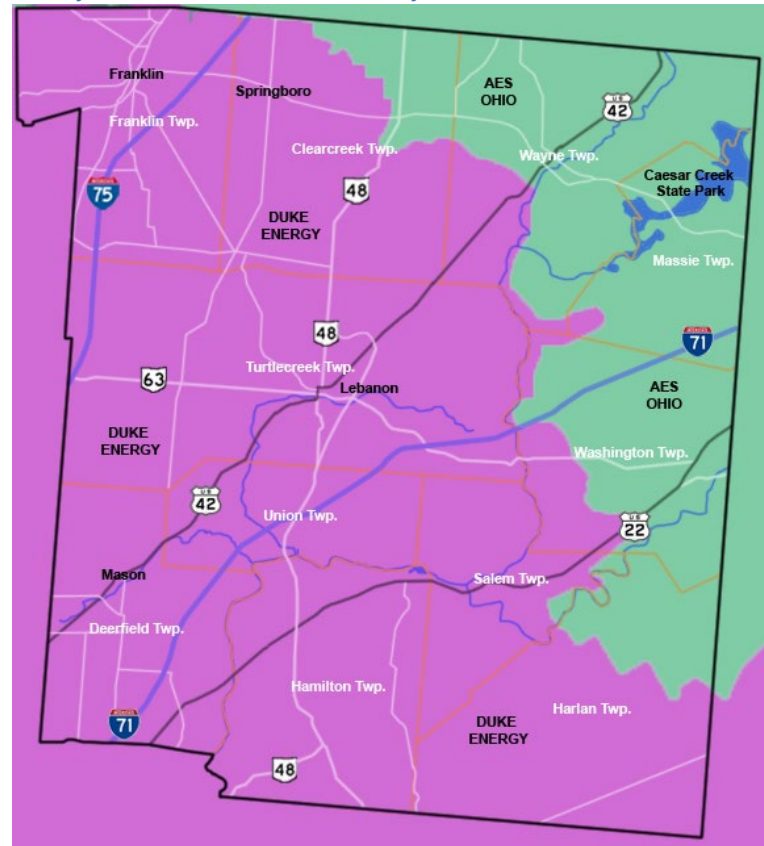
<https://pvnpm.phmsa.dot.gov/PublicViewer/>

UTILITIES

Electric & Gas

The electric power for Warren County is provided by three (3) utility companies: AES Ohio (formerly Dayton Power and Light Company), Duke Energy, and Lebanon Municipal Electric. Duke Energy provides electrical services to the majority of Warren County, while AES Ohio provides electricity to northeastern parts of the county. Additionally, Lebanon Municipal Electric serves the City of Lebanon.

Figure 7: Map of Electric Utility Providers in Warren County



**Note: Lebanon Municipal Electric not represented in graphic.*

Source: Ohio Public Utilities Commission

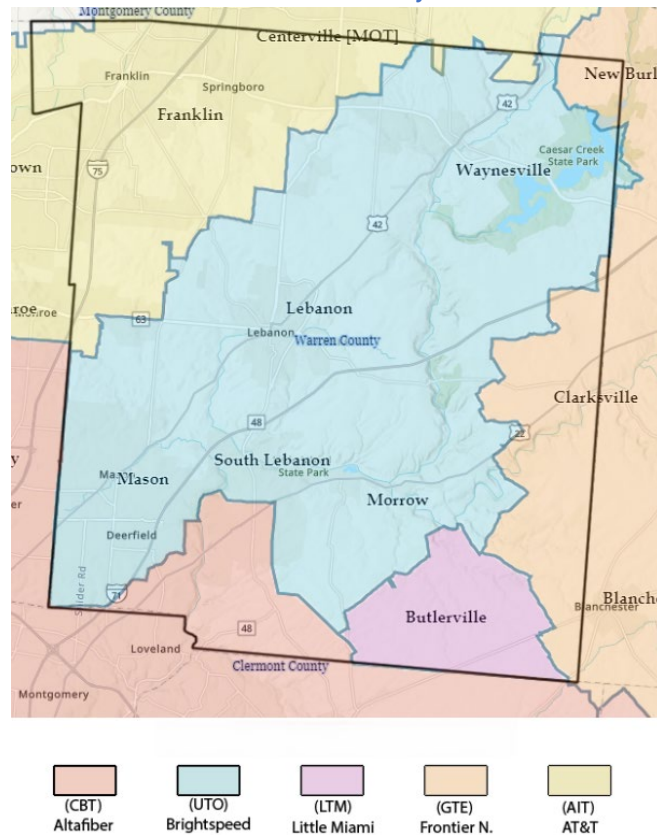
<https://puco.ohio.gov/utilities/electricity/service-area-map/electric-certified-territories-web-mapping-application>

There are three (3) companies that provide natural and bottled gas in the county. These companies include Columbia Gas of Ohio, Inc, Duke Energy, CenterPoint Energy of Ohio (formerly Vectren). Warren County is a part of the gas cooperative Knox Energy Cooperative Association, Inc., which is managed by Utility Pipeline, Ltd. Duke Energy provides gas services to the majority of the county, while Columbia Gas of Ohio provides natural gas services to some northern areas of the county and CenterPoint provides natural and bottled gas services to other areas in the county.

Telephone Service

There are five (5) landline telephone companies that service Warren County, including Altafiber, AT&T, Brightspeed (formerly Century Link), Frontier North, and Little Miami.

Figure 8: Map of Telephone Service Providers in Warren County



Source: Ohio Public Utilities Commission

<https://puco.ohio.gov/utilities/telecom/service-area-map>

There are also a number of cellular telephone service providers that cover Warren County. Cellular service is generally available in most portions of Warren County, with potential pockets of low service in the southeast and northeast corners of the county.

Water and Wastewater

The primary groundwater source in Warren County is a buried valley aquifer composed of sand and gravel. This aquifer serves as an adequate water supply for both individual and public wells for several large water users in the county, including the cities of Lebanon, Mason, and Franklin, as well as the Western Water Company and Warren County Water Company.

The Warren County Water and Sewer Department (WCWSD) is a regional water supplier that owns and operates two (2) water treatment plants with a total Ohio Environmental Protection Agency (EPA) rated capacity of 20 million gallons per day (gpd). The treatment plants treat water from wells located along the Great Miami and Little Miami aquifers. The water is distributed from four booster pump stations through 500 miles of watermains to over 29,000 water customers. Fire protection and daily storage are provided from eight (8) elevated storage tanks with a total storage volume of 13 million gallons.



WCWSD serves the Villages of Corwin, Harveysburg, and Maineville, as well as portions of Clearcreek, Deerfield, Franklin, Hamilton, Turtlecreek, Union, and Wayne Townships. In addition to the water furnished by county-operated plants, the county purchases potable water from the City of Springboro and the City of Cincinnati. Water for all residential and business customers in the City of Mason is supplied by Greater Cincinnati Water Works.

Warren County has emergency water system interconnections with neighboring cities and villages. Emergency water systems interconnections are pipeline connections that allow adjacent utilities to share water resources in the event of an emergency. These interconnections may be permanent or may be temporarily in place based on need. Permanent emergency water systems interconnections located within the county include the following jurisdictions:

- Carlisle
- Franklin
- Lebanon
- Morrow
- Springboro
- South Lebanon
- Waynesville
- Cincinnati Water Works
(City of Mason)

WCWSD also serves over 20,000 sewer customers and maintains over 389 miles of sanitary sewers and seventy (70) sewage pump stations throughout the county. The county operates two (2) major Wastewater Treatment Plants (WWTP) with a total design capacity of 12.7 million gpd, as well as two (2) smaller sewage treatment plants with a service range of 16,000 to 80,000 gpd.

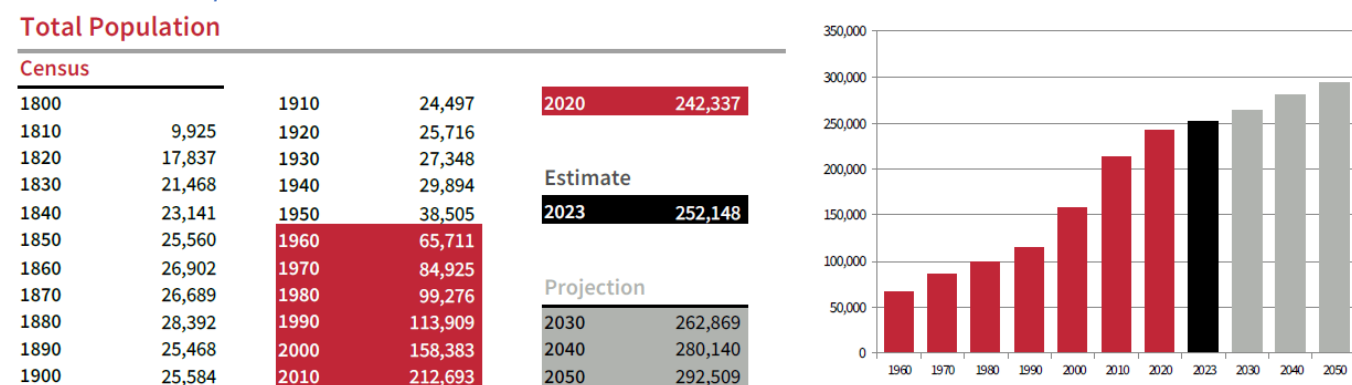
Warren County also has agreements with the Metropolitan Sewer District of Greater Cincinnati, Franklin Regional Wastewater Treatment Corporation, and Butler County to provide sewage treatment for some of the unincorporated areas of the county.

1.5. POPULATION AND DEMOGRAPHICS

As of July 1, 2023, the estimated population of Warren County was 252,148 residents. Warren County is semi-urban in character and is part of the Cincinnati-Dayton metropolitan area. It is the tenth (10th) most populous county in Ohio. The areas with the highest population density are the unincorporated areas of Deerfield Township and the City of Mason, which together had a total population of 74,075 people.

The population of Warren County experienced fluctuations between 1810 and 1950, but since 1950 it has steadily increased. The most significant percentage change occurred between 1950 and 1960, with a 71% population increase. The largest net population growth was recorded between 1990 and 2000, with an increase of 44,474 residents. Population growth is projected to continue steadily, with an estimated population of 292,509 by 2050, representing a 20.7% increase from 2020. Steady population increases are expected for Warren County through 2050, as depicted in Table 4.

Table 4: Total Population



Source: Ohio Department of Development, 2024 Edition

Population per jurisdiction in Warren County (gathered through US Census Bureau, population estimates division and through jurisdictional surveys).

Table 5: Population by Jurisdiction in Warren County

Cities	2020 Pop.	2023 Pop. Estimate	Pop. Change	Villages	2020 Pop.	2023 Pop. Estimate	Pop. Change	Townships	2020 Pop.	2023 Pop. Estimate	Pop. Change
Carlisle	5,501	5,460	-41	Butlerville	191	155	-36	Clearcreek	36,328	36,845	517
Franklin	11,670	11,690	20	Corwin	633	484	-149	Deerfield	40,525	41,486	961
Lebanon	21,216	20,841	-375	Harveysburg	767	554	-213	Franklin	31,676	32,020	344
Loveland*	13,307	13,280	-27	Maineville	2,164	1,405	-759	Hamilton	30,587	31,292	705
Mason	35,148	34,792	-356	Morrow	2,526	2,049	-477	Harlan	4,929	5,049	120
Middletown*	50,987	50,607	-380	Pleasant Plain	141	129	-12	Massie	1,195	1,204	9
Monroe*	15,412	15,024	-388	Waynesville	2,723	2,669	-54	Salem	5,215	5,329	114
Springboro	19,577	19,062	-515					Turtlecreek	17,644	17,690	46
South Lebanon	6,552	6,384	-168					Union	6,251	6,314	63
								Washington	2,752	2,816	64
								Wayne	8,658	8,854	196

Source: US Census ACS Data

*Indicates jurisdiction partially in Warren County

POPULATION ESTIMATES

Per the Ohio Department of Development (2024 Edition), the following are the population estimates for Warren County over the next twenty-five (25) years:

- In 2030, an estimated population of 262,869
- In 2040, an estimated population of 280,140
- In 2050, an estimated population of 292,509

DEMOGRAPHICS

Demographics of Warren County's population provide an insight into understanding the makeup of the county's citizens, and any possible access and functional needs that may be encountered during disaster events. The demographic breakdown for Warren County is depicted in Tables 6, 7, 8 and 9.

Source: Ohio Department of Development, 2024 Edition

Table 6: Population by Race

Population by Race	Number	Percent
ACS Total Population	243,189	100.0%
White	207,082	85.2%
African-American	8,505	3.5%
Native American	265	0.1%
Asian	16,113	6.6%
Pacific Islander	6	0.0%
Other	2,616	1.1%
Two or More Races	8,602	3.5%
Hispanic (may be of any race)	7,597	3.1%
Total Minority	39,459	16.2%

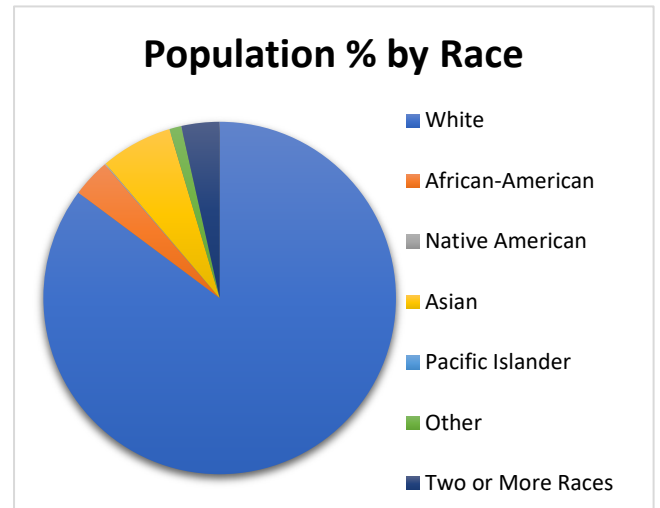


Table 7: Population by Age

Population by Age	Number	Percent
ACS Total Population	243,189	100.0%
Under 5 years	13,375	5.5%
5 to 17 years	45,080	18.5%
18 to 24 years	19,830	8.2%
25 to 44 years	61,341	25.2%
45 to 64 years	67,212	27.6%
65 years and more	36,351	14.9%
Median Age	39.5	

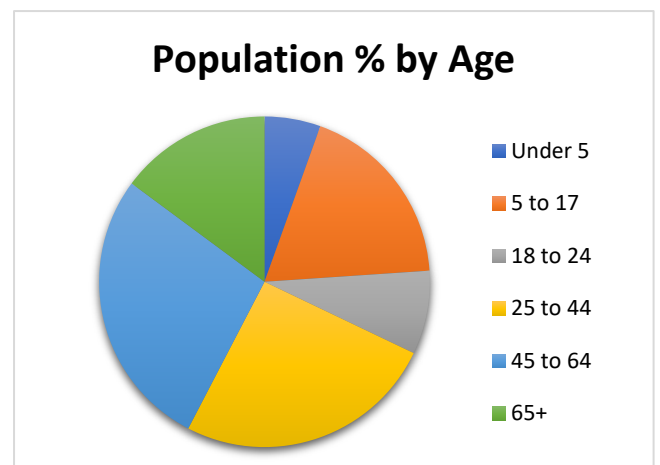


Table 8: Population by Education Attained

Educational Attainment	Number	Percent
Persons 25 years and over	164,904	100.0%
No high school diploma	8,526	5.2%
High school graduate	41,030	24.9%
Some college, no degree	28,024	17.0%
Associate degree	13,676	8.3%
Bachelor's degree	44,054	26.7%
Master's degree or higher	29,594	17.9%

Population % by Education

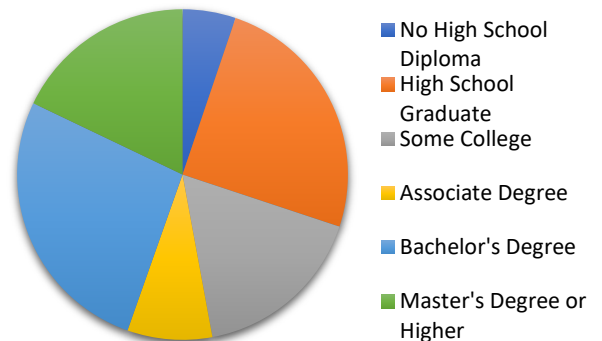
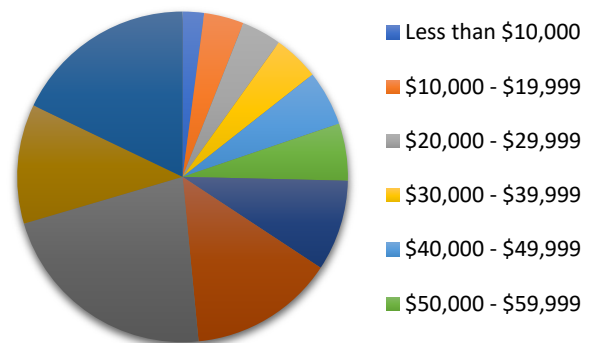


Table 9: Household Income

Household Income	Number	Percent
Total Households	88,735	100.0%
Less than \$10,000	1,865	2.1%
\$10,000 to \$19,999	3,425	3.9%
\$20,000 to \$29,999	3,488	3.9%
\$30,000 to \$39,999	3,958	4.5%
\$40,000 to \$49,999	4,759	5.4%
\$50,000 to \$59,999	4,936	5.6%
\$60,000 to \$74,999	7,902	8.9%
\$75,000 to \$99,999	12,597	14.2%
\$100,000 to \$149,999	19,511	22.0%
\$150,000 to \$199,999	10,373	11.7%
\$200,000 or more	15,921	17.9%
Median household income	\$103,128	

Household Income %



POPULATION TRENDS

As a part of the Hazard Mitigation Plan update, Warren County jurisdictions were asked to complete a Community Profile Survey. Part of this survey included having jurisdiction's evaluating the population/demographic trends over the past five (5) years as well as forecasting those changes over the next five (5) years. Trends from the jurisdictions who responded are depicted in Table 10.

Table 10: Population/Demographics Trends for Jurisdictions in Warren County

Population/Demographics Trends		
Jurisdiction	Trend Over the Last 5 Years	Forecasted Trends Over Next 5 Years
Franklin	Population and overall demographics have remained steady.	Slight increase in population as a result of housing developments.
Lebanon	Population is steadily growing (about 1% per year).	Anticipate continued growth based on the number of building permits.
Loveland	Population has increased, but at a lesser rate then in the late 1990s – early 2000s.	Continue to increase.
Mason	Slight increase.	Slight increase to continue.
Monroe	Population has increased.	Will continue to increase.
Springboro	Population has increased.	Will continue to increase.
South Lebanon	Population has increased.	Increase in the population's diversity as high rates of single and multi-family residential development continue.
Corwin	No change.	Same.
Maineville	Population has increased slightly.	Will continue to increase, and median average will become younger.
Morrow	Population has increased.	Population will continue to grow.
Pleasant Plain	Slight increase in population, with a younger demographic.	Very little change.
Waynesville	No change.	Very little growth/change.
Deerfield Twp	Population has increased.	Population will continue to increase.
Franklin Twp	Population has increased.	Population will continue to increase based on new subdivision plans.
Hamilton Twp	Have seen a 7.4% growth in population.	Growth will continue at the current rate. Several residential and commercial developments underway.
Harlan Twp	Minor growth.	Slow, minor growth in population.
Washington Twp	No change.	Minor changes expected.
Wayne Twp	Population has increased.	Population will continue to increase slightly.

1.6. RESIDENTIAL HOUSING, HOME VALUES, LAND USE & FUTURE

RESIDENTIAL HOUSING & HOME VALUES

According to the Warren County Profile from the Ohio Department of Development, there are 93,520 housing units in Warren County. Of the total housing units, 88,735 are occupied and 4,785 are vacant. Most homes in Warren County are also owner-occupied (78.9%), with the remaining 21.1% categorized as renter-occupied units. More than 56.9% of the homes in Warren County were built between 1990 and 2019. An additional 21.3% of the homes were built between 1970 and 1989. The median home value is \$290,900. This breakdown is depicted in Tables 10, 11 and 12. *Source: Ohio Department of Development, 2024 Edition*

Table 11: Residential Housing Demographics

Housing Units	Number	Percent
Total housing units	93,520	100.0%
Occupied housing units	88,735	94.9%
Owner occupied	70,031	78.9%
Renter occupied	18,704	21.1%
Vacant housing units	4,785	5.1%

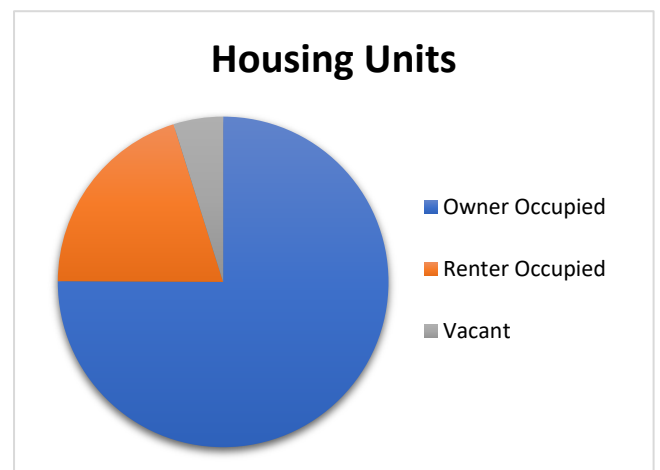


Table 12: Housing Demographics by Year of Structure

Year Structure Built	Number	Percent
Total housing units	93,520	100.0%
Built 2020 or later	828	0.9%
Built 2010 to 2019	11,451	12.2%
Built 2000 to 2009	20,968	22.4%
Built 1990 to 1999	20,705	22.1%
Built 1980 to 1989	8,997	9.6%
Built 1970 to 1979	10,987	11.7%
Built 1960 to 1969	6,059	6.5%
Built 1950 to 1959	6,309	6.7%
Built 1940 to 1949	1,691	1.8%
Built 1939 or earlier	5,525	5.9%
Median year built	1993	

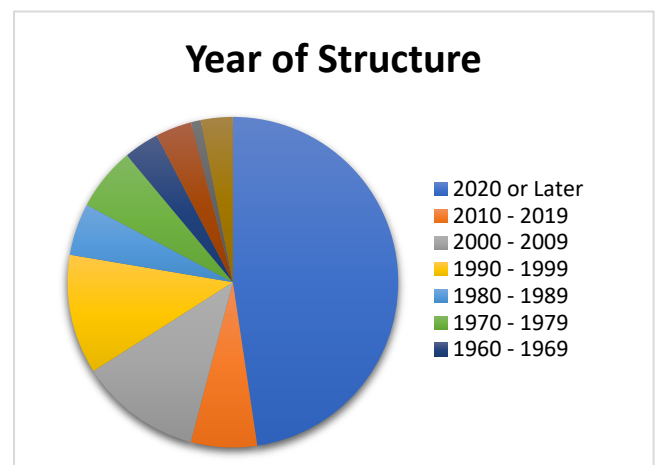
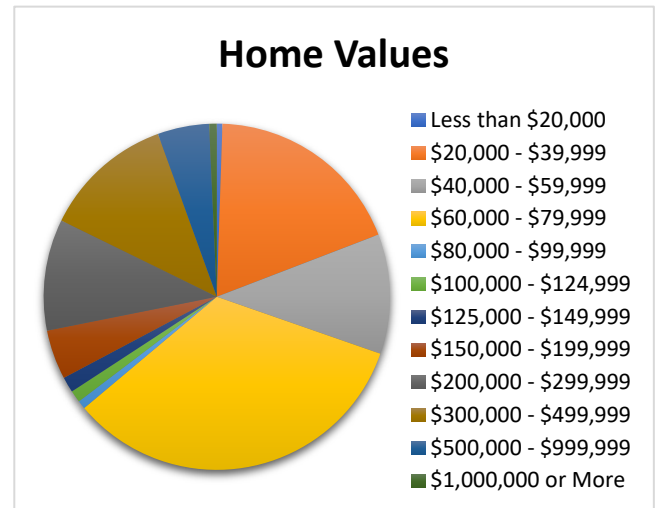


Table 13: Home Values in Warren County

Value for Specified Owner-Occupied Housing Units

	Number	Percent
Specified owner-occupied housing units	70,031	100.0%
Less than \$20,000	970	1.4%
\$20,000 to \$39,999	336	0.5%
\$40,000 to \$59,999	197	0.3%
\$60,000 to \$79,999	619	0.9%
\$80,000 to \$99,999	1,479	2.1%
\$100,000 to \$124,999	2,071	3.0%
\$125,000 to \$149,999	2,722	3.9%
\$150,000 to \$199,999	8,699	12.4%
\$200,000 to \$299,999	19,551	27.9%
\$300,000 to \$499,999	22,978	32.8%
\$500,000 to \$999,999	9,063	12.9%
\$1,000,000 or more	1,346	1.9%
Median value	\$290,900	



LAND USE

Warren County contains approximately 256,000 land acres, of which approximately 73% is rural. 39% of the land in Warren County is agricultural.

Warren County Comprehensive Plan

In 2007, the Warren County Planning Commission drafted an updated Comprehensive Plan. This plan included information on land use, transportation, capital improvements, housing, economic development, and parks and recreation. The plan was formally adopted in 2011 by the Warren County Board of Commissioners.

This plan also considers master plans already in place from other cities, villages and townships. Combining land use planning with economic development, thoroughfare planning, and housing plans will allow the county to sensibly move toward the future. The incorporation of data from this mitigation plan into future updates will only strengthen the comprehensive plan.

Table 14: Land Use in Warren County

Land Use/Land Cover	Percent
Developed, Lower Intensity	20.20%
Developed, Higher Intensity	6.53%
Barren (strip mines, gravel pits, etc.)	0.15%
Forest	27.75%
Shrub/Scrub and Grasslands	0.61%
Pasture/Hay	18.86%
Cultivated Crops	23.72%
Wetlands	0.33%
Open Water	1.85%

Source: Ohio Department of Development, 2024 Edition

Table 15: Agricultural Land Use in Warren County

Agriculture

Land in farms (acres)	101,621
Number of farms	872
Average size (acres)	117
Total cash receipts	\$76,607,000
Per farm	\$87,853
Receipts for crops	\$71,118,000
Receipts for livestock/products	\$5,489,000

Source: Ohio Department of Development, 2024 Edition

FUTURE LAND USE AND INFRASTRUCTURE IMPROVEMENTS

As previously mentioned, Warren County jurisdictions were asked to complete a Community Profile Survey as a part of the Hazard Mitigation Plan update. Part of this survey included evaluating land use trends, housing trends, economic, and business and industry improvements. The Warren County Department of Economic Development was also consulted. Trends from the participating jurisdictions are depicted in Table 16 and 17:

Table 16: Land Use/Housing Trends in Warren County

Land Use/Housing Trends		
Jurisdiction	Trend Over the Last 5 Years	Forecasted Trends Over Next 5 Years
Franklin	Land use has remained steady, with approximately 60% industrial, 39% residential and 1% open land.	Some additional residential developments.
Lebanon	Mixture of apartments to executive level estate homes being built.	Continued development and housing complexes.
Loveland	Infill development has been observed and averaging 10 homes being built per year.	Limited expansion, mostly infill development. Housing growth to stay about the same.
Mason	Growth in mixed use commercial development, and some housing.	More of the same.
Monroe	A move from agriculture to light industrial and housing.	More multi-family and single-family homes. Expansion of light industrial.
Springboro	Additional housing.	More of the same.
South Lebanon	High density of single and multi-family residential development with commercial development on the main thoroughfares.	An increase in demand for mineral extraction and processing within the city. Continuation of residential development.
Maineville	Land use has primarily remained steady, with a couple agricultural areas converting to residential/commercial developments.	Same.
Corwin	Mainly residential, and some agriculture.	New housing development.
Morrow	Some agricultural areas have been converted to housing and new development.	Continuation of agricultural areas converting into development as more houses will be built.
Pleasant Plain	Mainly agricultural/rural.	Continuation of agricultural development, and building/repairing residential areas.
Waynesville	No changes.	Continued updates and replacement of old infrastructure.

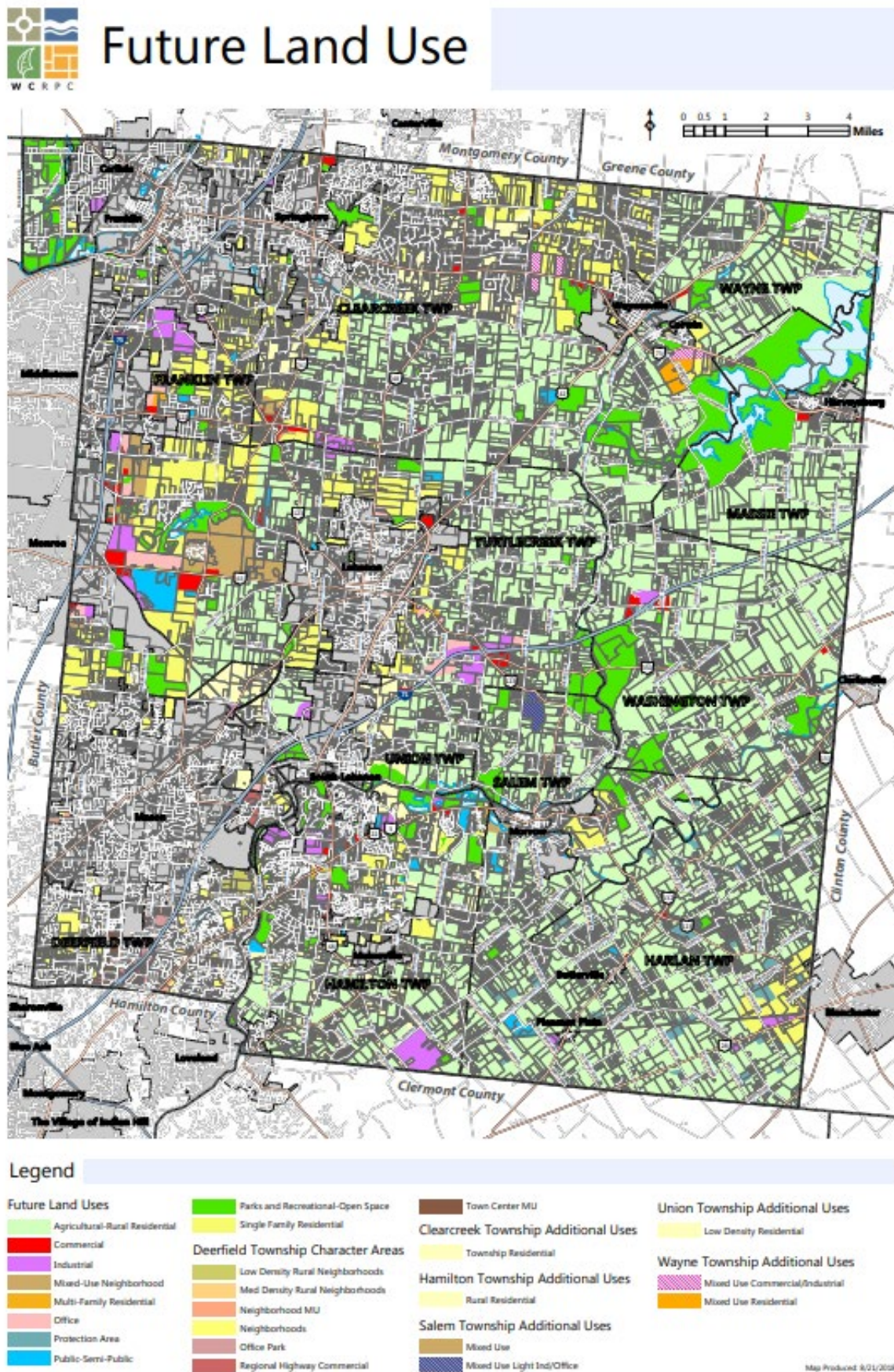
Table 16 Continued

Land Use/Housing Trends		
Jurisdiction	Trend Over the Last 5 Years	Forecasted Trends Over Next 5 Years
Clearcreek Twp	Seeing a lot of single-family homes being built.	Increase in single-family housing.
Deerfield Twp	A lot of residential development (multi family, apartments, and larger homes).	Continuation of larger homes. Becoming limited in available land.
Franklin Twp	Increase in subdivisions/single family homes.	Continuation of new homes. Limited commercial development.
Hamilton Twp	Light commercial and residential developments.	Continuing increase in commercial and residential developments.
Harlan Twp	Large, single-family homes being built.	Same.
Washington Twp	Mainly agricultural, some increase in single family homes.	Same.
Wayne Twp	No new trends.	Agricultural areas are becoming residential development.

Table 17: Infrastructure/Business Trends in Warren County

Infrastructure/Business Trends	
Jurisdiction	Forecasted Trends Over Next 5 Years
Franklin	- Water/sewer replacements and additions in downtown - Expansions are planned - New splash pad being installed
Lebanon	- Business/commercial expansion - Improvements along Broadway to facilitate downtown development moving north - Electric upgrades to the municipal owned system for a data center project
Loveland	- Replacement of aged water mains - New commercial development along Loveland Madeira Road - New elementary school building planned - Expansion/improvement of public parks
Mason	- Additional roadway development - Roadway development for research and development park - Improvements for the tennis facility to bring year-round activities
Monroe	- Roadway improvements - Utility expansion - Improvements to parks/offering
South Lebanon	- Increase in commercial development - Development of Spicer Park - Adding new commercial and residential
Morrow	- Improvements in roads and sewers to meet new housing demand - Recruitment of new businesses to Morrow - Expansion in tourism from the Phegley Park renovations
Waynesville	New library park opening
Deerfield Twp	- Upgrade/upkeep of infrastructure - Completing improvements on District at Deerfield town center with public amenities and commercial/residential
Franklin Twp	Will need to improve infrastructure to meet growing demands
Washington Twp	Possible park expansion
Wayne Twp	Road connectively as subdivisions are approved

Figure 9: Map of Future Land Use for Warren County as provided by WC Economic Development



1.7. LIBRARIES AND SCHOOLS

According to the Warren County Profile from the Ohio Department of Development, there are multiple public and private school districts, as well as libraries throughout Warren County.

Table 18: Educational Buildings in Warren County

Education	
Traditional public schools buildings	40
Students	35,973
Teachers (Full Time Equivalent)	2,403.1
Expenditures per student	\$10,968
Graduation rate	97.3
Community/charter schools buildings	0
Students	0
Teachers (Full Time Equivalent)	0.0
Expenditures per student	
Graduation rate	
Private schools	14
Students	3,516
Public universities, 4-year	0
Public universities/colleges, 2-year	0
Public learning centers, less-than 2-year	1
Private universities and colleges	0
Public libraries (Districts / Facilities)	5 / 7

Source: Ohio Department of Development, 2024 Edition

LIBRARIES

There are seven (7) libraries in Warren County. There are depicted in Table 19.

Table 19: Public Library Buildings in Warren County

Library	Jurisdiction Library is Located
Franklin Public Library	Franklin
Lebanon Public Library	Lebanon
Mary L. Cook Public Library	Waynesville
Mason Public Library	Mason
Salem Twp Public Library	Morrow
Springboro Public Library	Springboro
Warren County Law Library	Lebanon

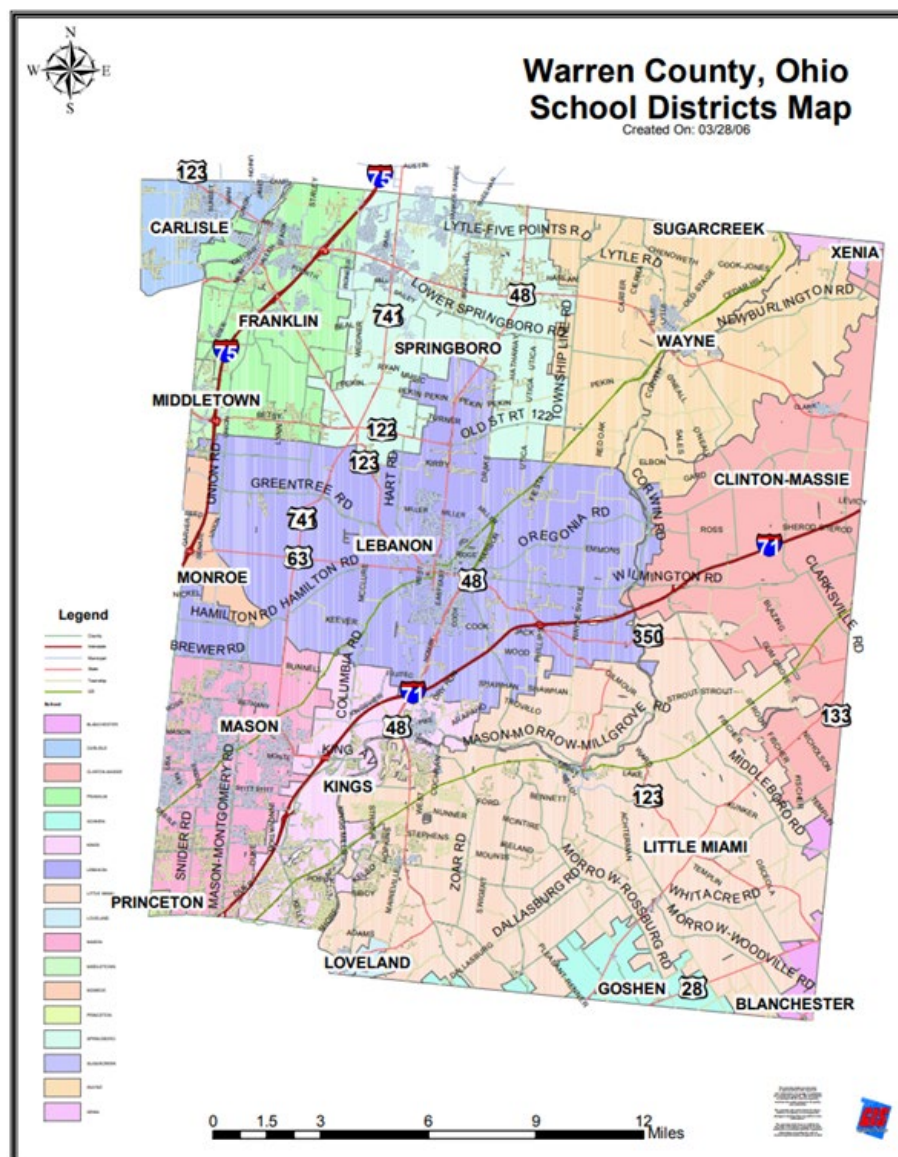
SCHOOLS

There are ten (10) main public-school districts in Warren County, along with six (6) other districts that extend into the county. There are also multiple private schools and alternative education facilities in Warren County.

Public School Districts include:

- **Carlisle Local School District**
- **Clinton-Massie Local School District**
(buildings in Clinton County)
- **Franklin City School District**
- **Goshen Local School District**
(extends into Warren County)
- **Kings Local School District**
- **Lebanon City School District**
- **Little Miami Local School District**
(extends into Clermont County)
- **Loveland City School District**
(extends into Warren County)
- **Mason City School District**
- **Middletown City School District**
(extends into Warren County)
- **Monroe Local School District**
(extends into Warren County)
- **Princeton City School District**
(extends into Warren County)
- **Springboro Community School District**
(extends into Montgomery County)
- **Wayne Local School District**
- **Warren County Vocational School District**
- **Xenia City School District**
(extends into Warren County)

Figure 10: Map of Warren County Public School Districts



Private Schools include:

- Bishop Fenwick High School – Franklin
- Lebanon Christian School – Lebanon
- Middletown Christian Schools – Franklin
- Montessori Academy of Cinti – Deerfield Twp.
- St. Margaret of York School – Loveland
- Liberty Bible Academy – Mason
- St. Susanna Parish School – Mason
- Royalmont Academy – Mason
- St. Francis de Sales – Lebanon
- Chess Christian School – Clearcreek Twp.

Alternative Schools include:

- Warren County Educational Service Center (John K. Lazares Alternative School)
- Warren County Learning Center (Laura Farrell)
- Warren County Learning Center (St. Mary)
- Transition Living Classrooms
- Mary Haven Youth Center
- Warren County Juvenile Detention Center
- Greater Ohio Virtual School

1.8. BUSINESS AND INDUSTRY, WORK FORCE STATISTICS

According to the Warren County Profile from the Ohio Department of Development, there are 184,734 people aged eighteen (18) and over, of which 124,076 are in the labor force. Out of 124,076 people in the labor force, 120,341 are employed, and 3,735 are unemployed. The median household income in Warren County is \$103,128. Additional statistics regarding the workforce in Warren County are depicted in Tables 20, 21, and 22. *Source: Ohio Department of Development, 2024 Edition*

Table 20: Civilian Labor Force Statistics, 2019 – 2023

Civilian Labor Force	2023	2022	2021	2020	2019
Civilian labor force	124,076	122,415	115,880	119,662	121,515
Employed	120,341	118,391	120,752	112,049	117,211
Unemployed	3,735	4,024	4,872	7,613	4,304
Unemployment rate	3.0	3.3	4.0	6.4	3.5

Table 21: Establishments, Employment, and Wages by Sector: 2022

Industrial Sector	Number of Establishments	Average Employment	Total Wages	Average Weekly Wage
Private Sector	5,918	89,682	\$5,705,534,634	\$1,223
Goods-Producing	732	17,504	\$1,238,812,223	\$1,361
Natural Resources and Mining	43	321	\$12,968,101	\$778
Construction	423	4,169	\$299,056,226	\$1,380
Manufacturing	267	13,015	\$926,787,896	\$1,369
Service-Providing	5,186	72,178	\$4,466,722,411	\$1,190
Trade, Transportation and Utilities	1,276	20,278	\$1,059,868,031	\$1,005
Information	161	713	\$93,251,386	\$2,516
Financial Services	619	5,457	\$412,111,965	\$1,452
Professional and Business Services	1,450	16,854	\$1,797,713,828	\$2,051
Education and Health Services	721	12,522	\$672,416,963	\$1,033
Leisure and Hospitality	508	13,624	\$289,043,235	\$408
Other Services	419	2,677	\$137,828,861	\$990
Federal Government		303	\$21,131,057	\$1,340
State Government		1,085	\$85,007,093	\$1,507
Local Government		8,349	\$470,836,507	\$1,085

Private Sector total includes Unclassified establishments not shown.

Table 22: Largest and Notable Employers in Warren County

Employer	Category
ADVICS Manufacturing Ohio	Manufacturing
Amazon	Transportation
Anthem Blue Cross/Blue Shield	Insurance
Atrium Medical Center	Service
Cedar Fair/Kinds Island	Service
Cengage learning Inc.	Service
Cintas Corp	Manufacturing
Honeywell Intelligrated Inc.	Manufacturing
L3Harris Technologies Inc	Manufacturing
Luxottica Group SpA	Manufacturing
Macy's Inc	Trade
Mason Local Schools	Government
Mitsubishi Electric Automotive	Manufacturing
Portion Pac Inc/Kraft Heinz	Manufacturing
Procter & Gamble	Research & Development

1.9. TOURISM, POINTS OF INTEREST, AND COMMUNITY FESTIVALS

Warren County is home to many attractions, points of interest, and community festivals that draw in large crowds, require pre-planning, and may alter traffic patterns. The popularity of these attractions drives tourism in the county and increases the overall population at a given time. Below are some of the highlighted attractions and events that increase tourism in Warren County:

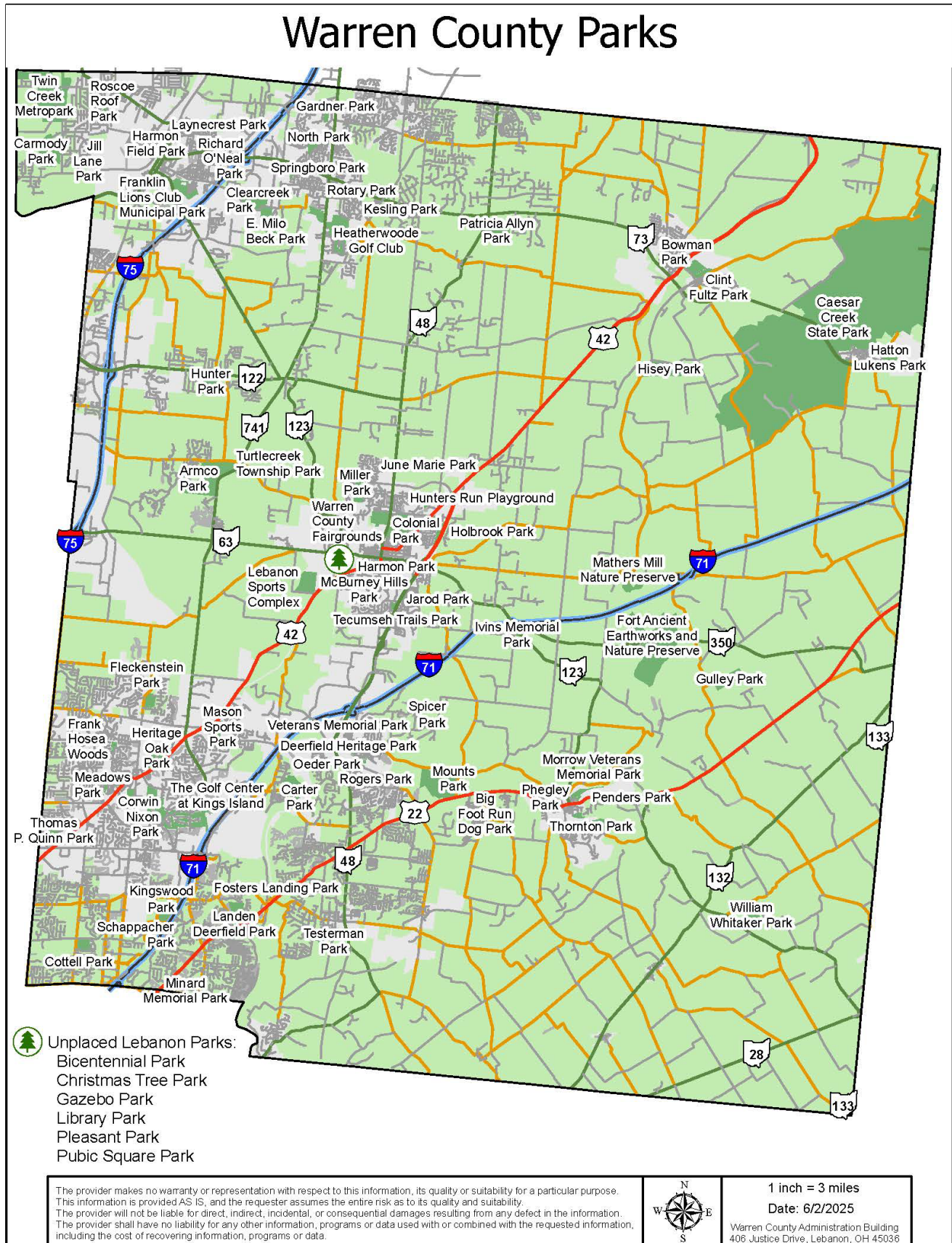
Recreation and Attractions

- Kings Island (Theme Park)
- Cincinnati Open (Professional Tennis Tournament)
- Great Wolf Lodge (Indoor Water Park Resort)
- Lebanon Mason Monroe Railroad
- Fort Ancient (American Indian Earthen Mounds)
- Ohio Renaissance Festival
- Warren County Fair
- The Golden Lamb (Ohio's Oldest Operating Inn)
- Cincinnati Premium Outlets
- Miami Valley Gaming
- Lebanon Raceway
- Warren County Sports Park
- Caesar's Creek State Park/Caesar's Creek Lake
- Armco Park
- Other Smaller Parks (Figure 10)

Community Festivals & Events

- Lebanon Horse Drawn Carriage Parade
- Lebanon Blues Festival
- Lebanon Country Music Festival
- Apple Fest
- Feast and Fall-y
- Maineville's Crossroads Festival
- Red, Rhythm and Boom
- Sauerkraut Festival
- National Night Out
- Christmas in Springboro
- Devil's Staircase
- Celtic Festival
- Oktoberfest

Figure 11: Map of Warren County Parks



1.10. CRITICAL INFRASTRUCTURE

Critical infrastructure is defined as facilities or systems that provide essential facilities, products, and services to the general public and that are necessary to preserve welfare and quality of life, or to fulfill emergency response or disaster recovery operations locally or nationally. Identified critical facilities and essential services within Warren County are depicted in Table 23.

Table 23: Critical Infrastructure in Warren County

Critical Infrastructure	
Critical Facilities	
Fire/Ems Departments	911 Communication Centers
Law Enforcement Departments	Buildings Designated as Storm/Mass Care Shelters
Hospitals	Residential Health Care and Assisted Living Facilities
National Corporations/Headquarters	State Prisons
Defense Contractors	Emergency Supply Facilities (i.e., food, fuel stations, banks, postal service, etc.)
Road Dept. Facilities and Equipment	Schools
Critical Utilities	
Power Plants/Substations	Communications Systems/Towers
Water Treatment Plants/Well Field Storage Tanks	High Pressure Gas Lines
Wastewater Treatment Plants	
Critical Services/Other	
Traffic Signals	Major Rail Lines
Government Services Buildings	Levee Systems and Components
Major Roads and Bridges	Private Airfield

1.11. AUTHORITIES AND RESPONSIBILITIES

Warren County is updating the Hazard Mitigation Plan as required by 44 Code of Federal Regulations (CFR) Section 201, and the Robert T. Stafford Disaster Relief and Emergency Assistance Act. In order for Warren County's plan update to be compliant with the Disaster Mitigation Act of 2000, the Warren County Board of County Commissioners will adopt this plan in November of 2025 with all participating jurisdictional governing bodies adopting this plan within that same year, pending approval from the Ohio Emergency Management Agency, as well as acceptance from the Federal Emergency Management Agency.

The County and jurisdictions adopting this plan are responsible for incorporating mitigation actions into existing plans and ordinances and considering mitigation actions in budgetary or grant cycles. Commissioners, public safety officials, floodplain administrators, engineers, and other community leadership partners are expected to use the information from the plan to enhance or uphold local, state, and federal rules, regulations, codes, ordinances, policies, plans, procedures, or other administrative instruments. Examples of how the components of the plan can enhance existing authorities and responsibilities are outlined below:

- **Building/Development Codes and Zoning Ordinances:** The HMP will provide information to enable Warren County and local jurisdictions to make decisions on appropriate building/development codes and ordinances. Appropriate building codes and ordinances can increase resilience against natural disasters.
- **Comprehensive/Master Plans:** The HMP will provide information that can be incorporated into the Land Use Elements for future land planning. Specific risk and vulnerability information from the Warren County HMP will assist in identifying areas where development may be at risk to potential hazards.
- **Emergency Operations Plan (EOP):** The HMP highlights hazards that the County and its jurisdictions are vulnerable to. The priorities for hazards and strategies for mitigation can help highlight where emergency planning efforts can be concentrated.
- **Capital Improvements Plans:** The HMP will provide information to assist the county and jurisdictions with prioritizing capital projects, equipment purchases, and major studies that will sustain or improve community or county infrastructures.

2. PLANNING PROCESS

2.1. PLANNING PROCESS OVERVIEW

The Warren County Emergency Management Agency (EMA) acted as the project coordinator to complete the five (5)-year Hazard Mitigation Plan update. EMA personnel on the planning team consisted of:

- Melissa Bour, Director
- Sydney Renner, Operations Manager
- Frances Ficke, LEPC/Grants Coordinator
- Matthew Mumma, EMA Specialist

The planning process began in January of 2025 with a review of the 2020 Warren County Hazard Mitigation Plan and projects. A review of the planning process was completed to determine whether the plan update would be awarded to a contractor or be completed in-house. It was determined that the plan update would be completed by EMA staff to build collaborative relationships with the jurisdictions as well as public and private sector representatives. To accomplish the 2025 Hazard Mitigation Plan update, Warren County EMA personnel developed the mitigation strategy outlined below:

1. Review of the Initial Planning Process
 - Determined all Warren County EMA staff would be involved in the review and planning process
 - Reviewed the 2020 Warren County Hazard Mitigation Plan.
 - Reviewed relevant documents for the planning process including the State of Ohio Hazard Mitigation Plan, FEMA Hazard Mitigation Planning Handbook, and FEMA Local Mitigation Plan Review Guide.
 - Reviewed the hazards to determine if there were any changes to be made or additional hazards to be added.
 - Reviewed updated county plans including the Emergency Operations Plan, Disaster Recovery Plan, and updated countywide flood maps.
2. Review of Risk Assessment Strategy Portion
 - Reviewed contents of hazard information from the 2020 Plan.
 - Researched databases for additional hazard data for Warren County and confirmed data with appropriate parties where applicable (i.e., National Weather Service Office in Wilmington for natural hazard data).
 - Determined if other hazards should be added and created a profile for them.
 - Updated data for all hazards, to include the last five years.
 - Reviewed repetitive losses for the county.
 - Determined risk assessment strategy to rate hazards.
3. Reassessment of Hazard Vulnerability
 - Surveyed jurisdictions on current status including population, demographics, critical infrastructure, land use, trends, and points of interest.
 - Surveyed jurisdictions on capabilities including planning, resources, and response to hazards.
 - Ranked hazards according to the probability, impacts, and preparedness levels to determine jurisdictional risk.
 - Compiled scores to determine county risk.

4. Development of Goals and Objectives and Mitigation Actions
 - Developed goals and objectives for the mitigation strategy of the 2025 Hazard Mitigation Plan.
 - Reviewed mitigation projects from the 2020 Plan and updated the status for each.
 - Developed list of mitigation projects for the 2025 Plan.
 - Had jurisdictions and county departments select the most relevant mitigation projects to their jurisdiction and evaluate them against vulnerability to determine priority.
 - Reconciled mitigation projects with goals and objectives,
5. Evaluate Plan Maintenance Process
 - Strengthened process to make it a stronger countywide collaborative effort.
 - Described the process of how local government can incorporate the mitigation strategy into other planning mechanisms.
 - Review and modify the process as necessary to continue public participation in the plan.
6. Draft Revised Plan Document
 - Submitted the drafted plan for review by stakeholders.
 - Modified the plan as recommended by stakeholders.
7. Plan Adoption
 - Submitted the plan for review by Ohio Emergency Management Agency (Ohio EMA) and Federal Emergency Management Agency (FEMA).
 - Incorporated recommended revisions as necessary from state and federal review.
 - Formal adoption by the Warren County Board of County Commissioners.
 - Formal adoption by all participating communities and special districts (where applicable).

For this plan update, the Warren County EMA desired to collaborate with jurisdictions and other agencies to provide a comprehensive guide for the hazards faced in the county. Meeting materials were produced and placed in binders for the jurisdictions to personalize for their specific hazards and mitigation projects. The following describes the process for meetings and binder contents:

Table 24: Planning Meeting Materials

Meeting	Meeting Subject	Binder Section	Binder Contents
Pre-Meeting	Email surveys to jurisdictions.	1	• Community Profile Survey • Jurisdictional Capability Survey
#1	Hazard Assessment & Ranking	2	• Hazard-Specific Informational Packets (includes history, impacts, etc.) • Hazard Ranking Sheet • Compiled Hazard Rankings (added after Meeting #1)
#2	Mitigation Projects Discussion, Selection & Ranking, and Grant Discussion	3 & 4	• Overarching Mitigation Goals & Objectives • List of Proposed Mitigation Projects • Current/Ongoing Projects as Identified in the 2020 Plan (personalized per jurisdiction) • Mitigation Project Selection & Ranking Sheet • Potential Grant Opportunities Overview Sheet
#3	Finalization of Plan/Review & Adoption Process	5	• Plan Review • Adoption Template

2.2. PLANNING COMMITTEE/PUBLIC INVOLVEMENT

Warren County EMA scheduled three (3) public planning meetings from February 2025 through June 2025. Meetings were announced via postings on the EMA website, emails to all jurisdictions and county partners, announcements at public meetings and events, and flyers in newsletters. The planning meetings were held in the Warren County Commissioner's Meeting Room, located at 406 Justice Drive, Lebanon. Which is centrally located in the county.

Table 25: 2025 Planning Meetings

Meeting	Date	Purpose	Attending
#1	February 19 th , 2025	Planning Meeting 1	Public/Warren County EMA
#2	April 17 th , 2025	Planning Meeting 2	Public/Warren County EMA
#3	June 18 th , 2025	Planning Meeting 3	Public/Warren County EMA

Figure 12: Newsletter Flyers & Website Posting for Planning Meetings



In addition, individual planning meetings were held with jurisdictions that were not able to attend the above-mentioned meetings. These individual meetings covered the same material as the public meetings, and ensured all jurisdictions had an opportunity to provide input.

The public was given numerous opportunities to comment and provide input throughout the planning process. Meeting information was provided to invite public involvement at the Warren County Police and Fire Chief's Association Meetings in January, March, and May, at the Warren County Local Emergency Planning Committee (LEPC) Meeting in January, and the Southwest Ohio Emergency Management Association (SWOEMA) Meeting in March and May.

FEEDBACK AND INVOLVEMENT

At each planning meeting, attendees were asked to fill out an anonymous evaluation form to provide feedback and evaluate the effectiveness of the meeting/planning process. This included providing comments about additional hazard or mitigation information that would assist with their planning or mitigation strategy efforts.

Additionally, planning components (specifically the documents provided in Section 4: Profile of Each Hazard and Section 5: Mitigation Strategy of this plan) were presented at Planning Meeting #1 and #2 and were emailed out to all stakeholders after each meeting for review and additional context. Additionally, this information was presented at individual meetings with jurisdictions. Once the information had been presented to stakeholders and a period of review was held, the revised information was placed into this plan.

Once drafted, this plan was posted on the Warren County EMA website. All stakeholders, including county departments, jurisdictional representatives, and partner organizations were sent an email inviting them to review the plan draft, and provide any comments or suggestions for revisions. Additionally, the general public was also invited via social media to review and provide feedback on the plan.

MITIGATION PLANNING COMMITTEE

The Mitigation Planning Committee was comprised of community leaders, public safety officials, school representatives, business and industry employees, representatives of various agencies, and county residents. For a full list of stakeholders who participated in the Hazard Mitigation Planning process see Appendix 1 Planning Participation Documents (1.1 List of Participants. 1.2 Community Participation and 1.3 Community Meeting Sign-In Sheets).

Besides community meetings, Warren County EMA representatives also collaborated with the following agencies/organizations regarding hazard mitigation planning:

Table 26: 2025 Planning Partner Collaboration

Agency/Organization	Method of Collaboration	Discussion Topics
Warren County Economic Development	Email	Current and future land use trends.
Warren County GIS	Email	Assisted with map production.
Warren County Health District	Email	Assistance with the Development of the Infectious Disease section of Meeting #1 (which was adapted and incorporated into the plan).
Warren County Regional Planning Commission	Email	Updates to Mitigation Projects Identified in 2020.
Miami Valley Conservancy District	Email	Updates to Mitigation Projects Identified in 2020.
Ohio Department of Natural Resources	Email	- Dam locations and classifications - GIS Mapping - Excel document for dam inventories
Army Corps of Engineers	Email	- Dam locations and classifications - GIS Mapping
National Weather Service Office in Wilmington, OH	Email	- Collaborated on severe weather data included in the meetings/plan. - Asked for input on how climate change is affecting hazards in Southwest Ohio.
City of Springboro	In-Person Meeting	- Hazard Mitigation Planning process. - The specific impact of hazards on the community and mitigation projects to incorporate. - Potential grant funding sources.
Village of Corwin	In-Person Meeting	- Hazard Mitigation Planning process. - The specific impact of hazards on the community and mitigation projects to incorporate. - Potential grant funding sources.

Table 26 Continued

Agency/Organization	Method of Collaboration	Discussion Topics
Village of Maineville	In-Person Meeting	• Hazard Mitigation Planning process. • The specific impact of hazards on the community and mitigation projects to incorporate. • Potential grant funding sources.
Village of Pleasant Plain	In-Person Meeting	• Hazard Mitigation Planning process. • The specific impact of hazards on the community and mitigation projects to incorporate. • Potential grant funding sources.
Salem Township	In-Person Meeting	• Discussion and selection of mitigation projects to incorporate.
Turtlecreek Township	In-Person Meeting	• Hazard Mitigation Planning process. • The specific impact of hazards on the community and mitigation projects to incorporate. • Potential grant funding sources.
Union Township	In-Person Meeting	• Hazard Mitigation Planning process. • The process of identifying mitigation projects and their benefit. • Potential grant funding sources.
Washington Township	In-Person Meeting	• Hazard Mitigation Planning process. • The specific impact of hazards on the community and mitigation projects to incorporate. • Potential grant funding sources.

2.3. PLAN ADOPTION AND RESOLUTION BY COMMISSIONERS

BOARD OF COUNTY COMMISSIONERS
WARREN COUNTY, OHIO

Resolution

Number _____ Adopted Date _____

IN THE MATTER OF RESOLUTION OF ADOPTING THE 2025 WARREN COUNTY HAZARD MITIGATION 5-YEAR PLAN UPDATE

WHEREAS, The Warren County Emergency Management Agency desires to be compliant with the Disaster Mitigation Act of 2000 and 44 CFR Section 201.6(d)(3). Said Act requires that a Hazard Mitigation Plan meeting program criterion be developed in order that the participating Warren County Communities and unincorporated areas of Warren County will be eligible for future pre-disaster and post-disaster mitigation program funds (i.e. Hazard Mitigation Grant Program, Flood Mitigation Assistance Program, etc.)

FURTHER, the mitigation planning regulation at 44 CFR Section 201.6(d)(3) states:

A local jurisdiction must review and revise its Hazard Mitigation plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.

WHEREAS, the Warren County Emergency Management Agency established the Warren County Hazard Mitigation Planning Team and they have, through an organized planning process, identified local problems and mitigation activities to help reduce hazards, damages, and loss of life during a natural hazard event. Public meetings were held, and a Countywide Hazard Mitigation Plan update was prepared and submitted to the Ohio Emergency Management Agency for review and comment in July 2025. Said Plan has been completed per the Ohio Emergency Management Agency recommendations. Said Plan is on file with the Department of Warren County Department of Emergency Services and is hereby formally adopted.

WHEREAS, by adopted Resolution, the Warren County Emergency Management Agency has entered into an agreement, in the manner provided by law, under the Ohio Revised Code, as amended, and has the power to coordinate and unify the comprehensive Emergency Management activities of the participants, thereof, including the various municipal corporations and unincorporated areas of Warren County, Ohio.

For the reasons stated in the preamble hereto, which is hereby declared to be an emergency measure and shall take effect and be in force from and after its passage by the Warren County Board of Commissioners, and its adoption by the participating municipalities of Warren County.

Mr. Grossmann–
Mr. Young -
Mrs. Jones –

Resolution adopted this day of 2025.

BOARD OF COUNTY COMMISSIONERS

Clerk

cc: Emergency Services (file)
 CIA-Ohio Emergency Management Agency

2.4. PLAN ADOPTION BY JURISDICTION

Municipal Resolution No. _____

A RESOLUTION ADOPTING THE WARREN COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION 5 – YEAR PLAN UPDATE

WHEREAS, Warren County has experienced severe damage from several natural hazards on many occasions in the past century, resulting in property loss, loss of life, economic hardship, and threats to public health and safety; and

WHEREAS, the Warren County Emergency Management Agency desires to be compliant with the Disaster Mitigation Act of 2000 and 44 CFR Section 201.6(d)(3). Said Act requires that a Hazard Mitigation Planning Program criteria be developed in order for the participating Warren County communities and unincorporated areas of Warren County to be eligible for future pre-disaster and post-disaster Hazard Mitigation Grant Program (HMGP) funding.

FURTHER, the mitigation planning regulation at 44 CFR Section 201.6(d)(3) states:

A local jurisdiction must review and revise its Hazard Mitigation Plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five (5) years in order to continue to be eligible for mitigation project grant funding.

WHEREAS, the Warren County Emergency Management Agency has established the Warren County Hazard Mitigation Planning Committee and they have, through an organized planning process, identified local problems and mitigation activities to help reduce hazards, damages, and loss of life during a natural hazard event; and

WHEREAS, the 2025 5-Year Plan Update recommends many hazard mitigation actions that will protect the people and property affected by the natural hazards that face Warren County; and

WHEREAS, the Warren County Hazard Mitigation Committee held monthly public planning meetings from January 2025 through June 2025 to review and revise the Plan as required by law; and will hereby be implemented, monitored, evaluated, and updated annually by the Warren County Hazard Mitigation Committee. The Warren County Board of Commissioners will be the public authority to promote and oversee the continued maintenance of this Plan.

NOW, THEREFORE, BE IT RESOLVED by the Council/Board of Trustees of the Village/City/Township of _____, Warren County, Ohio, the majority of all members elected thereto concurring, that:

Section 1: The Warren County Hazard Mitigation 5-Year Plan Update is hereby adopted as the official Multi-Jurisdictional Plan of Warren County, Ohio. By participating in the Warren County Plan and county planning process this municipality will be eligible to make applications for Hazard Mitigation Grant Program funding

Section 2: The Warren County Emergency Management Agency has entered into an agreement, in the manner provided by law, under the Ohio Revised Code, as amended, and has the power to coordinate and unify the comprehensive emergency management activities of the participants, thereof, including the various municipal corporations and the unincorporated jurisdictions of Warren County, Ohio, and

Section 3: The respective County, City, Village and Township officials identified in the strategy of the 5-Year Hazard Mitigation Plan Update are hereby requested to participate in addressing the recommended mitigation actions assigned to them. These officials will report annually on their hazard mitigation activities, accomplishments, and progress to the Warren County Hazard Mitigation Committee under the direction of the Warren County Board of Commissioners.

Section 4: This resolution shall take effect and be in force from and after the earliest period allowed by law.

Passed/Adopted: _____

Date

President of Council

Attest: _____

Clerk of Council

Mayor

3. HAZARD IDENTIFICATION AND RISK ASSESSMENT

3.1. OVERVIEW

Warren County is prone to many natural and man-made hazards, which can be noticed through the county's history of considerable hazard events resulting in millions of dollars of damage. As such, Warren County has assembled a Hazard Mitigation Plan as an overall effort to reduce future risks, impacts, and exposure to damages. Additionally, this plan was written in compliance with, and to meet the planning requirements of the Disaster Mitigation Act of 2000 as outlined in 44 CFR Section 201.

3.2. IDENTIFYING HAZARDS

44 CFR Section 201.6(c)(2)(i) requires a risk assessment to include a description of the type of hazards that can affect Warren County. Table 27, within this plan, presents a list of potential hazards that may likely impact Warren County. To determine the hazards that pose the greatest threat to the county, the Warren County Mitigation Committee updated the list of potential hazards by conducting a review of several key resources which include:

- Review of historical data on events that have occurred since the 2020 Plan update
- Review of 2020 Warren County Plan data
- Review of the State Hazard Mitigation Plan data
- Collaboration with community experts and agencies
- Review of past events and state and federally declared disasters
- Internet research

3.3. PROFILING HAZARDS

Section 201.6(c)(2)(i) requires that the risk assessment shall include a description of the location and extent of hazards that can affect Warren County including information on previous occurrences of hazard events, as well as the probability of future hazard events. The risk assessment relies upon information about past hazard events from published sources such as the National Oceanic and Atmospheric Administration (NOAA), the United States Geological Survey (USGS), United States Army Corp of Engineers (USACE), Ohio Emergency Management Agency (OEMA), Ohio Department of Natural Resources (ODNR), and Warren County records, as well as other agencies.

3.4. ASSESSING VULNERABILITY BY IDENTIFYING ASSETS AND CRITICAL INFRASTRUCTURE

Section 201.6(c)(2)(ii) requires a description of each jurisdiction's vulnerability to the hazards described and the description shall include an overall summary of each hazard and its impact on the community.

As a part of the planning process, each member of the Mitigation Planning Committee was asked to review each hazard and its associated impacts on the community. With information, committee members were then asked to complete a Hazard Ranking Sheet (see Figure 13), in which score was to be given to each hazard across multiple categories. These categories included the probability, the associated warning time of the hazard, the impact, and readiness for the hazard to occur. An explanation of these categories and their associated scoring was provided in the Risk Factor Criteria Sheet (see Figure 14).

A score was then compiled for each hazard. The score was determined by adding all the categories (warning time, impact, and preparedness) then multiplying that total by the probability score. This was done to show the realistic weight of how the hazard affects the jurisdiction.

At the end of this process, each participating jurisdiction had a Hazard Ranking Sheet specific to their jurisdiction. A compiled rankings list was then created to represent the county. This was done by taking the score for a hazard from all of the individual ranking sheets and computing the average. This process was repeated for all hazards. The final hazard ranking list includes sixteen (16) hazards and is listed, by ranking, in Table 27.

Table 27: 2025 Hazard Ranking

Ranking	Hazard	Risk Score
1	Wind/Severe Storm	16.82
2	Cyber Incident	15.94
3	Tornado	15.80
4	Utility Failure	15.17
5	Hazardous Materials Incident	15.09
6	Flood	13.19
7	Infectious Diseases	12.05
8	Man-Made/Terrorism	11.81
9	Winter Storm	11.69
10	Extreme Temperatures	10.91
11	Earthquake	10.21
12	Drought	10.19
13	Landslide, Erosion and Subsidence	9.42
14	Invasive Species	9.23
15	Dam/Levee Failure	7.19
16	Wildfire	6.91

Figure 13: Example of Hazard Ranking Sheet from Planning Meeting #1

WARREN COUNTY HAZARD RANKING SHEET

Jurisdiction: _____

	Severity = (Magnitude/Impact - Mitigation/Preparedness)							
	<i>Probability</i>	<i>Warning Time</i>	<i>Impact</i>				<i>Preparedness</i>	
	Likelihood of Occurance	Preparation/Lead Time	Property Impact	Spatial Extent	Population Impact	Economic Impact	Jurisdictional Response, Capabilities & Assets	Mitigation Efforts in Place
	Based on Relative Data/Current Threats	Lead Time/Preparation Time Associated with the Hazard	Physical Losses & Damages <i>(include 5 yr future land development impacts)</i>	% of Jurisdiction Impacted by the Hazard <i>(Are impacts localized or regional?)</i>	Effect Hazard Would Have on Population <i>(Including injuries, deaths & disruptions to quality of life)</i>	Impact Hazard Will Have on the Local Economy	Plans, Trainings, Exercises & Equipment to Respond to Hazard <i>(Includes readiness of responders to specific hazards)</i>	Plans, Trainings, Exercises & Equipment to Reduce Risk, Severity or Impact of Hazard
	1 = Unlikely 2 = Possible 3 = Likely 4 = Highly Likely	1 = Public has DAYS of Warning Time Before Event 2 = Public has HOURS of Warning Time Before Event 3 = Public has MINUTES of Warning Time Before Event 4 = Public has LITTLE TO NO Warning Time Before Event	1 = Affected 2 = Minor 3 = Major 4 = Destroyed	1 = Negligible <i>(Less than 1% affected)</i> 2 = Small <i>(1% - 10% affected)</i> 3 = Moderate <i>(10% - 50% affected)</i> 4 = Large <i>(50% - 100% affected)</i>	1 = Minor 2 = Limited 3 = Critical 4 = Catastrophic	1 = Minor 2 = Limited 3 = Critical 4 = Catastrophic	1 = Fully Prepared/Have Capable Resources 2 = Moderately Prepared/Have Adequate Resources 3 = Somewhat Prepared/Have Limited Resources 4 = Not Prepared/No Resources	1= Not Need Measures 2 = Adequate Mitigation Measures 3 = Some Mitigation Measures 4 = Very Limited/No Mitigation Measures
Hazard List								
Cyber Incident								
Dam/Levee Failure								
Drought								
Earthquake								
Extreme Temperatures								
Flood								
Hazardous Materials Incident								
Infectious Diseases								
Invasive Species								
Landslide, Erosion and Subsidence								
Man-Made/Terrorism								
Tornado								
Utility Failure								
Wind/Severe Storm								
Winter Storm								
Wildfire								

Copies of Hazard Ranking Sheets completed by jurisdictions were filed with WCDES and a copy was included in the HMP participant mitigation binders.

Figure 14: Risk Factor Criteria Explanation for the Hazard Ranking Sheet



RISK FACTOR CRITERIA EXPLANATION

Assessment Category	Explanation	Level	Degree of Risk Level	Index
PROBABILITY	Likelihood of hazard occurring based on past data & current threats.	UNLIKELY	Less Than 1% Annual Probability	1
		POSSIBLE	Between 1 & 10% Annual Probability	2
		LIKELY	Between 10 & 100% Annual Probability	3
		HIGHLY LIKELY	100% Annual Probability	4
WARNING TIME	Amount of time a community has to prepare for a specific hazard.	DAYS	Days of warning time before the event occurs.	1
		HOURS	Hours of warning time before the event occurs.	2
		MINUTES	Minutes of warning time before the event occurs.	3
		NO WARNING	No to Little advanced warning before event occurs.	4
PROPERTY IMPACT	Degree of physical losses & damage that would occur to properties for a specific hazard, including 5yr projections.	AFFECTED	Properties may be affected by the event. Buildings may receive minimal damage to structure/contents and homes are habitable or business are operational without repairs.	1
		MINOR	Properties may be minimally affected by the event. Encompasses a wide range of damage that does not affect the structural integrity of the buildings.	2
		MAJOR	Building has sustained structural/significant damage, homes are uninhabitable, businesses aren't operational and damages require extensive repairs.	3
		DESTROYED	Home/business is a total loss or damaged to an extent that repairs are not economically feasible.	4
SPATIAL EXTENT	Size of an area impacted by a hazard.	NEGLIGIBLE	Less than 1% of Area Affected	1
		SMALL	Between 1 & 10% of Area Affected	2
		MODERATE	Between 10 & 50% of Area Affected	3
		LARGE	Between 50 & 100% of Area Affected	4
POPULATION IMPACT	Effect the hazard would have on the population. This includes injuries, deaths, and disruptions to quality of life	MINOR	Very few injuries, if any. Minimal disruption of quality of life. Temporary shutdown of critical facilities.	1
		LIMITED	Minor injuries only. Some disruption to quality of life. Complete shutdown of critical facilities for 1+ day.	2
		CRITICAL	Multiple deaths/injuries. Moderate disruption to quality of life. Complete shutdown of critical facilities for more than one week.	3
		CATASTROPHIC	High number of deaths/injuries possible. Complete shutdown of critical facilities for 30 days or more.	4
ECONOMIC IMPACT	The impact the hazard will have on the local economy.	MINOR	Minor impact on economy. Minor impact to infrastructure that could delay access to the community for a short period of time. Schools, businesses, and tourism remain open.	1
		LIMITED	Limited impact on the economy. Retained access to a most of infrastructure, most schools & businesses are still open.	2
		CRITICAL	Major impact on the local economy. Large portion of local infrastructure is moderately affected. Schools and a large number of businesses are closed for one week or longer. Tourism or other tax base affected.	3
		CATASTROPHIC	Catastrophic impact on the local economy. Majority of infrastructure is damaged or destroyed. Schools and a large number of businesses are closed for longer than one week. Tourism or other tax bases are highly affected.	4
JURISDICTIONAL RESPONSE, CAPABILITIES & ASSESTS	Jurisdiction has plans and training that cover incident response, continuity of government, and recovery operations for the hazard. Also, it includes the readiness of responders for the hazard.	FULLY PREPARED & CAPABLE RESOURCES	Jurisdiction has prepared for hazard through planning, training, education, and exercises. Jurisdiction has enough resources on hand to respond to the event.	1
		MODERATELY PREPARED & ACCESS TO ADEQUATE RESOURCES	Jurisdiction has prepared for hazard through training and planning. Jurisdiction has some resources available to respond and can utilize nearby mutual aid to supplement.	2
		SOMEWHAT PREPARED & LIMITED ACCESS TO RESOURCES	Jurisdiction has planned for hazard but has no special training, education, or exercises. Jurisdiction can utilize mutual aid from other counties or through the state to supplement but wait times and availability may be limited.	3
		NOT PREPARED/NO ACCESS TO RESOURCES	Jurisdiction has no specific plans, training, exercises or education on the hazard. Jurisdiction may not have access to adequate resources within the first 48 -72 hours of event.	4
MITIGATION EFFORTS IN PLACE	Plans, trainings, exercises and equipment for mitigating risks or effects hazard.	NOT NEEDED	No mitigation measures are needed to lessen the risk, severity or impact of the specific hazard.	1
		ADEQUATE MITIGATION MEASURES	Adequate mitigation measures in place to lessen the risk, severity or impact of the specific hazard.	2
		SOME MITIGATION MEASURES	Some mitigation measures in place to lessen the risk, severity or impact of the specific hazard. More measures are needed due to the risk or severity/impact on jurisdiction.	3
		VERY LIMITED OR NO MITIGATION MEASURES	Very limited or no mitigation measures in place to lessen the risk, severity or impact of the specific hazard. More measures are needed.	4

4. PROFILE OF EACH HAZARD

For each hazard listed within the plan, a hazard profile was developed. Each profile captures hazard descriptions, historical occurrences, the probability of occurring, the potential impacts and other details specific to Warren County for each hazard. These profiles were compiled through extensive research from jurisdiction representatives, industry experts and internet searches. The resulting profiles were published and presented at Planning Meeting #1. Additionally, copies were published in the jurisdictional/participant binders as well as sent out via email.

4.1. CYBER INCIDENT

Definition:

A cyber incident is an event or action that comprises the confidentiality, integrity, or availability of an organization's information systems or the information they contain. This includes unintentional errors as well as malicious attacks.

Primary Sources of Information:

- Federal Emergency Management Agency (FEMA) – <https://community.fema.gov/>
- Cybersecurity & Infrastructure Security Agency (CISA) – <https://www.cisa.gov/>
- Warren County Telecommunications

Historical Occurrences in Warren County:

In July 2024, a widespread IT outage affecting Microsoft Windows known as the “CrowdStrike Incident” occurred. Relatively minor impacts occurred in Warren County.

In terms of cyber-attacks, there has not been a reported cyber-attack in Warren County. There have been several documented cyber-attacks throughout Ohio, including:

- Kettering Health Network (2025)
- Washington Courthouse (2025)
- Wood County (2024)
- Butler County (2024)
- City of Columbus (2024)
- City of Huber Heights (2023)
- Cincinnati Public Schools (2020)
- Columbus Public Schools (2020)
- City of Akron (2019)

Probability of Occurrence:

There is no historical precedence in Warren County to determine frequency. Although, according to the 2024 Verizon Data Breach Investigations Report (DBIR), the Public Sector experienced 12,217 incidents that resulted in 1,085 confirmed data breaches.

Description and Damage Extent/Impact:

While there are many types of cyber incidents, including attacks, a few of the common ones are:

- Negligence – A valid user exposes an organization through carelessness, i.e., forgetting to secure a laptop, clicking on a malicious link, or failing to update software.
- Accidental - When a user mistakenly causes an unintended risk to the organization. Can include sending sensitive data to the wrong email address or accidentally sharing confidential data.
- Malware – Uses software to gain unauthorized access to IT systems in order to steal data, disrupt system services or damage IT networks in anyway.
- Ransomware – Type of malware identified by specified data or systems being held captive by attackers until a form of payment or ransom is provided.
- Phishing – Online scams enticing users to share private information by using deceitful or misleading tactics.

Table 28: Cyber Incident Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Cyber Incident	County-wide	Localized or Widespread. Unintentional cyber incidents and cyber-attacks can disrupt the intended flow of information and cause business interruption, lead to data breaches, damage reputations, or physically manipulate items connected to the network. In major cyberattacks, information can be stolen from millions of people, and/or critical infrastructure (i.e., utility systems, electric grid) can be taken offline.	The extent is dependent on the nature and scale of the cyber incident, and whether or not it was an intentional attack.
Cyber-Attack			

Causes that May Exacerbate a Cyber Incident:

- Lack of cybersecurity measures in place and enforcement of those measures.
- User mistakes, carelessness, or lack of understanding of security protocols.
- Type of data accessed during a cyber-attack.
- Cyber-attack occurring over a weekend or break when staffing is low.
- How essential the service that has been affected is (i.e., water station systems).

Warnings:

There is no national or state level alert system for cyber incidents or cyber-attacks. Individual organizations with certain systems in place, such as endpoint detection and response (EDR) or firewalls, may receive advanced notice of a cyber-attack occurring.

4.2. DAM/LEVEE FAILURE

Definition:

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams typically are constructed of earth, rock, concrete, or mine tailings. A dam failure is the collapse, breach, or other failure, often resulting in down-stream flooding.

A levee is any artificial barrier that will divert or restrain the flow of a stream or other body of water for the purpose of protecting an area from inundation by flood waters. A levee breach results when a portion of the levee breaks away, providing an opening for water to flood the landward side of the structure.

Primary Sources of Information:

- National Inventory of Dams (USACE) – <https://nid.sec.usace.army.mil/#/>
- National Inventory of Levees – <https://levees.sec.usace.army.mil/>
- Ohio Department of Natural Resources – <https://ohiodnr.gov/>

Historical Occurrences in Warren County:

Table 29: History of Recorded Dam Failures in Warren County

NID No.	Structure Name	Incident Date	Incident	Dam Failure
	Water's Edge Dam (Type II)	1993	Dam was Rebuilt After Failure	Yes
OH00547	Lilley Lake Dam (Type IV)	February 8, 2001	Inadequate Spillway Capacity	No
	Pine Hill Lake Dam (Type I)	2001	Emergency Spillway Flowed	Yes
	Remick Lake Dam (Type I)	August 2019	Inadequate Safety Measures	No

Probability of Occurrence:

There have been two (2) recorded dam failures in Warren County out of the recorded 167 dams. The probability of future occurrences for regulated dams is reduced due to proactive preventive actions in compliance with Ohio Department of Natural Resources Dam Safety Program, therefore, the probability of dam failure in Warren County is low.

Description and Damage Extent/Impact:

In the State of Ohio, the **Ohio Department of Natural Resources** (ODNR) has combined the description and potential damages of Dam Failures into one (1) classification system. The potential downstream hazard is broken into four (4) classes.

- **Class I** – Total storage volume greater than 5,000-acre ft. or a height of greater than sixty (60) ft. Sudden failure would result in probable loss of life, serious hazard to health, structural collapse of at least one (1) residence or one commercial or industrial business.
- **Class II** – Total storage volume greater than 500-acre ft. or a height of greater than forty (40) ft. Sudden failure would result in disruption of public water supply or wastewater treatment facility, release of health hazard industrial or commercial waste or other health hazards, floodwater damage to homes, businesses, and industrial structures. Flooding of high-value property, damage to major roads and critical access points, damage to railroads or other public utilities, probable damage to downstream dams or levees of high value. (No probable loss of human life).
- **Class III** – Total storage volume of greater than fifty (50)-acre ft. or a height of greater than twenty-five (25) ft. Sudden failure would result in damage to low value non-residential structures, local roads, agricultural crops and livestock.
- **Class IV** – Total storage volume of fifty (50)-acre ft. or less and height of twenty-five (25) ft. or less. Sudden failure would result in losses to the dam and immediate surrounding property.

In Warren County, **ODNR** has Classified 167 Dams:

30: Number of Classified Dams in Warren County (also see Table 3)

Class I	Class II	Class III	Class IV
13	15	14	48

*There are also six (6) abandoned dams, five (5) unclassified dams, and fifty-nine (59) exempt dams per ODNR.

The **National Inventory of Dams** also classifies dams by level of hazard they present:

- **High Hazard Potential Classification** – Loss of human life is likely if the dam fails.
- **Significant Risk Hazard Potential Classification** – No probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or impact other concerns.

Table 31: High Hazard Potential Dams

High Hazard Potential Dams (10 in Warren County)								
Dam Name	River/Lake	City	Owner	Storage/Class	Year	Last Inspection	EAP	Potential Impacts
Caesar Creek Lake Dam	Caesar Creek	Oregonia	Federal	242,200 Acre Ft Class I	1976	8/6/2024	Yes	Structures within Oregonia, Morrow, and South Lebanon flooded within 2 hours. Water will flow through Warren, Hamilton and Clermont counties, reaching Lunken Field in Cincinnati.
Caesar Creek Lake Dam (Saddle Dike #2)	Caesar Creek	Oregonia	Federal	242,200 Acre Ft Class I	1976	9/23/2020	Yes	
Caesar Creek Lake Dam (Saddle Dike #3)	Caesar Creek	Oregonia	Federal	242,200 Acre Ft Class I	1976	9/23/2020	Yes	
Pine Hill Lake Dam	Tributary to Muddy Creek	Mason	Local Govt.	194 Acre Ft Class I	1952	5/2/2019	Yes	5 structures along Kings Mills Rd and US Rt 42 have a couple of feet of water.
Landen Farm Lake Dam	Simpson Creek	Foster	Private	1,400 Acre Ft Class I	1975	4/11/2019	Yes	Kings Mills Rd and nearby residential area inundated. Socialville Foster Rd overtopped.
Shaker Run Dam	Shaker Creek	Armco Park	Private	6,124 Acre Ft Class I	1973	5/6/2021	Yes	Several commercial bldgs. and homes along Shaker and Garver Rds. are inundated. Railroad levee overtopped near RS22400. Corrections Facility & Monroe treatment plant and bldgs. affected.
Remick Lake Dam	Tributary to Clear Creek	Springboro	Private	44 Acre Ft Class I	1966	5/6/2021	Yes	Multiple residential and commercial structures inundated. State Route 741 overtopped.
Classic Farm Lake Dam	Tributary to Little Miami River	South Lebanon	Private	73 Acre Ft Class II	1965	4/18/2019	No	Mostly farmland, some residences, and Ford St. affected.
Lilley Lake Dam	Tributary to Halls Creek	Oregonia	Private	210 Acre Ft Class I	1954	4/25/2019	No	Map search shows mostly farmland and some residences affected.
Sunrise Lake Dam	Tributary to Bear Run	Foster	Private	257 Acre Ft Class I	1931	4/18/2029	Yes	Multiple businesses and residential bldgs. could incur a few feet of water.

Table 32: Significant Risk Potential Dams

Significant Risk Potential Dams (15 in Warren County)								
Dam Name	River/Lake	City	Owner	Storage/Class	Year	Last Inspection	EAP	Potential Impacts
Goodrich Lake Dam	Tributary to Dry Run	South Lebanon	Private	44.2 Acre Ft Class II	1994	4/25/2019	Yes	Multiple structures in South Lebanon impacted.
Fenwick Home Company Lake Dam	Tributary to Stony Run	Senior	Private	21.5 Acre Ft Class II	1969	4/4/2019	No	Knights of Columbus Campground, homes along St Rt 350 & Arabian Dr affected.
Burnap Lake Dam	Tributary to Stony Run	Senior	Private	50.7 Acre Ft Class II	1969	4/4/2019	No	A few buildings may be affected.
Stoneybrook Farm Lake Dam	Tributary to Newman Run	Oregonia	Private	76.4 Acre Ft Class II	1968	7/2/2019	No	E. Lower Springboro Rd and nearby businesses affected.
Rippe Pond No. 2 Dam	Tributary to Little Miami River	Loveland	Private	35.2 Acre Ft Class II	1968	4/11/2019	No	Some residential homes and Kelso Dr may be affected.
Arnett Lake No. 1 Dam	Tributary to North Fork	South Lebanon	Private	57.1 Acre Ft Class II	1967	7/2/2019	No	St Rt 73, nearby businesses and 1 home affected.
Arnett Lake No. 2 Dam	Tributary to North Fork	South Lebanon	Private	30 Acre Ft Class II	1967	7/2/2019	No	
Mid-Western Children's Home	Stoney Run	Cozadale	Private	74.6 Acre Ft Class II	1967	4/4/2019	Yes	Some residential homes, the Children's Home & a school may be affected.
Bel-Wood Country Club Lake No. 2 Dam	Tributary to Bigfoot Run	South Lebanon	Private	44.6 Acre Ft Class II	1965	4/18/2019	No	Golf course affected. Western Water and nearby residences may be affected.
Roemer Lake Dam	Tributary to Newman Run	South Lebanon	Private	144 Acre Ft Class II	1960	7/2/2019	Yes	Some residential homes and Township Line Rd may be affected.
Votel Lake Dam	Tributary to Turtle Creek	Lebanon	Private	97.3 Acre Ft Class II	1954	4/25/2019	Yes	Flooding of businesses, residential access and walking bridge, rural building, and local road.
Oeder Lake No. 3 Dam	Tributary to Bigfoot Run	South Lebanon	Private	199 Acre Ft Class II	1953	4/18/2019	Yes	St Rt 22&3 residences may incur flooding.
Walnut Hills Lake Dam	Tributary to North Fork	Oregonia	Private	28.1 Acre Ft Class II		7/2/2019	No	St Rt 73 and nearby homes and businesses affected.
Anderson Lakes Farm Dam No. 1	Tributary to Little Miami River	Morrow	Private	33.6 Acre Ft Class II		4/4/2019	Yes	Water overtops Waynesville Rd and St Rt 123.
Cin. Semiconductor Lake Dam	Tributary to Little Miami River	Morrow	Private	82.4 Acre Ft Class II		4/18/2019	No	Grandin Rd and local businesses affected. Water may stretch to homes on Grandin Ridge Dr.

In the State of Ohio, the **Ohio Department of Natural Resources** (ODNR) has combined the description and potential damages of **Levee** Failures into one classification system. The potential downstream hazard is broken into three (3) classes.

- **Class I** – Probable loss of human life, structural collapse of at least one (1) residence or one (1) commercial or industrial business.
- **Class II** – Disruption of public water supply or wastewater treatment facility, or other health hazards; flooding of residential, commercial, industrial, or publicly owned structures; flooding of high-value property; damage or disruption to major roads including but not limited to interstate and state highways, and the only access to residential or other critical areas such as hospitals, nursing homes, or correctional facilities as determined by the chief; damage or disruption to railroads or public utilities.
- **Class III** – Property losses including but not limited to rural buildings not otherwise described in this rule; damage or disruption to local roads including but not limited to roads not otherwise listed as major roads in this rule.

In Warren County, the **National Levee Database** has Identified three (3) Levees:

Table 33: Levees in Warren County

Levee Name	River/Lake	City	Total Miles	Owner	Population	Structures	Property Value
Franklin LFP – FRAL1	Great Miami River	Franklin	.98 miles	Miami Conservancy District	553	207	\$74.4M
Franklin LFP – FRAL 2	Great Miami River	Franklin	1.47 miles	Miami Conservancy District	714	308	\$162M
Franklin LFP – FRAR1	Great Miami River	Franklin	.87 miles	Miami Conservancy District	434	156	\$50M

Table 34: Dam/Levee Failure Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Dam Failure	Inundation Area	Localized or Wide-Spread, depending on classification of dam and level of breach. Potentially all critical infrastructure located in the inundation zone from a dam would be impacted by a breach/failure. Figures 16 – 20 show the impact of dam breaches from dam breaches from Class I or Class II dams on critical infrastructure.	There are 13 Class I Dams in Warren County.
	Harveysburg, Morrow, Waynesville, Massie Township, Salem Township, Wayne Township, others downstream from Caesar Creek Dam/Little Miami River	Caesar Creek Dam is one of Warren County's highest profile dams. Should a failure/breach occur it would greatly impact the immediate area and downstream communities.	
Levee Failure	City of Franklin	Localized or Wide-Spread, depending on classification of levee and level of breach. Potentially all critical infrastructure located in downtown Franklin and residential areas of Carlisle would be impacted by a breach/failure. Figure 21 depicts the areas of Franklin affected by the 1913 flood prior to the levees being built.	3 Class I Levees in Warren County.

Causes of a Dam/Levee Failure:

Per ODNR, causes of **dam** failure include:

- **Overtopping** – Is often a precursor of dam failure. National Statistics show that overtopping due to inadequate spillway design, debris blockage of spillways, or settlement of the dam crest account for 34% of all U.S. dam failures.
- **Foundation Defects and Slope Instability** – This includes settlement and slope instability which cause about 30% of all dam failures.
- **Piping** – Is internal erosion by seepage which often occurs around hydraulic structures, such as pipes and spillways, through animal burrows, around roots of woody vegetation, and through cracks in dams, dam accessories, and dam foundations.

Per U.S. Army Corps of Engineers, causes of **levee** failure include:

- **Overtopping** – The level of floodwater is higher than the height of the levee. Overtopping can cause significant damage if the land side of the levee is not armored or reinforced, the water can undercut the levee and cause it to collapse or breach.
- **Erosion** – the force of water on a levee can cause the levee to fail by eroding the water side of the levee through wave action or scouring. In cases of extreme pressure, the water can push the levee from its original position.
- **Breach** – A section of the levee collapses, breaks, or is washed away allowing water to flow through the levee. A breach can be caused by an object hitting the levee or an object on the levee, such as a tree or building falling and pulls part of the levee out with it. Unexpected breaches can cause rapid flooding.
- **Drainage System Failure** – The bulk of the water remains on the water side of the levee, but damages can occur to nearby properties.

Causes that May Exacerbate Dam/Levee Failure:

- Debris Blockage of Spillways Can Lead to Overtopping of Dams
- Settlement Of Dam Crest
- Foundation Defects (Including Settlement and Slope Instability)
- Internal Erosion Caused by Seepage

Gaps remain in some qualitative and quantitative data for levees and dams, which will affect a community's ability to gauge risk and implement successful risk communication. Such data gaps exacerbate existing state and community- specific safety issues, such as estimating maintenance costs, which affect future funding priorities; and completing accurate risk assessments among the various counties containing such structures in their jurisdictions.

Warnings:

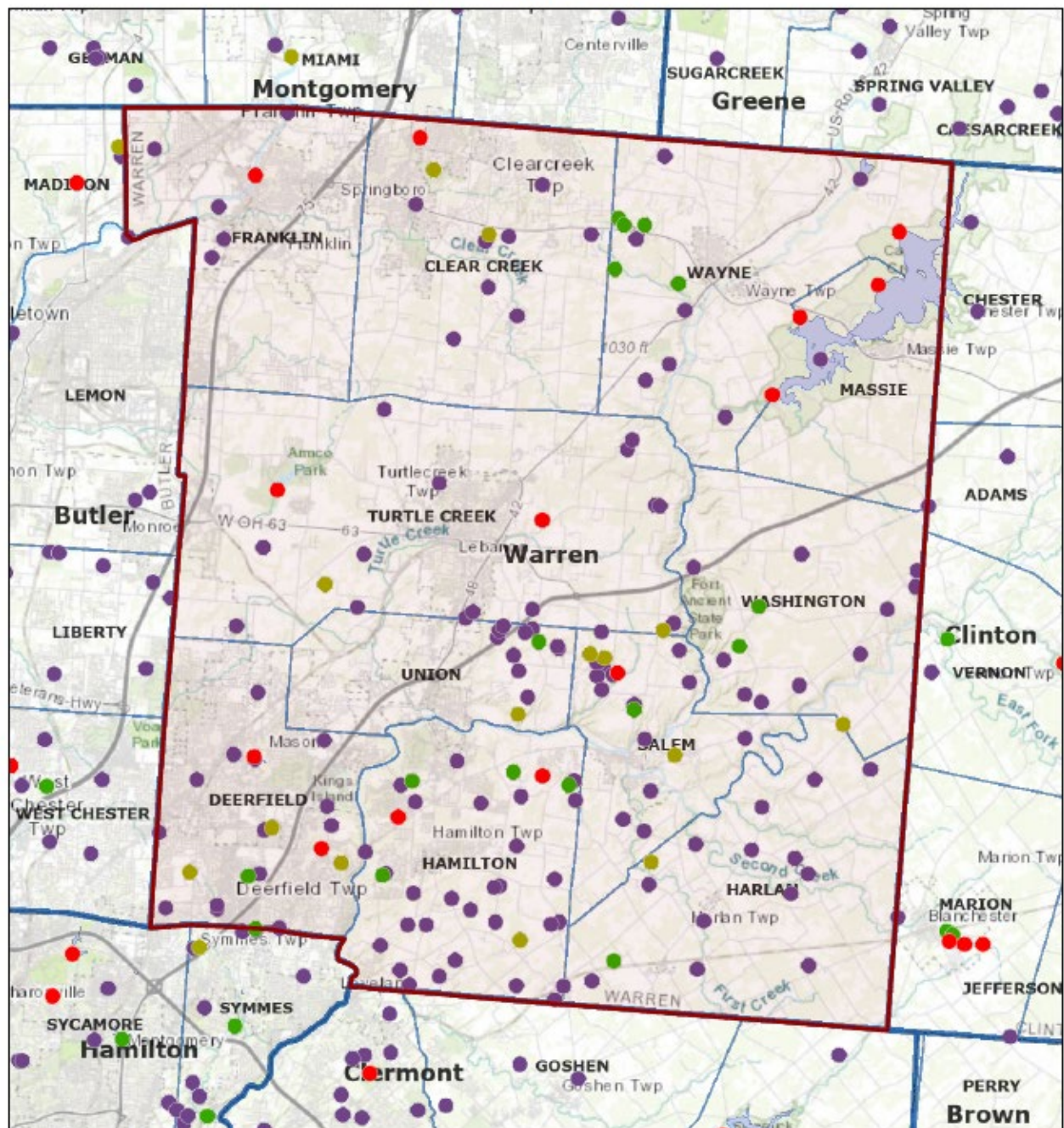
There are three (3) classifications of dam alert status that should be listed in all Class I Dam Emergency Action Plans. The dam owner is responsible for activating the dam alert status and notifying the appropriate authorities.

- **Monitor** – A hazardous condition exists, requiring investigation and corrective action; potential for failure is being assessed; corrective measures are underway.
- **Watch** – Potential failure situation is developing.
- **Warning** – Dam failure is occurring or is imminent.

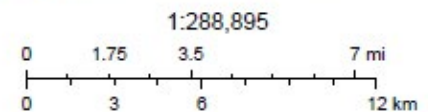
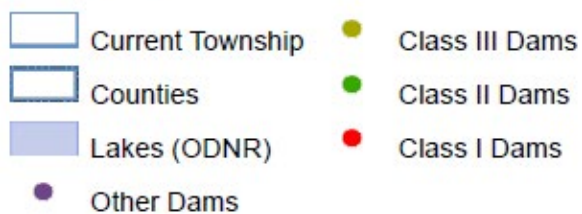
For levees in Warren County, the City of Franklin or the Miami Conservancy District will identify any breaches or failures, and make the appropriate notifications.

Figure 15: Map of Dams in Warren County (also see Figure 4)

Ohio Dam Locator



January 14, 2025



Ohio Department of Natural Resources-Division of Water Resources, Esri, HERE, Garmin, USGS, NGA, EPA, USDA, NPS

Figure 16: Map of Damages to Critical Infrastructure from Dam Breach (North Central Warren County)

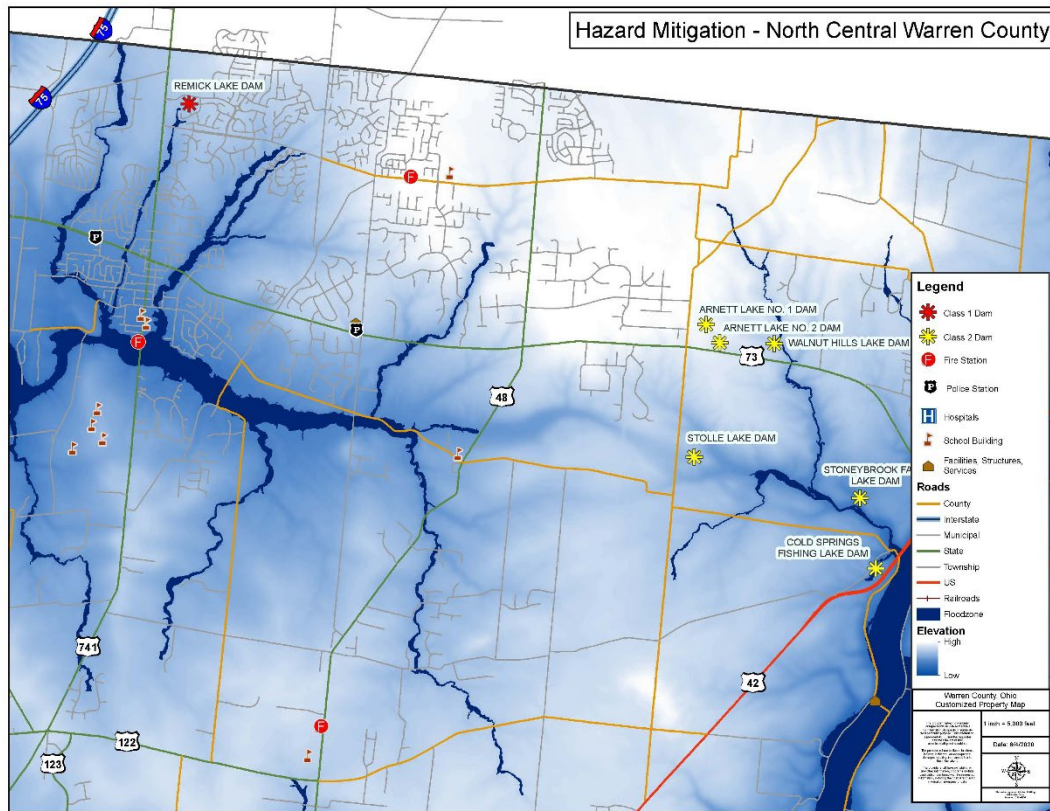


Figure 17: Map of Damages to Critical Infrastructure from Dam Breach (Northeast Warren County)

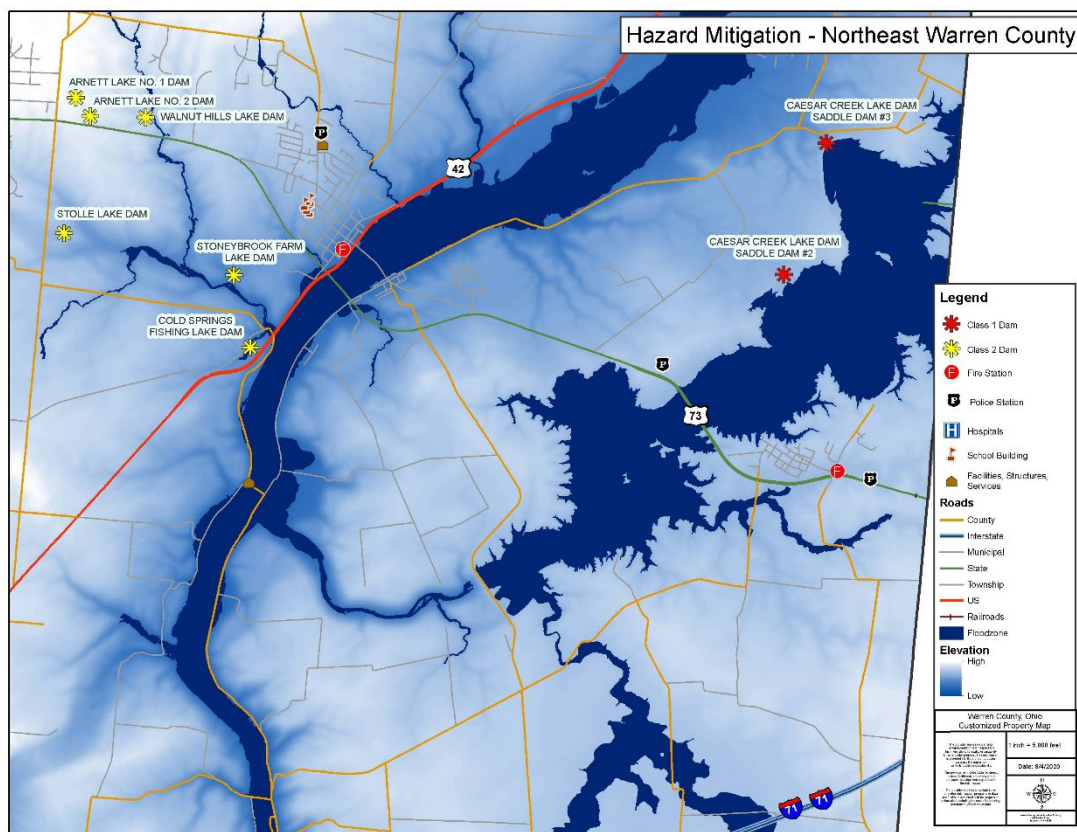


Figure 18: Map of Damages to Critical Infrastructure from Dam Breach (West Central Warren County)

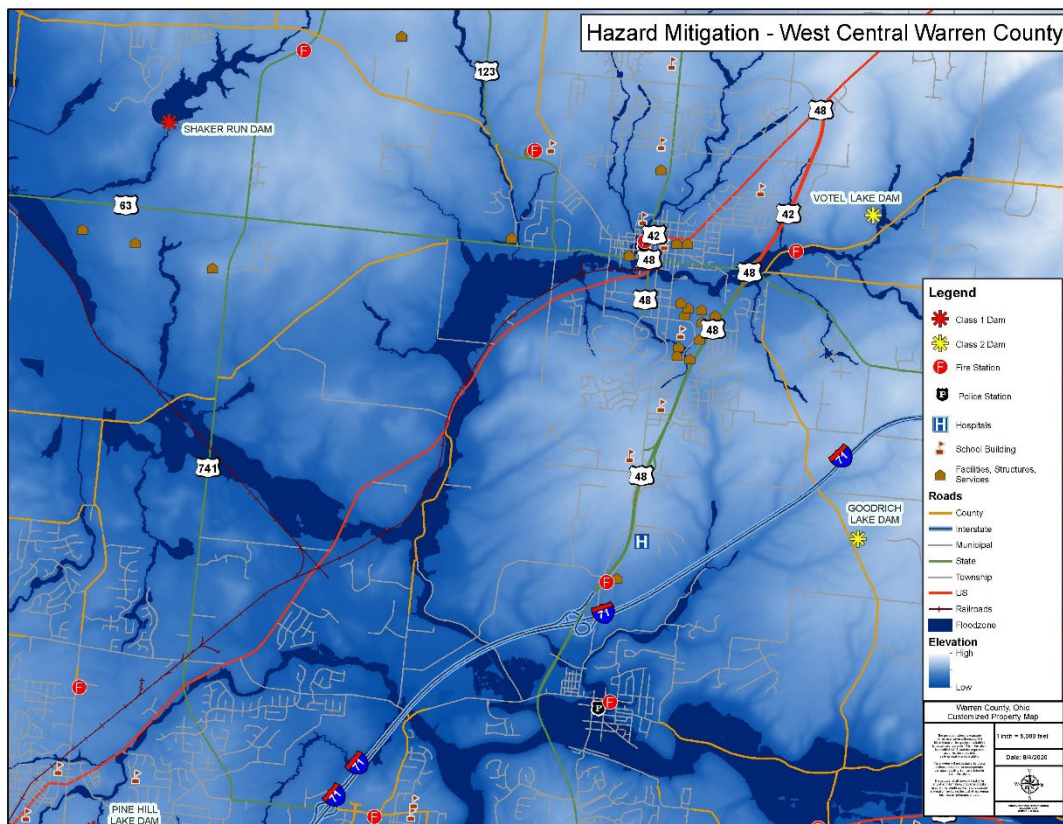


Figure 19: Map of Damages to Critical Infrastructure from Dam Breach (Southeast Warren County)

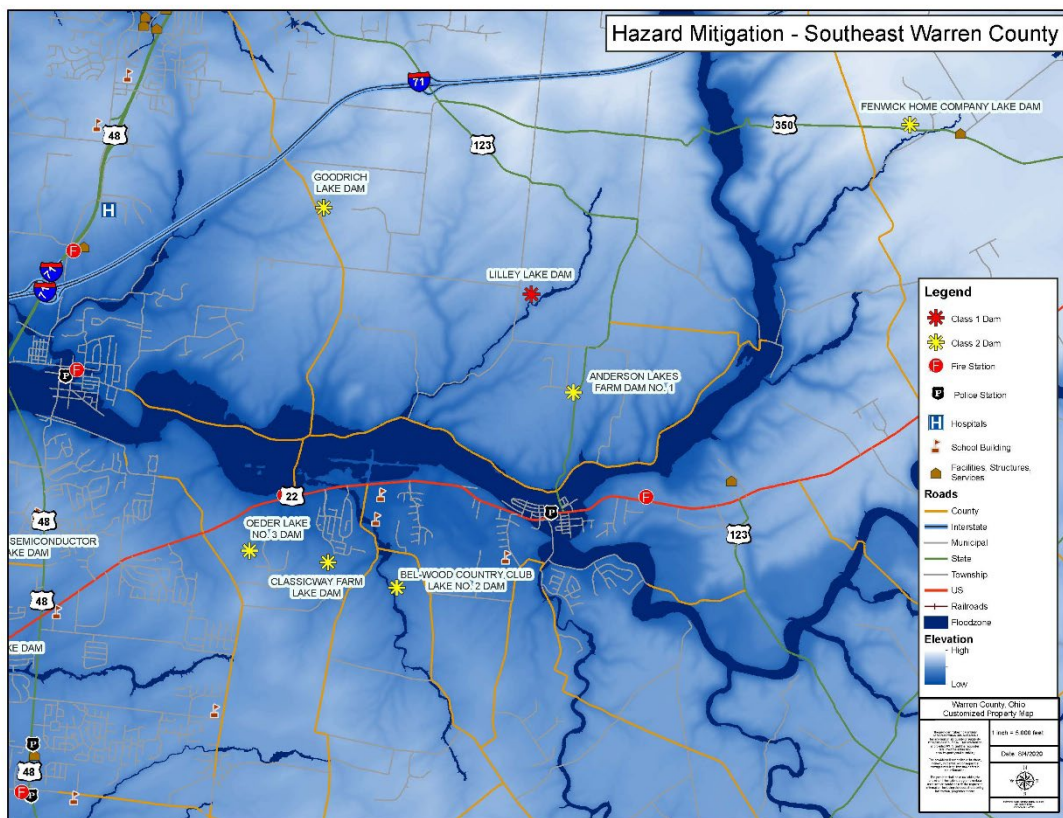


Figure 20: Map of Damages to Critical Infrastructure from Dam Breach (Southwest Warren County)

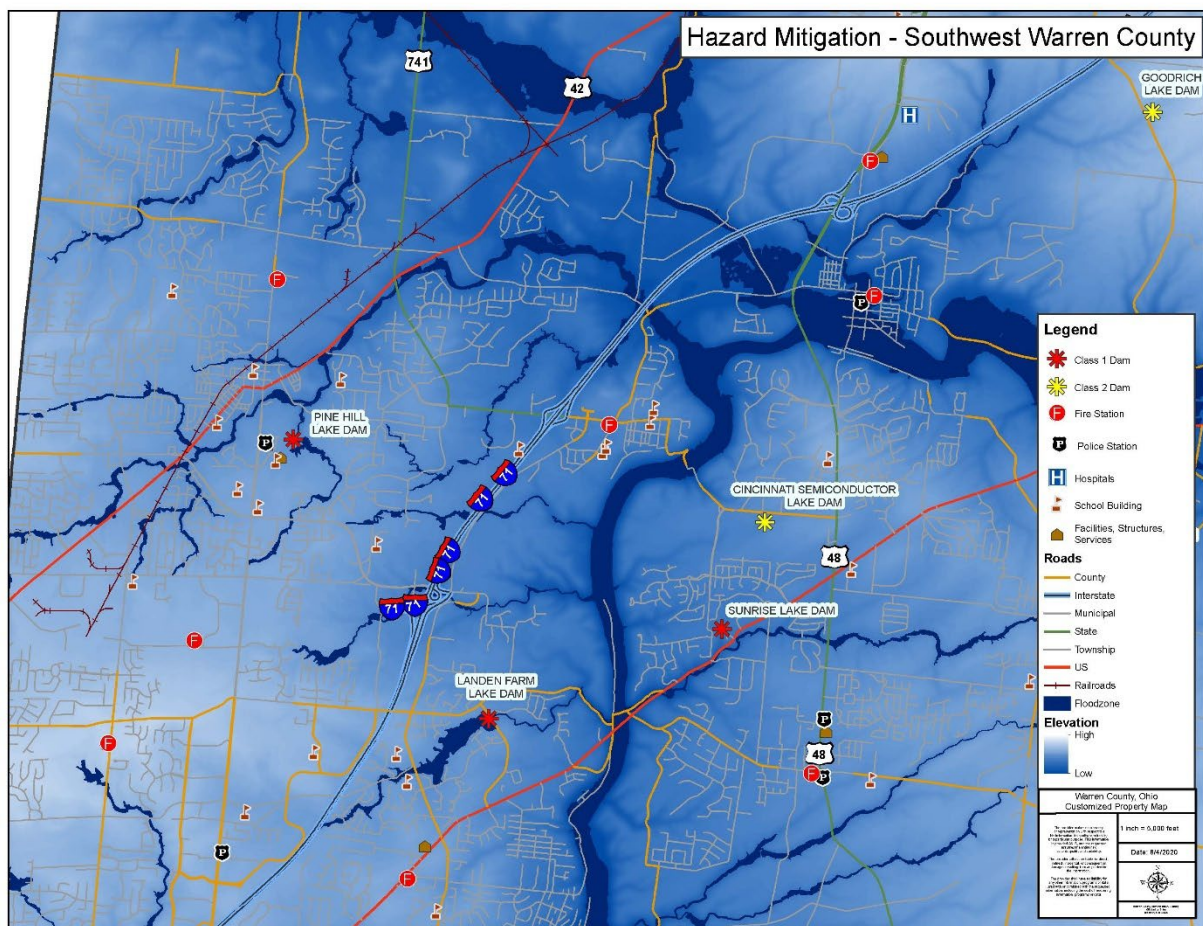


Figure 21: Map of City of Franklin 1913 Flood Areas



4.3. DROUGHT

Definition:

A drought is the deficiency of moisture that results in adverse impacts on people, animals, or vegetation over a sizeable area.

There are different types of drought:

- **Meteorological** – When dry weather patterns dominate an area.
- **Hydrological** – When low water supply becomes evident in the water system.
- **Agricultural** – When crops become affected by drought.
- **Socioeconomical** – When the supply and demand of various commodities is affected by drought.
- **Ecological** – When natural ecosystems are affected by drought.

Primary Sources of Information:

- National Integrated Drought Information System (NIDIS): [Drought.gov](https://drought.gov)
- National Center for Environmental Information (NCEI): [NCEI.noaa.gov](https://ncei.noaa.gov)

Historical Occurrences in Warren County:

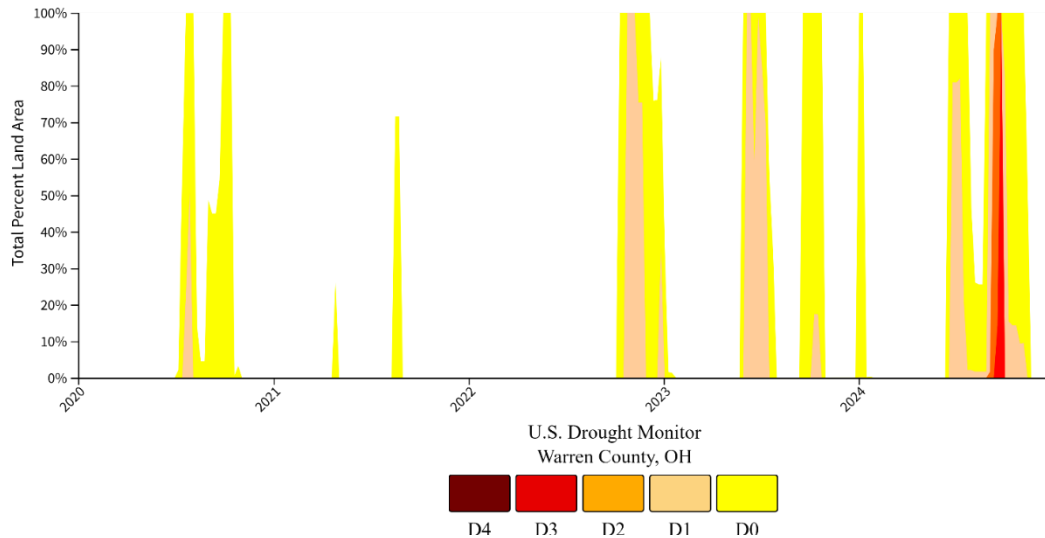
Table 35: History of Recorded Drought Events in Warren County

Start Date	End Date	Drought Category Percentage					
		None	D0	D1	D2	D3	D4
11/12/2024	11/18/2024	46.13	53.87	0	0	0	0
11/5/2024	11/11/2024	0	100	9.48	0	0	0
10/29/2024	11/4/2024	0	100	9.39	0	0	0
10/22/2024	10/28/2024	0	100	14.33	0	0	0
10/15/2024	10/21/2024	0	100	14.33	0	0	0
10/8/2024	10/14/2024	0	100	15.36	0	0	0
10/1/2024	10/7/2024	0	100	82.12	0	0	0
9/24/2024	9/30/2024	0	100	100	100	100	0
9/17/2024	9/23/2024	0	100	100	100	14.35	0
9/10/2024	9/16/2024	0	100	100	89.85	0	0
9/3/2024	9/9/2024	0	100	100	1.64	0	0
8/27/2024	9/2/2024	0	100	1.69	0	0	0
8/20/2024	8/26/2024	74.43	25.57	1.69	0	0	0
8/13/2024	8/19/2024	74.43	25.57	1.69	0	0	0
8/6/2024	8/12/2024	73.93	26.07	1.69	0	0	0
7/30/2024	8/5/2024	53.5	46.5	2.08	0	0	0
7/23/2024	7/29/2024	0	100	2.08	0	0	0
7/16/2024	7/22/2024	0	100	21.03	0	0	0
7/9/2024	7/15/2024	0	100	81.98	0	0	0
7/2/2024	7/8/2024	0	100	80.84	0	0	0
6/25/2024	7/1/2024	0	100	80.84	0	0	0
6/18/2024	6/24/2024	0	100	0	0	0	0
1/23/2024	1/29/2024	99.77	0.23	0	0	0	0
1/16/2024	1/22/2024	99.87	0.13	0	0	0	0
1/9/2024	1/15/2024	0	100	0.13	0	0	0
1/2/2024	1/8/2024	0	100	0.13	0	0	0
12/26/2023	1/1/2024	99.9	0.1	0	0	0	0
12/19/2023	12/25/2023	99.93	0.07	0	0	0	0
12/12/2023	12/18/2023	99.93	0.07	0	0	0	0
12/5/2023	12/11/2023	99.93	0.07	0	0	0	0
11/28/2023	12/4/2023	99.93	0.07	0	0	0	0

Table 35 Continued

Start Date	End Date	Drought Category Percentage					
		None	D0	D1	D2	D3	D4
11/21/2023	11/27/2023	99.93	0.07	0	0	0	0
11/14/2023	11/20/2023	99.93	0.07	0	0	0	0
10/24/2023	10/30/2023	0	100	0	0	0	0
10/17/2023	10/23/2023	0	100	17.41	0	0	0
10/10/2023	10/16/2023	0	100	17.41	0	0	0
10/3/2023	10/9/2023	0	100	0	0	0	0
9/26/2023	10/2/2023	0	100	0	0	0	0
9/19/2023	9/25/2023	0	100	0	0	0	0
7/25/2023	7/31/2023	66.04	33.96	0	0	0	0
7/18/2023	7/24/2023	45.04	54.96	0	0	0	0
7/11/2023	7/17/2023	0	100	69.73	0	0	0
7/4/2023	7/10/2023	0	100	85.76	0	0	0
6/27/2023	7/3/2023	0	100	99.48	0	0	0
6/20/2023	6/26/2023	0	100	59.42	0	0	0
6/13/2023	6/19/2023	0	100	100	0	0	0
6/6/2023	6/12/2023	0	100	100	0	0	0
5/30/2023	6/5/2023	0	100	0	0	0	0
1/17/2023	1/23/2023	98.72	1.28	0	0	0	0
1/10/2023	1/16/2023	98.45	1.55	0	0	0	0
1/3/2023	1/9/2023	64.06	35.94	0.04	0	0	0
12/27/2022	1/2/2023	12.27	87.73	35.94	0	0	0
12/20/2022	12/26/2022	23.9	76.1	0	0	0	0
12/13/2022	12/19/2022	24.12	75.88	0	0	0	0
12/6/2022	12/12/2022	0	100	0	0	0	0
11/29/2022	12/5/2022	0	100	0	0	0	0
11/22/2022	11/28/2022	0	100	75.37	0	0	0
11/15/2022	11/21/2022	0	100	75.37	0	0	0
11/8/2022	11/14/2022	0	100	100	0	0	0
11/1/2022	11/7/2022	0	100	100	0	0	0
10/25/2022	10/31/2022	0	100	100	0	0	0
10/18/2022	10/24/2022	0	100	0	0	0	0
10/11/2022	10/17/2022	0	100	0	0	0	0
10/4/2022	10/10/2022	99.93	0.07	0	0	0	0
8/24/2021	8/30/2021	28.45	71.55	0	0	0	0
8/17/2021	8/23/2021	28.45	71.55	0	0	0	0
4/27/2021	5/3/2021	73.29	26.71	0	0	0	0
10/27/2020	11/2/2020	96.8	3.2	0	0	0	0
10/20/2020	10/26/2020	99.35	0.65	0	0	0	0
10/13/2020	10/19/2020	0	100	0	0	0	0
10/6/2020	10/12/2020	0	100	0	0	0	0
9/29/2020	10/5/2020	0	100	0	0	0	0
9/22/2020	9/28/2020	45.88	54.12	0	0	0	0
9/15/2020	9/21/2020	55.01	44.99	0	0	0	0
9/8/2020	9/14/2020	55.01	44.99	0	0	0	0
9/1/2020	9/7/2020	51.38	48.62	0	0	0	0
8/25/2020	8/31/2020	95.52	4.48	0	0	0	0
8/18/2020	8/24/2020	95.52	4.48	0	0	0	0
8/11/2020	8/17/2020	86.3	13.7	0	0	0	0
8/4/2020	8/10/2020	0.12	99.88	0	0	0	0
7/28/2020	8/3/2020	0.12	99.88	50.58	0	0	0
7/21/2020	7/27/2020	0.12	99.88	22.81	0	0	0
7/14/2020	7/20/2020	44.88	55.12	0	0	0	0
7/7/2020	7/13/2020	97.87	2.13	0	0	0	0

Figure 22: Percent Land Area of Drought Categories



Probability of Occurrence:

Due to the nature of drought, it is hard to predict the probability of occurrence per event. Reviewing the data from the history of droughts in Warren County, the following can be assumed:

[current year (2025)] subtracted by [historical year where tracking began (2020)] = 5 Years on Record

[{number of historical events (84)}] divided by [Years on Record (5)] = 16.8

It can be reasonably assumed that this type of event occurs nearly 16.8 times per year in the county.

Description and Damage Extent/Impact:

There are a few different methods for measuring drought, but no standard measurement is recognized by all agencies:

- **The Standard Precipitation Index (SPI)** shows actual precipitation compared to the probability of precipitation for various timeframes. The SPI is used for short-term agricultural and long-term hydrological applications. A drought occurs any time the SPI is continuously negative and reaches an intensity of d-1.0 or less. The event ends when the SPI becomes positive.
- **The Palmer Drought Severity Index (PDSI)** uses temperature and precipitation data to estimate dryness. It is a standardized index that spans -10 (dry) to +10 (wet) and is the most effective method in determining long-term drought. Many U.S. government agencies and states rely on the PDSI to trigger drought relief programs and responses.
- **The National Drought Mitigation Center** established a US Drought Monitor which classifies droughts on a numeric system similar to the Fujita Scale for tornadoes. The scale measures from abnormally dry conditions (D0) through exceptional wide-spread drought (D4). The USDM's weekly report uses this classification scale in combination with a color-coded map to provide a tool for decision making and drought planning.

Figure 23: National Drought Mitigation Center – Palmer Drought Severity Index

DROUGHT SEVERITY	RETURN PERIOD (YEARS)	DESCRIPTION OF POSSIBLE IMPACTS	DROUGHT MONITORING INDICES		
			Standardized Precipitation Index (SPI)	NDMC* Drought Category	Palmer Drought Index
Minor Drought	3 to 4	Going into drought; short-term dryness slowing growth of crops or pastures; fire risk above average. Coming out of drought; some lingering water deficits; pastures or crops not fully recovered.	-0.5 to -0.7	D0	-1.0 to -1.9
Moderate Drought	5 to 9	Some damage to crops or pastures; fire risk high; streams, reservoirs, or wells low, some water shortages developing or imminent, voluntary water use restrictions requested.	-0.8 to -1.2	D1	-2.0 to -2.9
Severe Drought	10 to 17	Crop or pasture losses likely; fire risk very high; water shortages common; water restrictions imposed	-1.3 to -1.5	D2	-3.0 to -3.9
Extreme Drought	18 to 43	Major crop and pasture losses; extreme fire danger; widespread water shortages or restrictions	-1.6 to -1.9	D3	-4.0 to -4.9
Exceptional Drought	44 +	Exceptional and widespread crop and pasture losses; exceptional fire risk; shortages of water in reservoirs, streams, and wells creating water emergencies	Less than -2	D4	-5.0 or less

Source: National Drought Mitigation Center

Table 36: Drought Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Drought	County-wide	Drought conditions, if reaching Exceptional Drought (D4) status, could be detrimental to agricultural operations with loss of crop, or could impact critical utilities (either directly or indirectly through overuse). Drought condition may more heavily impact rural/agriculturally based areas.	The extent is dependent on the nature and scale of the drought.
	Butler, Corwin, Harveysburg, Maineville, Morrow, Pleasant Plain, Massie Township, Harlan Township, Salem Township, Washington Township, Wayne Township, other rural/agricultural-based jurisdictions		

Table 37: FEMA National Risk Index (Drought) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Very Low (72.86)	39165030102
Franklin	Very Low (69.49)	39165032501
Lebanon	Very Low (72.22)	39165031500
Mason	Very Low (70.48)	39165031908
Springboro	Very Low (70.92)	39165030504
South Lebanon	Very Low (79.98)	39165032100
Butler	Relatively Low (87.12)	39165032400
Corwin	Relatively Low (81.52)	39165031002
Harveysburg	Relatively Low (85.84)	39165031100
Maineville	Very Low (74.17)	39165032205
Morrow	Relatively Low (82.47)	39165032300
Pleasant Plain	Relatively Low (87.12)	39165032400
Waynesville	Relatively Low (81.86)	39165031001
Clearcreek	Relatively Low (81.45)	39165030800
Deerfield	Very Low (67.96)	39165032008
Franklin	Very Low (74.2)	39165030600
Hamilton	Very Low (74.17)	39165032205
Harlan	Relatively Low (87.12)	39165032400
Massie	Very Low (85.84)	39165031100
Salem	Relatively Low (82.47)	39165032300
Turtlecreek	Very Low (78.26)	39165030700
Union	Very Low (85.84)	39165032100
Washington	Relatively Low (85.84)	39165031100
Wayne	Relatively Low (81.52)	39165031002

**Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County*

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability, and Community Resilience.

Conditions that May Exacerbate Drought:

Although climate is a primary contributor to hydrological drought, other factors such as changes in land use, land degradation, and the construction of dams all affect the hydrological characteristics of a particular region. Since geographic regions are interconnected by natural systems, the impact of drought may extend well beyond the borders of the precipitation-deficit areas.

Changing weather patterns can also affect drought. El Niño patterns, caused by seasonably warmer ocean temperatures, can contribute to warmer, drier conditions in the Ohio Valley

Warnings:

The National Integrated Drought Information System (NIDIS) reports current drought conditions in different regions of the United States. The Midwest Drought Early Warning System (DEWS) depicts current drought conditions in the Midwest, including the Ohio Valley.

The US Drought Monitor is a weekly product that provides a general summary of seasonal drought conditions. The US Seasonal Drought Outlook shows predicted trends for areas currently in drought, as well as areas where new droughts may develop.

Drought events develop over time and can be classified according to multiple different scales. By the time a drought has been classified, its effects may already be felt by the people and environment

Figure 24: USGS Earthquake Hazard Zones

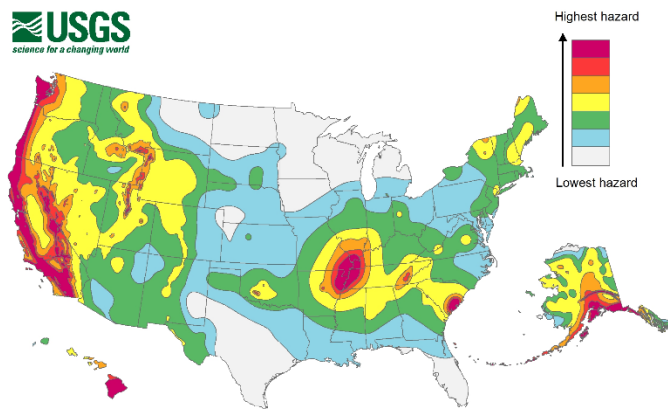
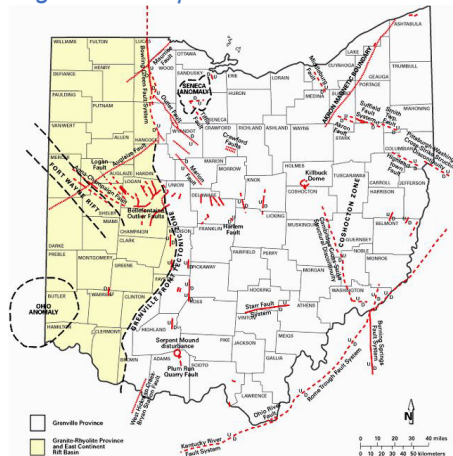


Figure 25: Map of Fault Lines in Ohio



Description and Damage Extent/Impact:

Table 39: Earthquake Description and Damages

EARTHQUAKE MAGNITUDE AND INTENSITY				
Magnitude (M _w)	Intensity (Modified Mercalli Scale)	Description	Perceived Shaking	Potential Damage
1.0 – 3.0	I	I. Not felt except by very few people under especially favorable conditions.	Not felt	None
3.0 – 3.9	II – III	II. Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.	Weak	None
		III. Felt quite noticeably indoors. Many do not recognize it as an earthquake. Standing motorcars may rock slightly.	Weak	None
4.0 – 4.9	IV – V	IV. Felt by many who are indoors; felt by a few outdoors. At night, some awakened. Dishes, windows, and doors rattle.	Light	None
4.0-4.9	IV-V	V. Felt by nearly everyone; many awakened. Some dishes and windows broken; some cracked plaster; unstable objects overturned.	Moderate	Very Light
5.0 – 5.9	VI – VII	VI. Felt by everyone; many frightened and run outdoors. Some heavy furniture moved, some fallen plaster or damaged chimneys. Damage negligible in well-constructed buildings; considerable damage in poorly constructed buildings.	Strong	Light
		VII. Most people are alarmed and run outside. Damage negligible in well-constructed buildings; considerable damage in poorly constructed buildings.	Very Strong	Moderate
6.0 – 6.9	VII – IX	VIII. Damage slight in special designed structures; considerable in ordinary buildings; great in poorly built structures. Heavy furniture overturned. Chimneys, monuments, etc. may topple.	Severe	Moderate to Heavy
		IX. Damage can be considerable in specially designed structures. Buildings shift from foundations and collapse. The ground cracked. Underground pipes broken.	Violent	Heavy
7.0 and Higher	VIII and Higher	X. Some well-built wooden structures can be destroyed. Most masonry structures can be destroyed. The ground badly cracked. Landslides on steep slopes.	Extreme	Very Heavy
		XI. Few, if any, masonry structures remain standing. Railroad rails bent; bridges destroyed. Broad fissure in ground.	Extreme	Very Heavy
		XII. Virtually total destruction. Waves seen on ground. Objects thrown into the air.	Extreme	Very Heavy

The most important variables affecting earthquake damage are the intensity of the ground shaking caused by the quake coupled with the quality of the engineering of structures in the region. Buildings most susceptible to shaking damage:

- Soft-story apartments and condos that have large openings on the first floor for garage doors and windows to accommodate parking or commercial space, and housing on upper floors (built prior to recent codes).
- Older, pre-WWII homes and homes built before the 1980's are more susceptible to damage due to their lack of bolting mechanisms to the foundation.
- Mobile homes
- Unreinforced masonry buildings – with no steel reinforcing within a masonry wall. Most buildings before 1933 are not reinforced (depending on local code enforcement).
- Infrastructure susceptible to damage from earthquakes (Source: Congressional Research Service)
- Bridges built before 1992 (that were most likely not built to seismic standards nor have they been retrofitted)

Table 40: Earthquake Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Earthquake	County-wide	May be localized to older structures and some infrastructure if shaking is minimal, or it could be widespread if the magnitude is severe. Buildings and critical infrastructure could fall/damaged by other debris or sink into the ground. Dams/levees may also fail or landslides could happen as a result.	There is one Ohio Seismic Network monitoring station in Spring Valley near the northern Warren County border.

Table 41: FEMA National Risk Index (Earthquake) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively Low (61.79)	39165030102
Franklin	Very Low (47.55)	39165032501
Lebanon	Relatively Low (65)	39165031500
Mason	Relatively Low (69.57)	39165031908
Springboro	Very Low (47.4)	39165030504
South Lebanon	Relatively Low (73.13)	39165032100
Butler	Relatively Low (67.89)	39165032400
Corwin	Very Low (29.14)	39165031002
Harveysburg	Relatively Low (59.21)	39165031100
Maineville	Relatively Low (61.55)	39165032205
Morrow	Relatively Low (57.99)	39165032300
Pleasant Plain	Relatively Low (67.89)	39165032400
Waynesville	Relatively Low (67.14)	39165031001
Clearcreek	Relatively Low (66.43)	39165030800
Deerfield	Relatively Low (71.98)	39165032008
Franklin	Relatively Low (62.52)	39165030600
Hamilton	Relatively Low (61.55)	39165032205
Harlan	Relatively Low (67.89)	39165032400
Massie	Relatively Low (59.21)	39165031100
Salem	Relatively Low (57.99)	39165032300
Turtlecreek	Relatively Low (66.01)	39165030700

Table 41 Continued

Jurisdiction	Risk Index (Score)	Census Tract
Union	Relatively Low (73.13)	39165032100
Washington	Relatively Low (59.21)	39165031100
Wayne	Very Low (29.14)	39165031002

**Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County*

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability, and Community Resilience.

Causes of Earthquakes in Ohio:

The origins of Ohio earthquakes appear to be associated with ancient zones of weakness in the earth's crust that formed during rifting and continental collision events about a billion years ago. These zones are characterized by deeply buried and poorly known faults, some of which serve as the sites for periodic release of strain that is constantly building up in the North American continental plate due to continuous movement of the tectonic plates that make up the earth's crust.

Conditions that May Exacerbate an Earthquake:

The nature of earthquakes is that they strike randomly with no notice and varying intensities. There is one unnamed fault line in the Northwest Portion of Warren County.

Warnings:

There are early warning systems for earthquakes that can provide up to tens of seconds of warning prior to shaking arriving. The time required to detect and issue an earthquake warning is dependent on distance between the earthquake source and the closest seismic network station, the transfer of information to the regional network, the detection and characterization of an earthquake, and the shaking intensity threshold used to issue an alert (Source: USGS.gov). Typically, those who don't live in active seismic zones will receive little-to-no warning before the shaking of an earthquake arrives.

4.5. EXTREME TEMPERATURES

Definition:

Extreme Temperatures are those that are outside the norm for a particular region and that last for an extended period. According to the National Weather Service, temperature alerts are issued when there is a threat to life or the environment. The following describes how the weather service identifies extreme temperatures:

Heat

A heat wave is a period of unusually hot weather that typically lasts more than two (2) days. Heat waves are generally the result of trapped air. To be considered a heat wave, the temperatures must be outside the historical averages for a given area.

The Heat Index is a measure of how hot it really feels when relative humidity is factored in with the actual air temperature. The National Weather Service Office will initiate alert procedures when the heat index is expected to reach or exceed 105° for a sustained period.

Cold

The magnitude of extremely cold temperatures is generally measured through the Wind Chill Index. Wind Chill is a term used to describe what the air temperature feels like to the human skin due to the combination of cold temperatures and winds blowing on exposed skin. In simple terms, the colder the air temperature and the higher the wind speeds the colder it will feel on your skin if you're outside. So even if it remains the same temperature, but due to wind speed increase, it will actually feel colder. The National Weather Service Office in Wilmington will initiate alert procedures for extreme cold when dangerously cold air temperatures or excessive wind chill values are expected or are occurring.

Figure 26: National Weather Service Heat Index Chart

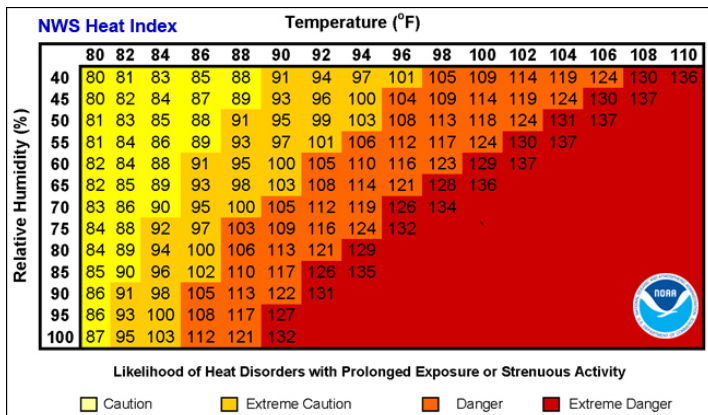
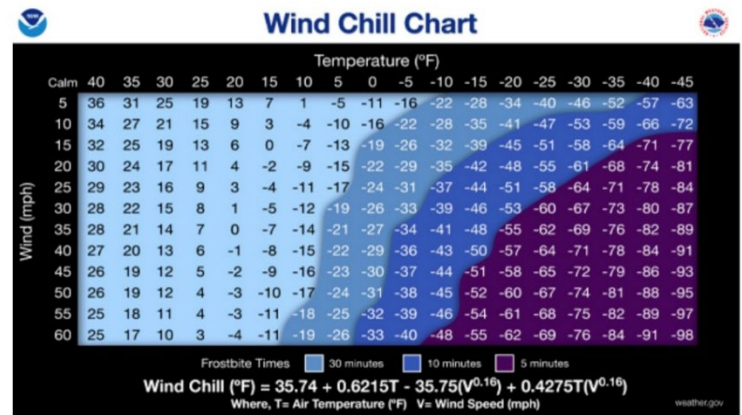


Figure 27: National Weather Service Wind Chill Chart



Primary Sources of Information:

- National Weather Service – <https://www.weather.gov/safety/cold>, <https://www.weather.gov/safety/heat>
- National Risk Index – <https://hazards.fema.gov/nri/map>

Historical Occurrences in Warren County:

According to the National Weather Service office in Wilmington, the following is the probability for extreme temperature events in Warren County:

Excessive Heat

- Advisory – On average three (3) to four (4) days per summer.
- Watch/Warning – On average one (1) to two (2) days per summer.

Extreme Cold:

- Advisory – On average, four (4) to five (5) days per winter.
- Watch/Warning – On average one (1) to two (2) days per winter.

Probability of Occurrence:

It is important to note that there is tremendous variability in the frequencies listed above. Some years there is no data reaching criteria, some years there are seven (7)-ten (10) days (depending on weather pattern and its longevity).

Description and Damage Extent/Impact:

Extreme temperatures can cause problems with critical infrastructure and services, such as transportation, electric grid, water sanitation systems, communication services, etc. Frozen pipes, water main breaks, power outages, and damages to other critical infrastructure should be considered probable to occur in lengthy events. The cost of damages may exceed jurisdictional means. If the weather event is prolonged and widespread it may disrupt public safety services.

Table 42: Extreme Temperatures Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Extreme Cold	County-wide	Widespread effects on people and the environment, with potential localized impacts on critical infrastructure/utilities. At-risk populations - including elderly, infants, homeless, those with pre-existing health conditions – may be significantly impacted.	Record low of -25°F in January 1963
Extreme Heat	County-wide		Record high of 104°F in July 2002

Table 43: FEMA National Risk Index (Extreme Temperatures) – Based on Census Tract

Jurisdiction	Cold Wave Risk Index (Score)	Heat Wave Risk Index (Score)	Census Tract
Carlisle	Relatively Low (47.4)	Relatively Low (34.07)	39165030102
Franklin	Very Low (44.19)	Relatively Low (27.76)	39165032501
Lebanon	Relatively Low (53.98)	Relatively Low (35.15)	39165031500
Mason	Relatively Low (45.2)	Relatively Low (29.97)	39165031908
Springboro	Relatively Low (44.26)	Relatively Low (26.3)	39165030504
South Lebanon	Relatively Low (53.98)	Relatively Low (42.25)	39165032100
Butler	Relatively Low (61.76)	Relatively Low (29.43)	39165032400
Corwin	Relatively Low (53.55)	Relatively Low (22.11)	39165031002
Harveysburg	Relatively Low (62.2)	Relatively Low (26.45)	39165031100
Maineville	Relatively Low (47.55)	Relatively Low (36.93)	39165032205
Morrow	Relatively Low (52.77)	Relatively Low (33.55)	39165032300
Pleasant Plain	Relatively Low (61.76)	Relatively Low (29.43)	39165032400
Waynesville	Relatively Low (58.78)	Relatively Low (36.97)	39165031001
Clearcreek	Relatively Low (55.63)	Relatively Low (31.92)	39165030800
Deerfield	Very Low (43.78)	Relatively Low (23.42)	39165032008

Table 43 Continued

Jurisdiction	Cold Wave Risk Index (Score)	Heat Wave Risk Index (Score)	Census Tract
Franklin	Relatively Low (45.35)	Relatively Low (24.48)	39165030600
Hamilton	Relatively Low (47.55)	Relatively Low (36.93)	39165032205
Harlan	Relatively Low (61.76)	Relatively Low (29.43)	39165032400
Massie	Relatively Low (62.2)	Relatively Low (26.45)	39165031100
Salem	Relatively Low (52.77)	Relatively Low (33.55)	39165032300
Turtlecreek	Relatively Low (51.78)	Relatively Low (37.47)	39165030700
Union	Relatively Low (53.98)	Relatively Low (42.25)	39165032100
Washington	Relatively Low (62.2)	Relatively Low (26.45)	39165031100
Wayne	Relatively Low (53.55)	Relatively Low (22.11)	39165031002

**Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County*

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability and Community Resilience.

Causes that May Exacerbate Effects of Extreme Temperatures:

Winter storm conditions can exacerbate cold temperatures. El Niño and La Niña patterns, can also exacerbate temperatures. El Niño and La Niña are weather patterns that occur every few years. The water temperatures associated with these weather patterns can push warmer or colder air through the jet streams toward different parts of the country. La Niña, caused by cooler than normal ocean temperatures, can cause cooler winter temperatures. Extended La Niña patterns can exacerbate wind chills into extreme temperatures. Conversely, El Niño patterns, caused by warmer than normal ocean temperatures, can contribute to extreme heat in the Ohio Valley.

Warnings:

The National Weather Service issues the following warnings for Heat:

- **Excessive Heat Outlooks** – Issued when the potential exists for an excessive heat event in the next three (3) – seven (7) days.
- **Heat Advisory** – Is issued for dangerous heat conditions that are not expected to reach warning criteria and when the maximum heat index values are forecast to reach 100°F with higher confidence in such occurrence.
- **Excessive Heat Watch** – Is issued when conditions are favorable for excessive heat, but its occurrence, location and timing are somewhat uncertain.
- **Excessive Heat Warning** – Issued when the maximum heat index values are forecast to reach or exceed 105°F with higher confidence in such occurrence.

The National Weather Service issues the following warning for Cold:

- **Cold Advisory** – issued when temperatures or wind chills are expected to fall below 25°F.
- **Extreme Cold Watch/Warning** – issued when temperatures or wind chills are expected to fall below 15°F.

4.6. FLOOD

Definition:

An overflow of water onto normally dry land. The inundation of a normally dry area caused by rising water in an existing waterway, such as a river, stream, or drainage ditch.

There are multiple categories for floods:

- **Flash floods** – Generally develop within six (6) hours of the immediate cause (which could include heavy rain, slow-moving thunderstorms, ice or debris jams, and levee or dam failure). These floods exhibit a rapid rise of water over low-lying areas or a large amount of water that cannot be absorbed in urban areas. Flash flooding can cause small streams to become rapid, violent rivers, and can produce rapid runoff over mountainous terrain.
- **River Flooding** – Occurs when river levels rise and overflow their banks or edges of their main channel and inundate areas that are normally dry. River flooding can be caused by heavy rainfall, dam failures, rapid snowmelt and ice jams.
- **Burn Scars/Debris Flows** – In areas where wildfires have occurred, vegetation may have been burned away and soil properties may have been altered, leaving behind bare ground that tends to repel water (which is called a burn scar). When rain falls over a burn scar the ground is unable to absorb the moisture, leaving the water to collect or run across the surface of the ground towards the lowest point.
- **Urban Flooding** – Is the result of development and the ground's decreased ability to absorb excess water without adequate drainage systems in place. Typically, this type of flooding occurs when land uses change from fields or woodlands to roads and parking lots. Urbanization can increase runoff two (2) to (6) six times more than natural terrain. The flooding of developed areas may occur when the amount of water generated from rainfall and runoff exceeds a storm water system's capability to remove it.
- **Ice/Debris Jams** – Are stationary accumulations of ice or debris that restrict flow. As ice or debris moves downstream, it may get caught on any sort of obstruction to the water flow. When this occurs, water can be held back, causing upstream flooding. When the jam finally breaks, flash flooding can occur downstream.

Primary Sources of Information:

- National Weather Service: [Weather.gov](https://www.weather.gov)
- National Center for Environmental Information (NCEI): [NCEI.noaa.gov](https://www.ncmi.noaa.gov)
- National Water Prediction Service (NWPS): water.noaa.gov/

Historical Occurrences in Warren County:

Table 44: History of Recorded Flooding Occurrences in Warren County

Event ID	Location	Date	Type	Death	Injury	Damage
1117018	ROACHESTER	7/27/2023	Flash Flood	0	0	0
1117019	STUBBS MILLS	7/27/2023	Flood	0	0	0
1074896	CROSSWICK	3/3/2023	Flood	1	0	0
1051764	FRANKLIN	9/5/2022	Flood	0	0	\$5,000
1051768	HARVEYSBURG	9/5/2022	Flood	0	0	0
1017104	SOCIALVILLE	5/20/2022	Flood	0	0	\$100,000
1017105	COMARGO	5/20/2022	Flash Flood	0	0	\$10,000
1014809	LEBANON	5/6/2022	Flood	0	0	0
998461	S. LEBANON	2/18/2022	Flood	0	0	0

Table 44 Continued

Event ID	Location	Date	Type	Death	Injury	Damage
998462	WAYNESVILLE	2/18/2022	Flood	0	0	0
998428	STUBBS MILLS	2/17/2022	Flood	0	0	0
998429	RED LION	2/17/2022	Flood	0	0	0
998430	LEBANON	2/17/2022	Flood	0	0	0
998431	ROACHESTER	2/17/2022	Flood	0	0	0
998432	MORROW	2/17/2022	Flood	0	0	0
955712	MORROW	6/19/2021	Flash Flood	0	0	0
891025	LEBANON	6/30/2020	Flash Flood	0	0	\$3,000
891026	OTTERBEIN	6/30/2020	Flash Flood	0	0	0
882772	UNION VLG	5/19/2020	Flash Flood	0	0	0
882758	MORROW	5/19/2020	Flood	0	0	0
882759	UNION VLG	5/19/2020	Flood	0	0	0
882760	FRANKLIN	5/19/2020	Flood	0	0	0
882761	CARLISLE	5/19/2020	Flood	0	0	0
882263	MASON	5/18/2020	Flood	0	0	0
882265	CARLISLE	5/18/2020	Flood	0	0	0
882263	MASON	5/18/2020	Flood	0	0	0
		TOTALS:	26	1	0	\$218,000.00

Repetitive Loss Properties:

A Repetitive Loss property (RL) is any insurable building for which two (2) or more claims of more than \$1,000 were paid by the National Flood Insurance Program within a rolling ten (10)-year period, since 1978. A Severe Repetitive Loss (SRL) property is one (1) which the program has made at least four (4) payments for building/contents of more than \$5,000 or at least two (2) building-only payments that exceed the value of the property.

Table 45: Repetitive Flood Loss Properties

Community	Community Number	Occupancy Types	Zone	Total Paid	Total Losses	RL Structures	SRL Structures	Total RL/SRL Structures
City of Lebanon	390557	1,11,4	AE, X	\$43,025.14	6	3	0	3
City of Loveland	390068	1	AE, X	\$12,640.13	4	2	0	2
City of Mason	390559	18	C	\$34,572.18	3	1	0	1
City of Monroe	390042	18	AE	\$243,366.16	5	0	1	1
City of South Lebanon	390563	1,11	AE	\$392,326.76	20	4	2	6
City of Springboro	390564	4	-	\$12,579.05	2	1	0	1
Village of Morrow	390561	1,11	A11, AE	\$42,246.27	6	3	0	3
Warren County (Unincorp.)	390757	1,11	-	\$176,569.68	9	4	0	4
Totals:				\$957,325.37	55	18	3	21

Sources: State of Ohio Hazard Mitigation Plan 2024, & OpenFEMA Dataset: NFIP Multiple Loss Properties -v1.

The occupancy types per the OpenFEMA Dataset are as follows:

- 1 = Single family residence
- 2 = two (2) to four (4) Unit residential building
- 3 = Residential building with more than four (4) units
- 4 = Non-residential building
- 6 = Non-Residential Business
- 11 = Single-family residential building with the exception of a mobile home or a single residential unit within a multi-unit building
- 12 = A residential non-condo building with two (2)-, three (3)-, or four (4)-units seeking insurance on all units
- 13 = A residential non-condo building with five (5) or more units seeking insurance on all units
- 14 = Residential mobile/manufactured home
- 15 = Residential condo association seeking coverage on a building with one (1) or more units
- 16 = Single residential unit within a multi-unit building
- 17 = Non-residential mobile/manufactured home
- 18 = A non-residential building
- 19 = A non-residential unit within a multi-unit building

Probability of Occurrence:

The probability of the county and its municipalities experiencing a flood event can be difficult to quantify but based on historical records there have been twenty-six (26) flood events since 2020, meaning:

$$\begin{aligned} &[(\text{Current Year}) 2025] \text{ subtract } [(\text{Historical Year}) 2020] = 5 \text{ Years on Record} \\ &[(\text{Number of Historical Events}) 26] \text{ divided by } [(\text{Years on Record}) 5] = 5.2 \end{aligned}$$

It can be reasonably assumed that this type of event occurs nearly 5.2 times per year in the county.

Figure 28: Base Flood Elevation Illustration

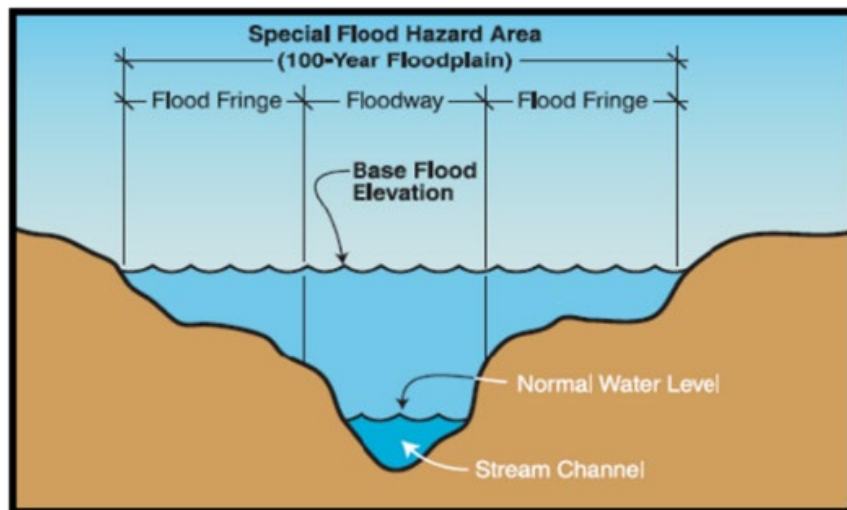


Diagram identifying Special Flood Hazard Area, 1% annual chance (100-Year) floodplain, floodway and flood fringe, FEMA

Flood Risk by Location:

Most known floodplains in the United States have been mapped by FEMA, which administers the National Flood Insurance Program (NFIP). When a flood study is completed for the NFIP, the information and maps are assembled into a Flood Insurance Study (FIS). A FIS is a compilation and presentation of flood risk data for specific water courses, lakes, and coastal flood hazard areas within a community and includes causes of flooding.

The NFIP, for which Flood Insurance Rate Maps (FIRM) are published, identifies the 1% annual chance flood. This 1% annual chance flood event is used to delineate the Special Flood Hazard Area (SFHA) and identify Base Flood Elevations. The SFHA serves as the primary regulatory boundary used by FEMA and Warren County.

Warren County has several building codes and development regulations in place to reduce flood risk for new construction, substantial improvements, or other man-made changes. The Warren County Building Department, as the floodplain administrator for the County, determines if new construction must meet certain flood zone construction criteria.

The Building Department has authority to perform Flood Zone Determinations per Flood Damage Prevention Resolution, Sections 307.37 and 307.85. Upon application for a development permit, the application and plans are reviewed to determine whether the site of the proposed structure is within any Special Flood Hazard Area (SFHA) designated by FEMA on regulatory Flood Insurance Rate Maps (FIRMs).

Table 46: NFIP Participation by Jurisdiction

Jurisdiction	NFIP Participation	Community ID #
City of Carlisle	Yes	390606C
City of Franklin	Yes	390556C
City of Lebanon	Yes	390557C
City of Mason	Yes	390559C
City of Monroe	Yes	390042B
City of South Lebanon	Yes	390563C
City of Springboro	Yes	390564C
Village of Butlerville	No (no structures in flood hazard area)	390719#
Village of Corwin	No (no structures in flood hazard area)	390555C
Village of Harveysburg	No (no structures in flood hazard area)	390833C
Village of Maineville	No (no structures in flood hazard area)	390934C
Village of Pleasant Plain	Yes	Not Listed
Village of Waynesville	Yes	390565C
Warren County (Unincorp.)	Yes	390757

Description and Damage Impact/Extent:

Flood categories are terms defined for each gage location that describe or categorize the observed or expected severity of flood impacts in the corresponding stream segment or nearby stream. The severity of flooding at a given stage is not necessarily the same at all locations along a stream due to varying channel/bank characteristics on portions of the stream. The flood categories used in the NWS are minor, moderate, and major flooding, but all three of the flood categories do not necessarily exist for each gage location. Record flooding is flooding that equals or exceeds the highest stage or discharge at a given site during the period of record keeping.

- **Action Stage** – The stage which, when reached by a rising stream, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The type of action taken varies for each gage location. Gage data should be closely monitored by any affected people.
- **Flood Stage** – An established gage height for a given location, above which a rise in water surface level begins to create a hazard to lives, property, or commerce. The issuance of flood advisories or warnings is linked to flood stage. Not necessarily the same as bankfull stage.
- **Moderate Flood Stage** – Defined to have some inundation of structures and roads near the stream. Some evacuations of people and/or transfer of property to higher elevations may be necessary.
- **Major Flood Stage**- Defined to have extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations are necessary.

NWS records of flood stages at the **Great Miami River Gauge at Franklin**, has the following data:

Figure 29: Historic Crests of the Great Miami River at Franklin

Historic Crests		Categories	Feet	# of Instances	Probability per Event
• 17.60 ft	01/22/1959	Major Flood Stage	22	0	N/A
• 16.70 ft	01/22/1937				
• 16.60 ft	03/06/1963	Moderate Flood Stage	17	1	5%
• 16.50 ft	01/07/2005				
• 15.59 ft	12/22/2013	Flood Stage	14	16	84%
• 14.86 ft	03/20/2020				
• 14.50 ft	04/05/2018	Action Stage	11	1	5%
• 14.33 ft	02/25/2018				
• 10.07 ft	04/12/2013				

Flood Impacts per Height/Stage

- 22 Feet** Miami Conservancy flood protective levees would be overtopped, resulting in flooding of protected areas of Franklin. Many homes and businesses of Carlisle between the railroad tracks and the river are flooded. Areas most impacted would be west of the river, though areas of Franklin between Main Street and the river along the east bank.
- 18 Feet** This is roughly equal to the FEMA one (1) percent flood. Flood waters extend into yards of numerous homes in areas of Carlisle between the railway tracks and the river on the west bank...with water into the lowest lying homes of this area. Areas of Franklin protected by Miami Conservancy District Levees do not flood until stages at and above twenty-two (22) feet.
- 17 Feet** Portions of Dayton-Oxford Road flood, with flood water nearing homes near Carlisle along Dayton-Oxford Road. Areas of Franklin protected by Miami Conservancy District Levees do not flood until stages at and above twenty-two (22) feet.
- 16 Feet** In addition to flooding onto low areas of Oxford Road near the railway bridge, water floods basements of riverside apartments along Dayton-Oxford Road. Water extends nearly to Dayton-Oxford Road itself in Carlisle. Areas of Franklin protected by Miami Conservancy District Levees do not flood until stages at and above twenty-two (22) feet.
- 15 Feet** In addition to flooding along low areas of Oxford Road near the railway bridge, water approaches riverside apartments along Dayton-Oxford Road, and flooding of basement apartments may occur. Areas of Franklin protected by Miami Conservancy District Levees do not flood until stages at and above twenty-two (22) feet.
- 14 Feet** Flooding occurs along Oxford Road at the railway underpass.

NWS records of flood stages at the **Little Miami River Gauge at Spring Valley**, has the following data:

Figure 30: Historic Crests of the Little Miami River at Spring Valley

Historic Crests				Categories	Feet	# of Instances	Probability per Event
• 19.20 ft 01/21/1959	• 13.55 ft 09/03/1935	• 19.14 ft 03/05/1963	• 13.21 ft 02/24/1975	Major Flood Stage	17	2	2%
• 16.80 ft 02/06/1929	• 12.98 ft 06/19/2021	• 16.75 ft 01/27/1952	• 12.88 ft 02/25/2018				
• 16.47 ft 02/14/1948	• 12.87 ft 04/04/2018	• 16.12 ft 01/05/1949	• 12.69 ft 03/25/2023	Moderate Flood Stage	14	13	14%
• 15.79 ft 03/10/1964	• 12.60 ft 01/19/1927	• 15.50 ft 03/20/1943	• 12.41 ft 02/08/2019				
• 15.34 ft 12/03/1950	• 12.34 ft 12/06/2011	• 14.71 ft 06/02/1947	• 12.27 ft 11/07/2017	Flood Stage	11	26	35%
• 14.53 ft 06/06/1981	• 12.09 ft 05/02/1983	• 14.51 ft 06/29/1980	• 11.81 ft 05/20/2020				
• 14.47 ft 01/05/2004	• 11.80 ft 03/04/2023	• 14.08 ft 03/19/1933	• 11.66 ft 05/22/2014	Action Stage	9	-	-
• 14.00 ft 01/31/1982	• 11.24 ft 02/18/2022	• 13.97 ft 04/20/1920	• 11.15 ft 02/21/2014				
• 13.91 ft 03/20/2008	• 11.14 ft 06/21/2015	• 13.88 ft 01/06/1950	• 11.12 ft 12/22/2013				
• 13.76 ft 03/21/2020	• 11.09 ft 02/18/2022	• 13.72 ft 01/06/2005	• 11.03 ft 12/29/2015				
• 13.71 ft 06/05/2008							

Flood Impacts per Height/Stage

- 17 Feet** Flooding impacts numerous homes and businesses along the river, as well as backwater flooding along Sugar Creek. Structures near Corwin Road from Spring Valley to Corwin are impacted, as well as areas of Beavercreek township close to the river.
- 15 Feet** Some homes and businesses near Spring Valley, Roxanna, Oregonia and Corwin are impacted by flooding, possibly first floor level flooding. High water covers long stretches of Corwin Road near the river, as well as Waynesville, New Burlington, and Middletown Roads.
- 14 Feet** Flood waters approach businesses and some homes near Spring Valley, Roxanna, Oregonia, Corwin and east of Waynesville. Flooding continues along portions of Corwin Road near the river, as well as Waynesville, New Burlington, and Middletown Roads. Much of Wayne Township in Warren County is flooded along the river.
- 13 Feet** High water impacts low areas near Spring Valley, Roxanna, Corwin and east of Waynesville. Flood waters approach homes very close to the river, and widespread bottom land flooding occurs. Water floods Corwin Road, Waynesville Road, and Middletown Road near the river.
- 12 Feet** Water rises into low-lying areas close to the river near Spring Valley, Roxanna and east of Waynesville. Water floods Corwin Road, as well as Waynesville, and Middletown Roads.
- 11 Feet** Flooding impacts short areas of Middletown and Waynesville Roads, in addition to Corwin Road and Corwin Park. Backwater flooding may impact State Route 725 in Sugarcreek township.
- 10 Feet** Corwin Road and Corwin Park are flooded.

NWS records of flood stages at the **Little Miami River Gauge near South Lebanon**, has the following data:

Figure 31: Historic Crests of the Little Miami River near South Lebanon

Last 5 Years <i>*No Historic Data</i>		Categories	Feet	# of Instances	Probability per Event
• 20.11 ft	03/25/2023	Major Flood Stage	32	0	N/A
• 20.52 ft	03/04/2023				
• 18.00 ft	07/07/2022	Moderate Flood Stage	25	1	5%
• 23.20 ft	02/18/2022	Flood Stage	19	16	84%
• 21.51 ft	06/19/2021	Action Stage	15	1	5%

Flood Impacts per Height/Stage

- 33 Feet** Major flooding in South Lebanon covers about one third of the town, with water several feet deep into homes and businesses between Broadway Street and the river. The Village of Morrow also experiences moderate flooding along streets close to the river and along Todd Fork Creek. Kings Mills Road near Foster is also severely flooded.
- 31 Feet** Major flooding occurs in South Lebanon, especially buildings between McKinley Street and the river. Water is several feet deep into many homes. Flood waters are several feet deep along Mason-Morrow-Millgrove Road, as well as on Front Street in Morrow.
- 30 Feet** This is roughly equal to the FEMA one (1) percent flood. Much of South Lebanon between East Pike Street and the river is flooded, including backwater flooding along Turtle Creek and Dry Run. Long stretches of Mason Morrow Millgrove Road are also flooded, as well as much of the village of Morrow.
- 26 Feet** South Lebanon incurs the worst of the flooding, with homes inundated along South Main Street and King Avenue in South Lebanon. Long stretches of Mason-Morrow-Millgrove Road is flooded, as well as Front Street in Morrow. Water spills onto Kings Mills Road near Foster.
- 25 Feet** Flooding along portions of South Main Street, South High Street & King Avenue in South Lebanon is a foot deep or more. Basement flooding of several feet occurs in riverfront homes of South Lebanon. Flooding also occurs along Front and Miami Streets in Morrow and becomes worse along portions of Mason-Morrow-Millgrove Rd. Todd Fork Creek in Morrow experiences backwater flooding resulting in flooding along Front Street and other low-lying roads in Morrow.
- 22 Feet** Low-lying roads are affected in South Lebanon including South Main and McKinley Streets and King Avenue. Some homes near the river incur basement flooding in South Lebanon. Lowland flooding can be expected elsewhere in Warren County near the Little Miami River including Mason-Morrow-Millgrove Road.
- 19.5 Feet** Flooding can be expected near Turtle Creek in South Lebanon. Roads affected by the flooding include Broadway, McKinley, and Pike Streets.
- 19 Feet** Flood waters begin to approach low-lying roads in Foster and South Lebanon, in addition to flooding along Front Street in Morrow, Stubbs Mills Road, and stretches of Mason Morrow Millgrove Road.
- 18 Feet** Several areas along Mason Morrow Millgrove Road are flooded, as well as Front Street in Morrow and Stubbs Mills Road. Portions of Rogers Park in South Lebanon is flooded.
- 17 Feet** Flooding of lowland areas occurs from South Lebanon to Foster. Portions of Mason-Morrow Millgrove Road also flood, as well as Stubbs Mills Road near the river. Front Street in Morrow floods.

Table 47: Flood Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Flood	County-wide	Localized or Wide-Spread. Low-lying areas or areas around bodies of water are more at-risk for flooding. Additionally, areas with lots of paved or finished surfaces may be prone to flooding due to impermeable surfaces. Businesses, homes (especially those with basements) and other critical infrastructure may be greatly impacted/services disrupted.	The extent is dependent on the nature and scale of the flood.
Flash Flood	County-wide	Localized or Wide-Spread. Flash flood incidents can occur anywhere, but areas along bodies of water have a higher risk to be impacted by a flash flood. Businesses, homes (especially those with basements) and other critical infrastructure may be greatly impacted/services disrupted.	The extent is dependent on the nature and scale of the flash flood.
	Corwin, Harveysburg, Maineville, Morrow, Waynesville, Franklin, South Lebanon, Hamilton Township, Harlan Township, Salem Township, Wayne Township, other jurisdictions along rivers/bodies of water		

Table 48: FEMA National Risk Index (Riverine Flooding) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively High (91.48)	39165030102
Franklin	Relatively Low (55.5)	39165032501
Lebanon	Relatively Low (60.99)	39165031500
Mason	Relatively Low (49.34)	39165031908
Springboro	Relatively Low (54.85)	39165030504
South Lebanon	Relatively Moderate (87.78)	39165032100
Butler	Relatively Low (42.92)	39165032400
Corwin	Relatively Moderate (70.56)	39165031002
Harveysburg	Relatively Low (66.58)	39165031100
Maineville	Very Low (27.11)	39165032205
Morrow	Relatively Moderate (84.8)	39165032300
Pleasant Plain	Relatively Low (42.92)	39165032400
Waynesville	Relatively Low (50.1)	39165031001
Clearcreek	Relatively Low (40.19)	39165030800
Deerfield	Relatively Low (35.92)	39165032008
Franklin	Relatively Low (34.75)	39165030600
Hamilton	Very Low (27.11)	39165032205
Harlan	Relatively Low (42.92)	39165032400
Massie	Relatively Low (66.55)	39165031100
Salem	Relatively Moderate (84.8)	39165032300
Turtlecreek	Relatively Low (41.4)	39165030700
Union	Relatively Moderate (87.78)	39165032100
Washington	Relatively Low (66.58)	39165031100
Wayne	Relatively Moderate (70.56)	39165031002

*Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability and Community Resilience.

Conditions that May Exacerbate Flooding:

The following factors will affect the severity of a flood:

- **Impermeable Surfaces:** Excessive amounts of paved areas or other surfaces upstream or in the community can increase the amount and rate of water runoff. Development affects the runoff of stormwater and snowmelt when buildings and parking lots replace natural vegetation, which would normally absorb water.
- **Steeply Sloped Watersheds:** In hilly and mountainous areas, a flood may occur after heavy rain.
- **Constrictions:** Re-grading or filling within or on the edge of floodplains obstructs flood flows, backing up floodwater onto upstream and adjacent properties.
- **Obstructions:** Bridges, culverts, and other obstructions can block flood flow and trap debris, causing increased flooding upstream and increased velocity downstream.
- **Debris:** Debris from the watershed, such as trees, rocks, and parts of damaged buildings increases the hazard possessed by moving water.
- **Contamination:** Water will pick up whatever was on the ground within the floodplain, such as soil, road oil, farm and lawn chemicals, and animal waste. It can also be caused by inundated wastewater treatment plants, and the presence of hazardous material storage in the flood plain.
- **Soil Saturation:** Rainfall in areas already saturated with water will increase runoff.
- **Velocity:** High velocity flooding (with the speed of moving water greater than five (5) feet per second) can erode stream banks, lift buildings off their foundations, and scour away soils around bridge supports and buildings.

Warnings:

The National Weather Service has multiple levels of warning the public for possible floods:

- **Flood Watch** – Issued to indicate current or developing conditions that are favorable for flooding. The occurrence is neither certain nor imminent. A watch is typically issued within several hours to days ahead of the onset of possible flooding. In situations where a river or stream is expected to be the main source of the flooding, forecast confidence may allow for a Flood Watch to be issued several days in advance.
- **Flash Flood Watch** – Issued to indicate current or developing conditions that are favorable for flash flooding. The occurrence is neither certain nor imminent. A watch is typically issued within several hours to days ahead of the onset of possible flash flooding.
- **Flood Advisory** – Issued when a flood event warrants notification but is less urgent than a warning. Advisories are issued for conditions that could cause a significant inconvenience, and if caution is not exercised, could lead to situations that may threaten life and/or property.
- **Flood Warning** – Issued to inform the public of flooding that poses a serious threat to life and/or property. A Flood Warning may be issued hours to days in advance of the onset of flooding based on forecast conditions. Floods occurring along a river usually contain river stage (level) forecasts.
- **Flash Flood Warning** – Issued to inform the public, emergency management, and other cooperating agencies that flash flooding is in progress, imminent, or highly likely. Flash Flood Warnings are urgent messages as dangerous flooding can develop very rapidly, with a serious threat to life and/or property. Flash Flood Warnings are usually issued minutes to hours in advance of the onset of flooding.

Figure 32: Residences in 100 Year Floodplain

Residences in 100 Year Floodplain

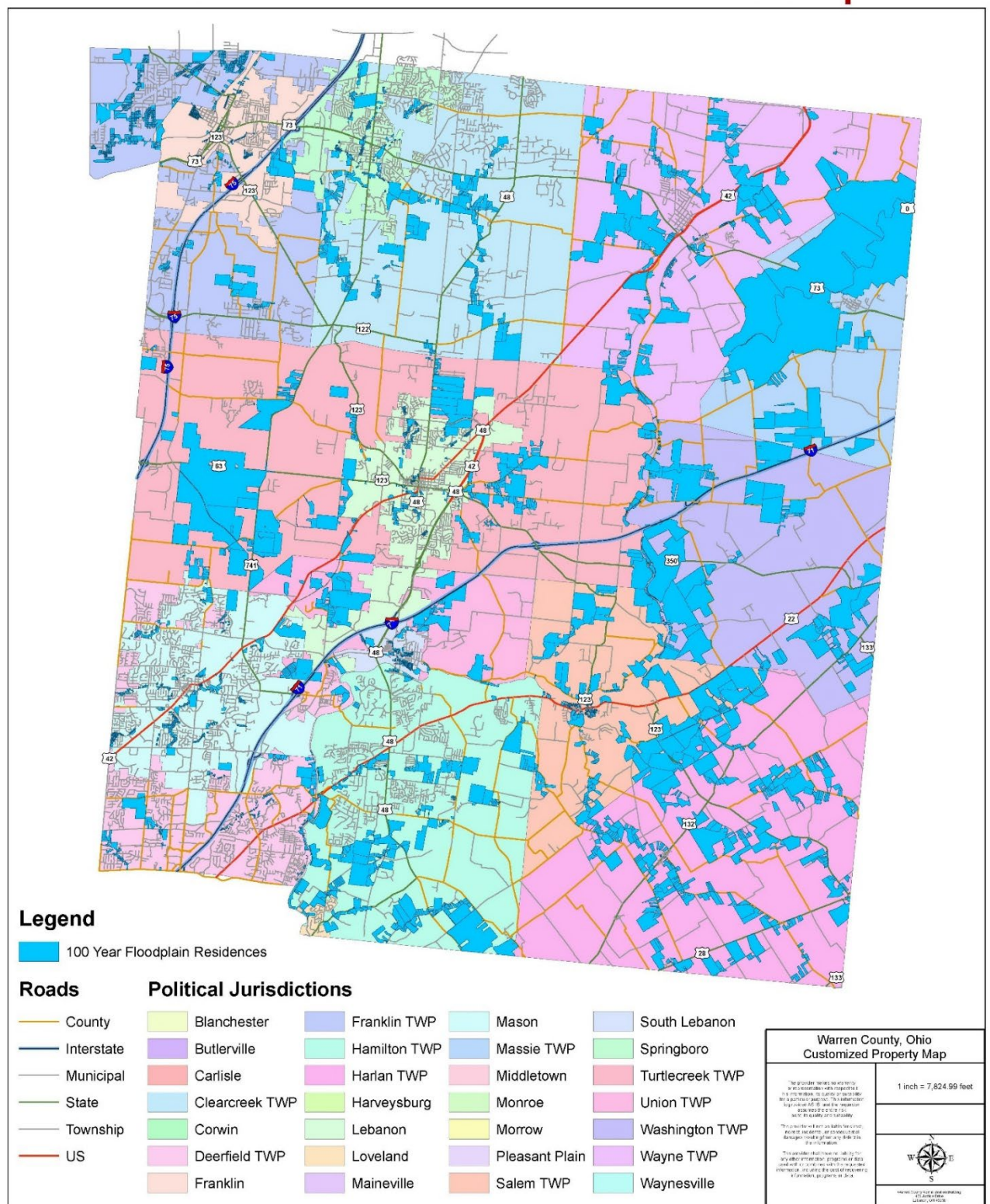
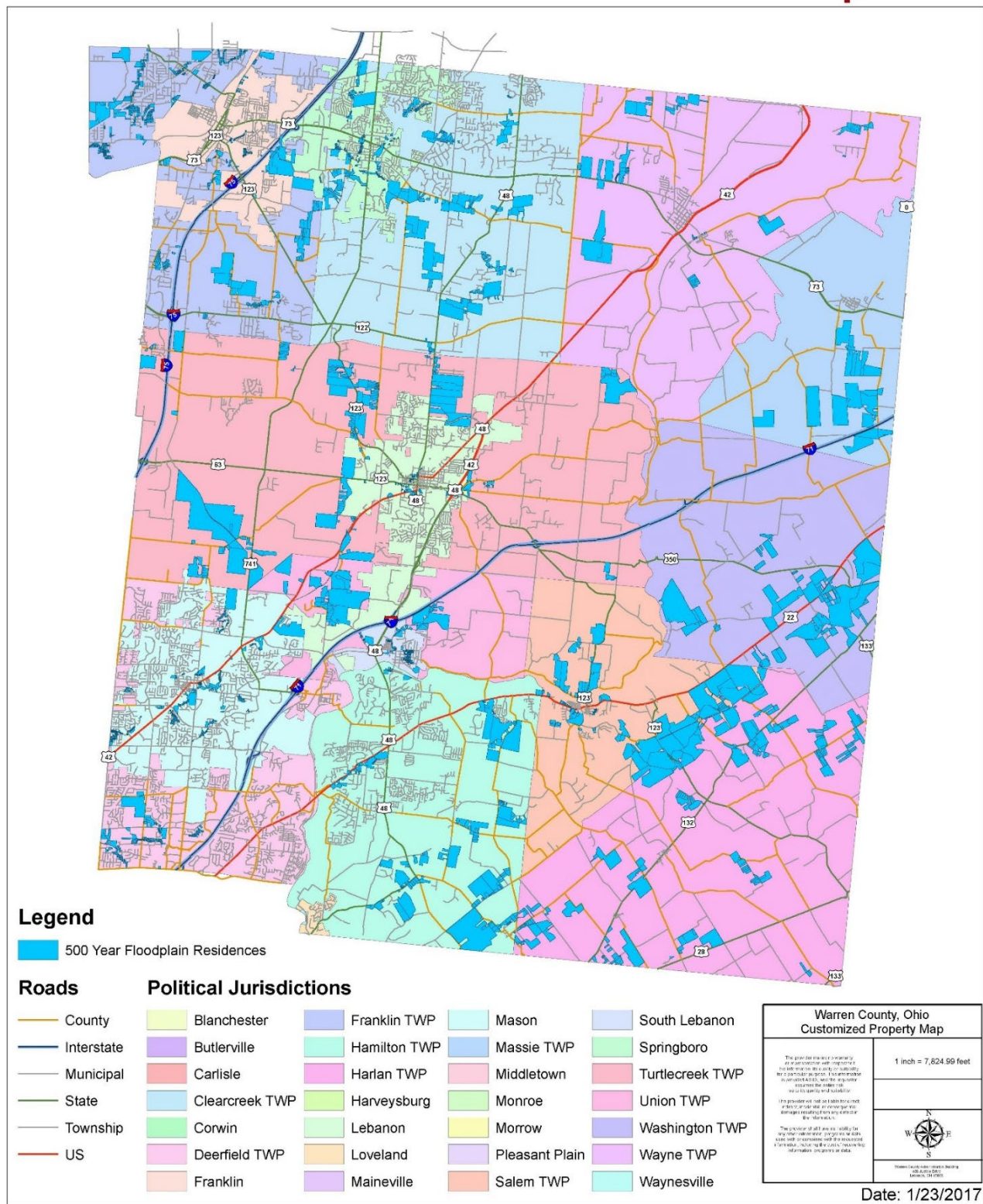


Figure 33: Residences in 500 Year Floodplain

Residences in 500 Year Floodplain



4.7. HAZARDOUS MATERIALS

Definition:

According to the Ohio Environmental Protection Agency, hazardous materials can be defined in different ways depending upon the law or regulation administered by the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), the Department of Transportation (DOT), and the U.S. Nuclear Regulatory Commission (NRC).

- The Institute for Hazardous Materials Management defines hazardous materials as “any item or agent (biological, chemical, radiological, and/or physical), which has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.”
- OSHA’s definition includes any substance or chemical which is a health hazard or a physical hazard, including carcinogens, toxic agents, irritants, corrosives, and sensitizers, as well as agents that interact to be harmful to the human body, explosive, or flammable.
- The EPA’s definition includes the OSHA definition. It adds any item or chemical which can cause harm to people, plants, or animals when released into the environment.
- The DOT defines hazardous materials as any item or chemical which, when being transported or moved in commerce, is a risk to public safety or the environment.

Primary Sources of Information:

- Occupational Safety and Health Administration – <https://www.osha.gov/laws-regs/standardinterpretations/1996-11-07>
- Environmental Protection Agency – https://www.epa.gov/sites/production/files/2014-09/documents/cleannrt10_12_distiller_complete.pdf
- Ohio Department of Transportation (ODOT) – <https://www.fmcsa.dot.gov/regulations/hazardous-materials/how-comply-federal-hazardous-materials-regulations>

Historical Occurrences in Warren County:

Table 49: History of Recorded Hazardous Materials Incidents in Warren County

OEPA No.	Location	Incident Date	Incident
2001EPA0000068	MONROE	1/16/2020	ACID NOT SPECIFIED/ SODIUM HYDROXIDE (NaOH)/CAUSTIC SODA/LYE UNK. QUANTITY
2001EPA0000149	MONROE	1/30/2020	DIESEL FUEL APPROX. 150 GALLONS
2004EPA0000455	BUTLERVILLE	4/2/2020	BURNING TIRES UNK. QUANTITY
2005EPA0000742	WASHINGTON TWP	5/26/2020	DIESEL FUEL APPROX. 600 GALLONS
2006EPA0000920	DEERFIELD TWP	6/21/2020	REFRIGERANT OTHER OR UNK TYPE APPROX. 340 LBS
2008EPA0001245	DEERFIELD TWP	8/24/2020	REFRIGERANT/OTHER APPROX. 115 LBS
2009EPA0001377	MASON	9/21/2020	WASTEWATER/OTHER APPROX. 3000 GALLONS
2010EPA0001550	TURTLECREEK TWP	10/28/2020	DIESEL FUEL APPROX. 60 GALLONS
2101EPA0000041	TURTLECREEK TWP	1/13/2021	DIESEL FUEL APPROX. 300 GALLONS
2106EPA0000798	HARLAN TWP	6/6/2021	MATERIAL WHITE UNK. QUANTITY LITTLE MIAMI RIVER INVOLVED
2106EPA0000897	TURTLECREEK TWP	6/20/2021	OIL TRANSFORMER NON-PCB APPROX. 89 GALLONS

Table 49

OEPA No.	Location	Incident Date	Incident
2106EPA0000937	TURTLECREEK TWP	6/27/2021	DIESEL FUEL APPROX. 50 GALLONS
2107EPA0001065	MASON	7/17/2021	DIESEL FUEL APPROX. 90 GALLONS
2107EPA0001111	TURTLECREEK TWP	7/22/2021	DIESEL FUEL APPROX. 10 GALLONS TURTLECREEK WATERWAY INVOLVED
2109EPA0001483	WASHINGTON TWP	9/19/2021	DIESEL FUEL APPROX. 100 GALLONS
2111EPA0001743	TURTLECREEK TWP	11/15/2021	AIR FIRE OPEN BURNING UNK. QUANTITY
2201EPA0000010	TURTLECREEK TWP	1/4/2022	DIESEL FUEL APPROX. 150 GALLONS
2202EPA0000107	MASON	2/2/2022	DIESEL FUEL APPROX. 50 GALLONS
2202EPA0000156	WASHINGTON TWP	2/9/2022	DIESEL FUEL APPROX. 200 GALLONS
2202EPA0000191	TURTLECREEK TWP	2/17/2022	DIESEL FUEL APPROX. 50 GALLONS
2203EPA0000348	FRANKLIN TWP	3/16/2022	OIL PETROLEUM NOT OTHERWISE SPECIFIED APPROX. 275 GALLONS
2203EPA0000358	SPRINGBORO	3/18/2022	OIL CUTTING /CUTTING OIL/COOLANT/LUBRICANT APPROX. 100 GALLONS
2203EPA0000436	HARLAN TWP	3/31/2022	DIESEL FUEL APPROX. 100 GALLONS SECOND CREEK INVOLVED
2205EPA0000681	LEBANON	5/12/2022	SOLVENT(S) APPROX. 4000 LBS
2208EPA0001214	FRANKLIN	8/10/2022	DIESEL FUEL APPROX. 120 GALLONS
2208EPA0001257	HAMILTON TWP	8/18/2022	DIESEL FUEL APPROX. 75 GALLONS
2212EPA0001900	FRANKLIN TWP	12/23/2022	DIESEL FUEL APPROX. 150 GALLONS
2304EPA0000657	SPRINGBORO	4/24/2023	DIESEL FUEL APPROX. 50 GALLONS
2310EPA0001747	FRANKLIN TWP	10/10/2023	DIESEL FUEL APPROX 100 GALLONS
2406EPA0001035	MASON	1/4/2024	DRUM(S) APPROX. 10 BBL (310 GALLONS)
2401EPA0000137	FRANKLIN	1/26/2024	DIESEL FUEL APPROX. 100 GALLONS
2404EPA0000602	WASHINGTON TWP	4/12/2024	DIESEL FUEL APPROX. 150 GALLONS
2409EPA0001645	TURTLECREEK TWP	9/25/2024	OIL PETROLEUM NOT OTHERWISE SPECIFIED APPROX. 60 BBL (1890 GALLONS)
2410EPA0001701	WASHINGTON TWP	10/5/2024	DIESEL FUEL APPROX. 300 GALLONS
2410EPA0001707	WASHINGTON TWP	10/7/2024	DIESEL FUEL APPROX. 75 GALLONS
2412EPA0001992	TURTLECREEK TWP	12/10/2024	DIESEL FUEL APPROX. 110 GALLONS

*Additional data is available at: https://data-oeqa.opendata.arcgis.com/datasets/467432b6916d4abdb56c91fff022b9f1_0/explore?filters=eyJDT1VOVFkiOlsiV2FycmVull19&location=40.111974%2C-82.601150%2C7.69&showTable=true

Probability of Occurrence:

Incidents involving releases/spills of hazardous materials are not assigned a probability of recurrence as are natural hazards. However, past data can be used to characterize the likelihood of future incidents. Based on data, Warren County has a high likelihood of having a release/spill of hazardous materials. Sources of these incidents could be transportation routes, fixed facilities, pipelines, illegal dumping, chemical misapplication, illegal drug labs, and incidents caused by natural occurrences.

Description and Damage Extent/Impact:

The hazardous material hazards are countywide and primarily are associated with the transport of materials by highway and/or rail. As found in the 2024 Warren County Hazardous Materials Annex of the Emergency Operation Base Plan, there are 178 sites within the county that store/utilize hazardous materials. A hazardous materials incident regarding one of these sites, intentional release or a transportation accident, could result in injuries, death, environmental damages, and financial losses.

Table 50: Hazardous Materials Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Hazardous Materials	County-wide	Localized to the jurisdiction(s) which the hazardous materials incident occurs. Minor spills/releases may temporarily close transportation routes and have minor disruptions in services. Larger releases (i.e., rail car/tanker truck explosion or fixed facility explosion) may have long term closures on transportation (including roads & rail) routes due to repairs needed, critical infrastructure and services may be disrupted. The health of responders and people in the areas may be greatly impacted. Long-term environmental monitoring may be required.	The maximum extent represents a hypothetical, but realistic, scenario.
	Carlisle, Franklin, Lebanon, Middletown, Mason, South Lebanon, Deerfield Township, Hamilton Township, other jurisdictions with major transportation routes or heavy congregation of facilities with hazardous materials		

Conditions that May Exacerbate Hazardous Materials Incident:

Based on the Warren County Hazardous Materials plan the following will affect the severity of a hazardous material incident:

- **Time of Day** – Affects the population and number of commuters within Warren County. During normal business hours there may be a higher number of individuals affected by a hazardous materials release.
- **Weather** – Can positively or negatively affect a hazardous materials release based on type of chemical and type and severity of weather.
- **Geography** – Terrain and waterways can affect how contaminants or spills move through the affected area. Warren County also has rural, suburban and urban areas, which can affect the movement of hazardous materials releases and/or the affected population.

Warnings:

Based on Warren County Hazardous Materials plan there are 3 levels of hazardous material response. Based upon the level of response, the public will be given warning via the following methods:

- Emergency Alert System (EAS)
- Integrated Public Alert & Warning System (IPAWS)
- Local Media

4.8. INFECTIOUS DISEASE OUTBREAK

Definition:

An infectious disease outbreak is an outbreak as one that is caused by micro-organisms, such as bacteria, viruses and parasites. A vector-borne disease is an infectious disease that is transmitted to humans by blood-feeding arthropods, including ticks, mosquitoes and fleas, or in some cases by mammals (e.g. rabies).

Infectious disease dynamics depend on a range of factors, including: land use, human behavior, climate, efficacy of healthcare services, population dynamics of vectors, population dynamics of intermediate hosts and the evolution of the pathogens themselves

Many of these diseases require continuous monitoring, as they present seasonal threats to the general population. An epidemic emerges when an infectious disease occurs suddenly in numbers that are in excess of normal expectancy. Infectious disease outbreaks put a strain on the healthcare system and may cause continuity issues for local businesses. These outbreak incidents are a danger to emergency responders, healthcare providers, schools, and the public. This can include influenza (e.g. H1N1), pertussis, West Nile virus, COVID-19, and many other diseases.

Primary Sources of Information:

- Ohio Department of Health – <https://odh.ohio.gov/know-our-programs/infectious-diseases>
- U.S. Centers for Disease Control and Prevention (CDC) – <https://www.cdc.gov/comec/resources/infectious-diseases.html>

Historical Occurrences in Warren County:

Pandemic Influenza, considered to be a global outbreak, spread quickly around the world and was observed in 1918, 1957, 1968 and in 2009 with the novel H1N1 strain. The 2009 H1N1 outbreak affected Warren County and the rest of Ohio. The Great Influenza Epidemic of 1918 killed millions worldwide and would likely cause hundreds to thousands of deaths in Ohio should a similar outbreak occur today. COVID-19 was the modern-day global pandemic that officially lasted from March of 2020 to May 2023.

Table 51: History of Recorded History of Recorded Infectious Disease Outbreaks in Warren County

Year	Number of _____ Outbreaks					
	Community	Foodborne	Healthcare-Associated	Institutional	Waterborne	Zoonotic
2024	0	0	6	2	0	0
2023	2	0	9	3	0	0
2022	0	0	7	8	0	0
2021	1	0	5	22	0	0
2020	4	0	29	50	0	0
2019	2	0	5	2	0	0
2018	0	2	6	2	0	0
2017	0	1	6	0	0	0
2016	0	0	1	4	1	0
2015	0	0	0	0	0	0
2014	0	0	0	6	0	0
2013	0	0	0	0	0	0
2012	1	0	0	1	0	0
2011	0	0	0	0	0	0
2010	0	0	0	0	0	0

Data Received from Warren County Health District

Probability of Occurrence:

Due to the nature of infectious disease outbreaks, it is difficult to predict when they may occur. There are some infectious diseases, such as influenza and norovirus, that have a predictable and known seasonality where there are an increased number of occurrences.

Damage Extent/Impact:

Table 52: Infectious Disease Outbreak Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Infectious Disease Outbreak	County-wide	Localized clusters to widespread epidemics/pandemics. Potential for regional or statewide spread depending on transmission mode and response measures. Infectious diseases may overwhelm healthcare systems, place a strain on critical infrastructure, and significantly impact vulnerable populations (exacerbate underlying conditions or even death). Areas with a more congregated population may be at a higher risk due to proximity and ease of spreading.	The extent is dependent on the type and scale of the infectious disease.

Causes that May Exacerbate an Infectious Disease Outbreak:

There are multiple factors that may exacerbate the spread of infectious disease. Water, sanitation, food and air quality, and climate and environmental conditions all play a vital role in the transmission of diseases. Additionally, low population vaccination rates can encourage the spread.

4.9. INVASIVE/HARMFUL SPECIES

Definition:

Harmful Species are species that have potential negative impacts on the environment and economy. Harmful species are both native and invasive and can cause significant ecological, public health, or economic harm. The National Oceanic and Atmospheric Administration (NOAA) defines an invasive species as “an organism that causes ecological or economic harm in a new environment and is not native.” Their growth is often encouraged through human activity.

There are multiple types of invasive species:

- **Land-Dwelling (Terrestrial) Invasive Plants** are non-native plants that grow in non-aquatic habitats, including agricultural fields, rangelands, forests, urban landscapes, wildlands, and along waterways.
- **Land-Dwelling (Terrestrial) Invasive Vertebrates** are non-native members of three (3) subphylum vertebrata (animals with a backbone) who spend most of their lives on land.
- **Land-Dwelling (Terrestrial) Invasive Invertebrates** are animals that lack a vertebral column (backbone). Insects are the most common invasive terrestrial invertebrate, but it also includes other arthropods, mollusks (such as snails and slugs), and nematodes (roundworms).
- **Water-Dwelling (Aquatic) Invasive Species** are non-native plants, animals, and other organisms that have evolved to live primarily in water (aquatic habitats) rather than on land (terrestrial habitats).

Primary Sources of Information:

- Warren County Health District:
- <http://warrenchd.com/lyme-disease-cases-continue-to-increase-in-ohio>
- Center for Disease Control (CDC) – [West Nile Data](http://www.cdc.gov/westnile/)
- Ohio Department of Natural Resources – <http://ohiodnr.gov/invasivespecies>
- Ohio Department of Agriculture – https://agri.ohio.gov/search/?search_query=invasive+species
- Ohio State University – <https://senr.osu.edu/extensionoutreach/invasive-species>

Historical Occurrences & Probability in Warren County:

There is no history/data of invasive/harmful species causing a significant impact to Warren County; thus, the probability of occurrence is very low.

List of invasive species found, or have the potential to be found, in Warren County:

Table 53: Invasive Species Found/Possibly Found in Warren County

Harmful Species	Plants	Invasive Land-Dwelling:			Invasive Water-Dwelling Species
		Vertebrates	Invertebrates		
Ticks*	Honeysuckle (Amur*, Morrow, and Tartarian)	Feral Swine*	Emerald Ash Borer*	Spotted Lantern Fly	Zebra Mussel
Mosquitoes*	Poison Hemlock		Asian Long-horned Beetle*	Hemlock Woolly Adelgid	
			Gypsy Moth*	Thousand Cankers Disease/Walnut Twig Beetles	

**Description of Invasive/Harmful species impact included on the following pages
Red Text indicates species IS in Warren County*

Description and Damage Extent/Impact:

Below are examples of potential hazards, their descriptions and associated damages:

- **Emerald Ash Borer (EAB)** – Invasive species that targets natural occurring and landscaped North American ash trees. The EAB is capable of eliminating an entire tree species from forest or urban environments. Native ash borers typically target weakened ash trees, but the EAB can impact healthy trees of any age. Because the pest has established itself throughout all of Ohio, in July 2011, ODA lifted the quarantine regulations in place for emerald ash borer within the state. Ohio is still inside the Federal quarantine boundary, and the movement of EAB regulated articles cannot exit the quarantine boundaries without Federal permits.

The Emerald Ash Borer can be found in all parts of Warren County. They can be transported by affected logs or firewood being carried into an area. Ash borers usually attack a tree first in the upper parts of the canopy. The first signs of EAB attacks are vertical cracks in the bark, usually accompanied by woodpecker damage and canopy (leaves at the top of the tree) thinning. Under the loose bark there may be S- shaped tunnels.

Figure 34: Emerald Ash Borer & Damages



- **Gypsy Moth** – Invasive species that defoliates trees, and can impact oak, spruce, hemlock, and other trees, with oak trees being the preferred hosts. The gypsy moth is one (1) of the most destructive insect pests threatening the forests and ornamental plants of Ohio. The impact includes forest ecosystem degradation, economic losses to businesses, loss of recreational opportunities in areas severely defoliated, reduced private property values, and nuisance from gypsy moth caterpillars. Since 1990, the Ohio Department of Agriculture has been conducting gypsy moth suppression projects in the generally infested areas of the state, combined with pheromone trapping and eradication projects in areas not considered generally infested.

The gypsy moth caterpillars can be identified by five pairs of blue dots followed by six pairs of red dots lining their backs. They can be dispersed naturally with newly hatched caterpillars hanging from silken threads blowing in the wind to other trees, or they can be transported when an infested area of a car, recreational vehicle, lawn furniture, logs, nursery stock or other outdoor items are brought into the area.

Gypsy moth infestation could be determined by the number of insects on trees or the level of defoliation (missing leaves). The Gypsy moth has not yet been identified in Warren County, however multiple counties in eastern Ohio have reported infestations and the spread is moving western.

Figure 35: Gypsy Moth & Damages



- **Asian Longhorned Beetle** – Also known as the Asian cerambycid beetle. In June 2011, the first Ohio infestation in trees was discovered near the village of Bethel in Clermont County. The insect was previously found associated with solid wood packing and crating materials in warehouses located in Cincinnati, Columbus, and Loudonville. However, an infestation of living host trees has never been detected in these cities. ALB is a serious pest of hardwood trees in its native environment where it has few natural enemies. In the U.S., where no natural enemies exist, the insect is extremely destructive to our trees and forests. Beetles will attack both stressed and healthy trees, which makes them an even greater threat.

Asian Longhorned Beetles can be identified by their bullet shaped bodies, shiny black and white spots, and long striped antennae. Infestation of this pest can be identified by chewed round depressions in the bark of a tree, pencil-sized round tree holes, excessive sawdust buildup near tree bases, and unseasonable yellowed or drooping leaves. Tunneling will also be present in fallen branches or cut wood after the beetle has chewed and laid its eggs in its tunnel channels. The Asian Longhorned Beetle can be transported to an area through transportation of firewood or logs, solid wood packing material, wood debris and trimmings, and other lumbers materials (even if beetles are not visible).

Figure 36: Asian Longhorned Beetle & Damages



- **Amur Honeysuckle** – Invasive species that stands about six (6)-fifteen (15) ft at maturity, stems have a hollow pith (center), pair of tubular flowers less than an inch long are borne along the stem in leaf axils. Amur Honeysuckle is a noxious woody shrub, introduced in southern Ohio in the late 1950s but is now rampant across the state and throughout much of the Eastern United States. Amur Honeysuckle has no significant disease or pest problem, however, it will take over an area within a few years of initial seeding, by a combination of its rapid growth rate, arching growth habit, and ability to prolifically reseed itself nearby. The only positive in terms of control is that its root system is shallow during the first several years of its life, so plants can literally be pulled up or dug out with relative ease, if caught early enough.

Figure 37: Amur Honeysuckle & Damages



- **Feral Swine** – Refers to the Eurasian Wild Boar and neglected domestic swine. While feral swine have not been reported in Warren County, they have been reported nearby and may find their way into the county. Potential impacts include the destruction of soybean and corn crops, damage to soil quality, and root strength through rooting, degradation to water quality through wallowing which leads to silt and bacterial contamination of downstream waterways, predation on smaller, native animals, erosion of soil which can lead to the growth of invasive plant species and outcompeting native animals.

Figure 38: Feral Swine & Damages



- **Mosquitoes** – West Nile virus is a type of virus that is spread by mosquitoes. The infection it causes may be so mild that people don't even know they have it. But in rare cases, West Nile leads to severe illness that affects the brain or spinal cord. People older than fifty (50) are at the highest risk for serious problems from West Nile. Most people fully recover from West Nile. But some people who get a severe infection have permanent problems such as seizures, memory loss, and brain damage. A few people die from it.

Most often, mosquitoes spread the virus by biting birds infected with the virus and then biting people. Mosquitoes can also spread the virus to other animals, such as horses. About eighty (80) out of 100 people who have West Nile have no symptoms. When symptoms do appear, they start two (2) -fifteen (15) days after the mosquito bite. Between 2019 - 2023 there were 0.01 to 0.16 cases per 100,000 residents in Warren County.

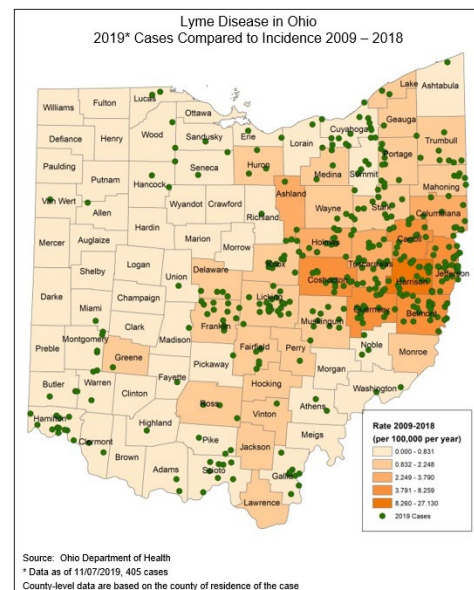
Source: Center for Disease Control

Warren County Health District traps and tests pools of mosquitos around the county annually. In 2018, there were seventy-eight (78) confirmed pools of West Nile Virus in pools of mosquitos. In 2019, there was one (1) reported positive case of West Nile Virus (in Waynesville) from tested pools of mosquitos. This change can be attributed to hotter, dryer weather conditions that mitigated mosquito breeding grounds.

- **Ticks** – Small spiderlike animals (arachnids) that bite to fasten themselves onto the skin and feed on blood. Ticks live in the fur and feathers of many birds and animals. Tick bites often occur during early spring to late summer and in areas where there are many wild animals/birds. Most ticks don't carry diseases, and most tick bites don't cause serious health problems, but it is important to remove a tick as soon as you find it. Removing the tick's body helps you avoid diseases the tick may pass on during feeding. Removing the tick's head helps prevent an infection in the skin where it bites you. Many of the disease's ticks carry cause flu-like symptoms, such as fever, headache, nausea, vomiting, and muscle aches. Symptoms may begin from one (1) day to three (3) weeks after the tick bite. Sometimes a rash or sore appears along with the flu-like symptoms. Ticks are found worldwide and can carry many diseases, such as Lyme disease.

The rate of person(s) with Lyme Disease in 2023 was 7.30 (rate is the number of cases per 100,000 residents in Warren County).

Figure 39: Map of Lyme Disease Reports



- **Zebra Mussels** – Small shellfish named for the striped pattern on its shell. However, color patterns can vary to the point of having only dark or light-colored shells with no stripes. This mussel is typically found attached to objects, surfaces, or other mussels by threads extending from underneath the shells. Although similar in appearance to the quagga mussel (*Dreissena bugensis*), the two species can be distinguished by their shell morphology. When placed on a surface, zebra mussels are stable on their flattened underside while quagga mussels, lacking a flat underside, will fall over.

Zebra Mussels are harmful bioengineers that spread quickly by way of attaching to watercraft that moves from place to place and by water currents. They are filter feeders, straining water for the food they need. Unwanted food is rejected and bound into pellets that, in heavily colonized areas, provide food for native as well as other aquatic invasive species. Large concentrations of Zebra mussels can also deprive water bodies of oxygen and nutrients needed to sustain certain ecosystems and species. Human impacts from zebra mussels can clog water intakes for municipalities and industries, foul boat hulls, motors, and water-related equipment. Damages can decrease property values. Sharp shells can litter beaches, cut feet, and affect recreation and tourism.

The Zebra mussel can be found in the Little Miami River watershed near the Warren/Hamilton County line and in Caesar Creek Lake. They have been partly implicated as a source of decline to Caesar Creek's native mussel population due to resource competition with the invasive species.

Figure 40: Zebra Mussels & Damages



Table 54: Invasive/Harmful Species Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Invasive/Harmful Species	County-wide	Localized or Wide-spread, depending if left uncontrolled. Once established, invasive species destroy ecosystems by overpowering/pushing out local species. Can be harmful to agriculture and outdoor recreational areas. If water-borne species were introduced, could negatively impact the water supply/treatment areas.	The extent is dependent on the nature and scale of the invasive/harmful species.

Conditions that May Exacerbate Invasive/Harmful Species:

Warmer weather will increase the number of insects during the annual cycle. Most invasive species outbreaks are caused by accidental or intentional human activity. For mosquitos, warmer temperatures combined with increased rainy seasons increase water pools which are breeding grounds for mosquitos.

Warnings:

There are no warnings for harmful species. Lists of invasive species are available on the ODNR website <http://ohiodnr.gov/invasivespecies>. Members of the community that observe or have questions about an occurrence report your sightings to the ODA website <https://www.eddmaps.org/>.

4.10. LANDSLIDE/EROSION

Definition:

A landslide is defined as any downward and outward movement of soil and rock material on slopes that significantly impacts infrastructure or personal property. Erosion is defined as the gradual wearing away of land masses along rivers and streams.

Primary Sources of Information:

- Ohio Department of Natural Resources (ODNR): OhioDNR.gov
- Ohio Department of Transportation (ODOT): Transportation.ohio.gov

Historical Occurrences in Warren County:

At any time, there are multiple landslides along Warren County roads that are monitored and remediated by local, county, and state maintenance departments. Current landslide (LS) observation list from Ohio Department of Transportation (ODOT):

Table 55: Number of Landslide Tier Sites in Ohio

LS Tier 1 Sites	LS Tier 2 Sites	LS Tier 4 Sites	LS Tier 4 Sites
51	14	3	0

Table 56: Landslide Tier Site Rating

Rating	Inspection Frequency
Non-Rated (Tier 1)	5 Years
Moderate Risk (Tier 2)	3 Years
High Risk (Tier 3)	2 Years
Very High Risk (Tier 4)	Annually

Probability of Occurrence:

The probability of a landslide occurring in Warren County is very low. Erosion is an on-going, but isolated occurrence. According to the State of Ohio Hazard Mitigation Plan, if a landslide were to occur in Warren County, it would most likely occur in the Central Eastern portion (which is hillier in nature).

Figure 41: Map of Landslide Incidence and Susceptibility in Ohio

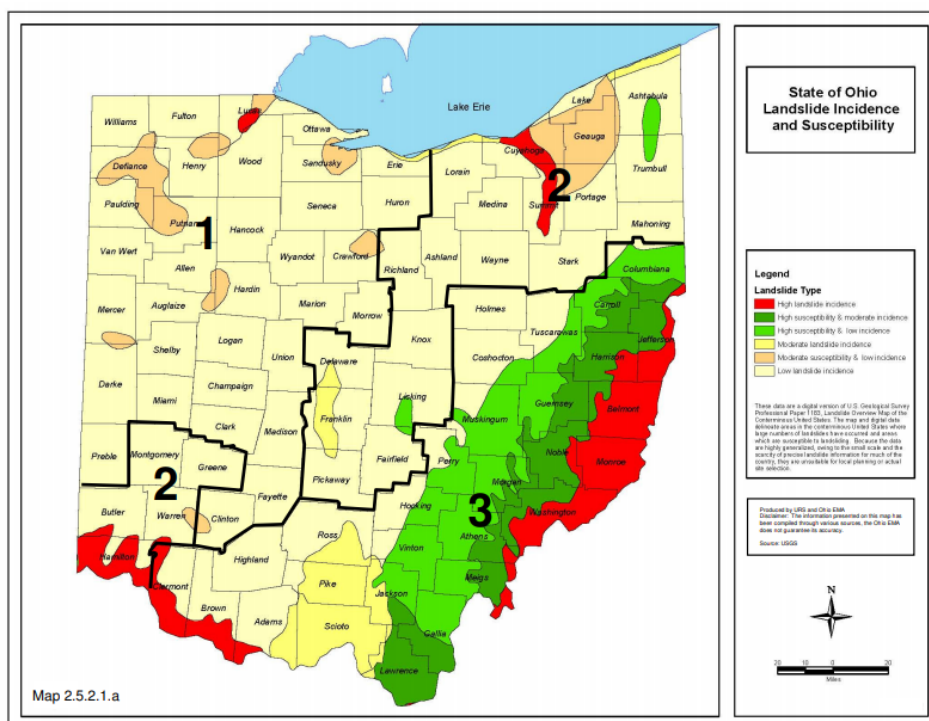
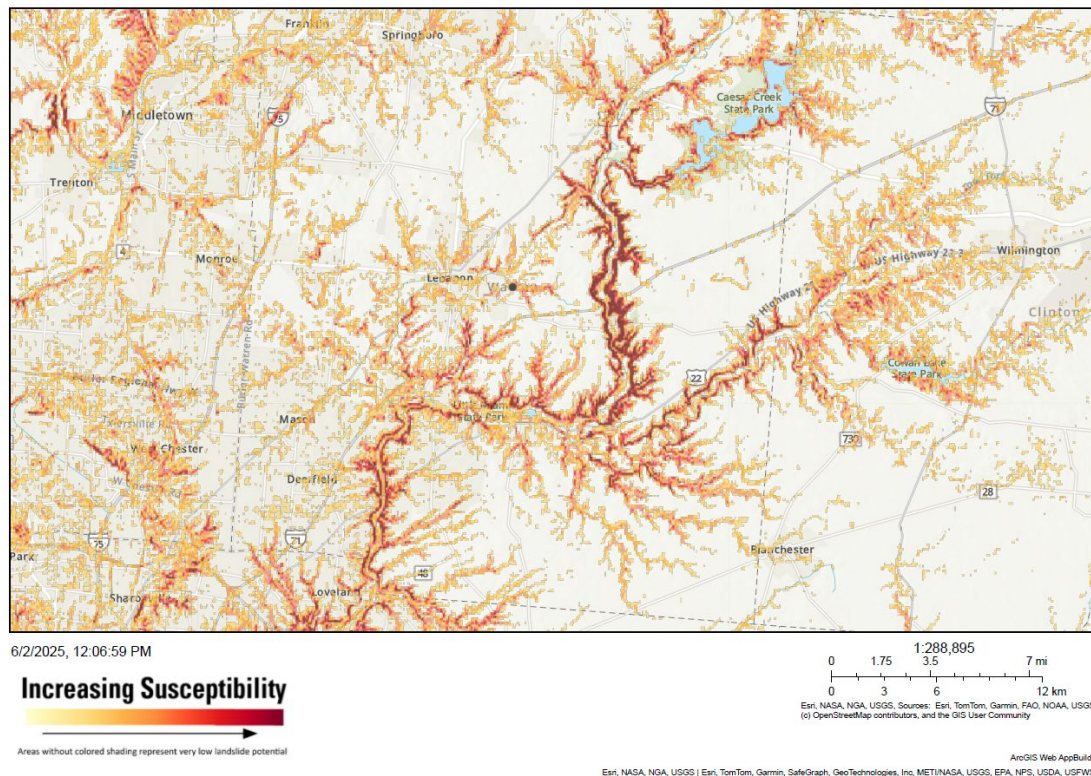


Figure 42: USGS Map of Landslide Inventory and Susceptibility in Warren County



Types of Landslides in Ohio:

- **Rotational Slump:** The movement of a mass of weak rock or sediment as a block unit along a curved slip plane. In Ohio, these types of slides commonly involve hundreds of thousands of cubic yards of material and extend for hundreds of feet. The crown or head, located in the upper section of the ground surface, consists of one or more rupture zones (scarps) that form a stair-step pattern of displaced blocks. The surfaces of these blocks are commonly rotated backward (reverse slope) and form depressions where water may accumulate, creating small ponds or swampy areas. Trees on these blocks may be inclined upslope, toward the top of the hill. The lower, downslope end (toe) of a rotational slump is a fan shaped, bulging mass of material characterized by radial ridges and cracks. Trees on this portion of the landslide may be inclined at strange angles, giving rise to the descriptive terms “drunken” or “staggering” forest. Rotational slumps may develop comparatively slowly and commonly require several months or even years to reach stability; however, on occasion, they may move rapidly, achieving stability in only a few hours.
- **Earthflow:** Involves rock, sediment, or weathered surface materials moving downslope in a mass. The most common form of earth movement in Ohio, earthflow involves a smaller area than a rotational slump and forms a hummocky topography of ridges and swales. Trees may be inclined at odd angles throughout the length of an earthflow. Earthflows are most common in weathered surface materials, do not necessarily indicate weak rock, and are also common in unconsolidated glacial sediments. The rate of movement of an earthflow is generally quite slow.
- **Rockfall:** An extremely rapid, potentially dangerous downslope movement of earth materials. Large blocks of massive bedrock suddenly become detached from a cliff or steep hillside and free fall in a rolling, bounding, or sliding manner downslope. Most rockfalls in Ohio involve massive beds of sandstone or limestone. Surface water seeps into joints or cracks in the rock, increasing its weight and causing expansion of joints in freezing temperatures, thus prying blocks of rock away from the main cliff. Weak and easily eroded clay or shale beneath the massive bed is an important contributing factor to rockfall.

Description and Damage Extent/Impact:

According to the State of Ohio Hazard Mitigation Plan, Warren County's potential damages resulting from landslides could equal \$122,400 for jurisdictions affected.

- **Landslide** damage can affect lifelines and access routes of the immediate area or other surrounding locations.
 - **Slow-moving Landslides** can affect manmade structures and infrastructure whether they are directly on or near the landslide.
 - **Fast-moving Landslides** such as debris flows are the most destructive type of landslide to structures as they often occur without precursors or warnings and move too quickly for mitigation measures to be enacted.
- **Erosion** can cause a loss of land space and may impact any structure built too close to a river or stream.

Table 57: Landslide/Erosion Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Landslide	County-wide	Localized, primarily in hilly or sloped areas of the county, especially near rivers, streams, road embankments, and areas with loose or saturated soils. Small landslides temporarily closing small portions of roadways occur often. Large-scale landslides may greatly damage critical infrastructure and homes.	The extent is dependent on the scale and location of the landslide/erosion.
Erosion	Village of Morrow	Localized. Homes or critical infrastructure near rivers/bodies of water may be impacted by water eroding away the bank, leading to structural issues and possible damage to utilities.	Residential property in Morrow is sinking in size due to erosion on the bank of the Little Miami River.

Table 58: FEMA National Risk Index (Landslide) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively Moderate (76.94)	39165030102
Franklin	Relatively Moderate (79.22)	39165032501
Lebanon	Relatively Low (49.31)	39165031500
Mason	No Rating	39165031908
Springboro	Relatively Low (46.88)	39165030504
South Lebanon	Relatively High (97.07)	39165032100
Butler	Relatively Moderate (83.44)	39165032400
Corwin	Relatively Moderate (84.5)	39165031002
Harveysburg	Relatively Moderate (83.11)	39165031100
Maineville	Relatively Low (63.09)	39165032205
Morrow	Relatively High (95.04)	39165032300
Pleasant Plain	Relatively Moderate (83.44)	39165032400
Waynesville	Relatively Moderate (82.69)	39165031001
Clearcreek	Relatively Moderate (72.58)	39165030800
Deerfield	No Rating	39165032008
Franklin	Relatively Low (64.01)	39165030600
Hamilton	Relatively Low (63.09)	39165032205
Harlan	Relatively Moderate (83.44)	39165032400
Massie	Relatively Moderate (83.11)	39165031100
Salem	Relatively High (95.04)	39165032300
Turtlecreek	Relatively Low (60.59)	39165030700

Table 58 Continued

Jurisdiction	Risk Index (Score)	Census Tract
Union	Relatively High (97.07)	39165032100
Washington	Relatively Moderate (83.11)	39165031100
Wayne	Relatively Moderate (84.5)	39165031002

**Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County*

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability, and Community Resilience.

Conditions that May Exacerbate Landslides/Erosion:

Precipitation, thawing, wildfires, and flooding can exacerbate landslide conditions. Additionally, the following conditions contribute to the occurrence of landslide events:

- **Steep Slope** with one (1) or more of the conditions listed below. All landslides move downslope under the influence of gravity. Therefore, steep slopes, cliffs, or bluffs are a required element leading to a landslide, especially in conjunction
- **Jointed Rocks** have caused multiple landslides along Warren County roads that are monitored and remediated by local, county, and state maintenance departments.
- **Weak Geologic Materials** such as fine-grained, permeable rock or sediment, clay or shale units subject to groundwater penetration, or natural zones of weakness such as bedding planes, and fault planes.
- **Climatic Conditions** where periods of heavy rainfall, excess snowmelt, or other events where water is accumulated, saturate the zone above the normal water table and cause a landslide.

In addition to the conditions noted above, a landslide requires a triggering mechanism to initiate downslope movement. Several events or circumstances, many of them human-caused, can trigger landslides, including:

- **Vibrations** such as those from human-caused like blasting or the passing of a heavy truck or from natural events like earthquakes, although no such occurrence has been documented in Ohio.
- **Oversteepened Slope** caused by undercutting by stream or wave erosion, by human construction activities, or by the addition of fill material to the upper portion of a slope. This disturbs the equilibrium of a stable slope and causes the angle of stability to be exceeded.
- **Increased Weight on a Slope** caused by the addition of large amounts of fill, the construction of a building or other structure, or an unusual increase in precipitation, either from heavy rains or from artificial alteration of drainage patterns.
- **Removal of Vegetation and Trees** can lead to the loss of roots which tend to hold the rock or sediment in place and soak up excess moisture.

Warnings:

There are very little warnings of landslides/erosion but previous landslides/erosion at a location is the best indication of future landslides.

4.11. MAN-MADE/TERRORISM

Definition:

- **Domestic Terrorism** – Violent, criminal acts committed by individuals and/or groups to further ideological goals stemming from domestic influences, such as those of a political, religious, social, racial, or environmental nature.
 - **Cyberterrorism**: is an electric attack using one computer system against another, and attack can be directed towards computers, networks, or entire systems. A cyber-attack may last minutes to days. Homeland Security, the FBI, the FCC, and the DOGJ are often involved in developing countermeasures that focus on reducing the threat, vulnerability, and the likelihood of attack.
 - **Agroterrorism**: is a direct, generally covert contamination of food supplies or the introduction of pests and/or disease agents to crops and livestock. An agricultural-based terror attack can last days to months. (U.S. Department of Homeland Security)
 - **Biological Attack**: is the intentional release of a pathogen (disease causing agent) or biotoxin (poisonous substance produced by a living organism) against humans, plants, or animals.
 - **Chemical Terrorism**: includes the use of nerve agents, choking agents, blood agents, or blister agents, to attack normal bodily functions of the nervous, respiratory, circulatory, and skin, respectively. Usually, an act of chemical-based terror lasts only minutes.
 - **Active Aggressor**: is an armed individual or group of individuals that is intending to cause harm or inflict terror on a civilian population. An active aggressor (or group) may be armed with guns, knives, bombs, or any other weapon/implement that may be used to inflict harm.
- **Civil Unrest** – Spontaneous disruption of normal, orderly conduct and activities in urban areas, or outbreak of rioting or violence that is of a large nature is referred to as civil unrest.

Primary Sources of Information:

- Federal Bureau of Investigation – <https://www.fbi.gov/investigate/terrorism>
- U.S. Department of Homeland Security – https://www.dhs.gov/xlibrary/assets/prep_biological_fact_sheet.pdf

Historical Occurrences in Warren County:

On June 9th, 2016, an active shooter shot their father and a Sheriff Deputy before fleeing the scene.

Increase occurrences of swatting calls to schools, businesses, etc. in the county over the past year.

Probability of Occurrence:

Because there have been no recorded terrorism events in Warren County, the probability of occurrence is low, however with societal issues on the rise the probability of a lone individual causing harm to the public is moderate.

Description and Damage Extent/Impact:

Terrorism or civil unrest events have generally been localized within a single jurisdiction. Coordinated events have occurred historically, greatly expanding the number of affected jurisdictions. Based on the nature of the event, several jurisdictions may respond to an incident.

Table 59: Man-Made/Terrorism Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Man-Made/ Terrorism	County-wide	May include active shooter events, bombings, cyberattacks, hazardous material releases, or coordinated acts of terrorism. Consequences can range from localized disruption to mass casualties and long-term infrastructure outages. Any critical infrastructure may be a target of a man-made incident. Areas with high tourism (i.e., Kings Island, ATP Tournament) may present an increased risk of being targeted due to large crowds and heightened visibility.	Critical infrastructure, public gatherings, government buildings, and transportation systems are considered high-risk targets.
	Mason, Deerfield, other jurisdictions with high tourism		

Warnings:

U.S. Department of Homeland Security will utilize the National Terrorism Advisory System (NTAS) alert to provide timely, detailed information to the public, government agencies, first responders, airports and other transportation hubs, and the private sector.

- NTAS Bulletins describe current developments or general trends regarding threats of terrorism.
- NTAS Elevated Alerts warn of a credible threat against the United States.
- NTAS Imminent Alerts warn of credible, specific and impending terrorism threats against the United States.

Conditions that May Exacerbate Man-Made/Terrorist Events:

Intelligence/information sharing via the Cincinnati Fusion Center can help mitigate a man-made incident by providing information gathering and recognition of indicators and warnings; intelligence analysis and production and intelligence and information sharing and dissemination.

Figure 43: Ohio Homeland Security Fusion Centers Map



4.12. TORNADO

Definition:

A tornado is a violently rotating column of air extending from a thunderstorm to the ground. Thunderstorms and hurricanes spawn tornadoes when cold air overrides a layer of warm air, causing the warm air to rise rapidly. The winds produced from hurricanes, earthquake induced fires, and wildfires have also been known to produce tornadoes. Tornadoes develop very rapidly and may dissipate just as quickly. Most tornadoes are on the ground for less than fifteen (15) minutes.

Tornado season generally runs from March through August; however, tornadoes can strike at any time of the year if the essential conditions are present.

Primary Sources of Information:

- National Weather Service (NWS) – [NCDC.noaa.gov](https://www.ncdc.noaa.gov)
- Federal Emergency Management Agency (FEMA) – hazards.fema.gov

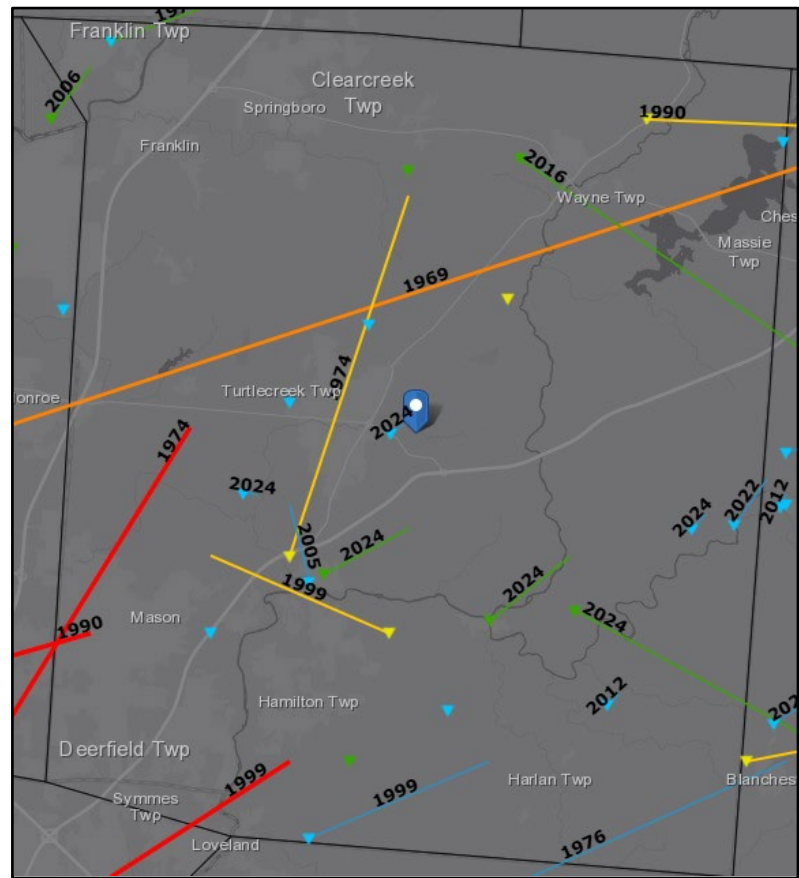
Historical Occurrences in Warren County:

Table 60: History of Recorded Tornado Events in Warren County

LOCATION	DATE	MAGNITUDE	DEATH	INJURY	DAMAGE
Warren Co.	6/26/1956	F1*	0	0	\$2,500
Warren Co.	5/22/1959	F0*	0	0	\$2,500
Warren Co.	5/10/1969	F3*	0	10	\$250,000
Warren Co.	4/3/1974	F4*	0	0	\$250,000
Warren Co.	4/3/1974	F2*	0	9	\$2,500,000
Warren Co.	5/18/1974	F1*	0	0	\$25,000
Warren Co.	4/2/1975	F2*	0	3	\$2,500,000
Warren Co.	6/24/1976	F0*	0	0	\$250,000
Warren Co.	10/1/1977	F0*	0	0	\$250,000
Warren Co.	6/2/1990	F4*	0	0	\$25,000,000
Warren Co.	9/14/1990	F2*	0	4	\$2,500,000
Warren Co.	8/20/1991	F0*	0	0	\$25,000
Warren Co.	7/12/1992	F1*	0	0	\$250,000
Loveland Park	4/9/1999	F1*	0	0	\$3,000,000
Maineville	4/9/1999	F2*	0	0	\$2,500,000
Cozzadale	8/24/1999	F0*	0	0	\$25,000
Morrow	8/30/2005	F0*	0	0	\$25,000
Carlisle	7/11/2006	F1*	0	0	\$200,000
Maineville	7/11/2006	F0*	0	0	\$10,000
Blackhawk	3/23/2012	EF0	0	0	\$20,000
Lebanon	5/1/2012	EF0	0	0	\$5,000
Genntown	5/1/2012	EF0	0	0	\$10,000
Harlan Twp	5/23/2012	EF0	0	0	\$0
Clarksville	5/23/2012	EF0	0	0	\$0
Harveysburg	5/24/2017	EF0	0	0	\$0
Waynesville	5/24/2017	EF1	0	0	\$0
Middleboro	3/23/2022	EF0	0	0	\$10,000
Morrow	5/27/2024	EF0	0	0	\$15,000
South Lebanon	5/7/2024	EF1	0	0	\$200,000
Lebanon	5/7/2024	EF0	0	0	\$20,000
Roachester	5/7/2024	EF1	0	0	\$500,000
Middleboro	5/7/2024	EF0	0	0	\$50,000
Hammel	7/30/2024	EF1	0	0	\$40,000
Totals:			0	26	\$37,935,002.500

*denotes ratings prior to the Enhanced Fujita Scale

Figure 44: Tornado Tracks from 1950-2024



Source: Purdue University

Probability of Occurrence:

The National Weather Service tracks tornado events on their Storm Events Database.

[current year (2025)] subtracted by [historical year where tracking began (1956)] = 69 Years on Record
[number of historical events (33)] divided by [Years on Record (69)] = 0.47

It can be reasonably assumed that this type of event has a probability of 47% of occurring each year. Additionally, based on historical data, it can be assumed that a tornado event has occurred 6x every year from 1956 through 2025.

In Warren County, the NWS has reports for the following wind speed events:
Table 61: National Weather Service Wind Speed (EF Rating) Reports in Warren County

EF0 (65-85 mph)	EF1 (86-110 mph)	EF2 (111-135 mph)	EF3 (136-165 mph)	EF4 (166-200 mph)	EF5 (>200 mph)
51.5%	27.3%	12.1	3.0%	6%	<1%

Description and Damage Extent/Impact:

Table 62: Tornado Damages Based on EF Rating

EF Scale	Wind Speed	Path Width	Path Length	Description of Damages
EF0	65-85 mph	6-17 yards	0.3-0.9 miles	Light damage, shingles blown off or parts of a roof peeled off, damage to gutters/siding, branches broken off trees, shallow rooted trees toppled.
EF1	86-110 mph	18-55 yards	1.0-3.1 miles	Moderate damage, more significant roof damage, windows broken, exterior doors damaged or lost, mobile homes overturned or badly damaged.
EF2	111-135 mph	56-175 yards	3.2-9.9 miles	Considerable damage, roofs torn off well-constructed homes, homes shifted off their foundation, mobile homes completely destroyed, large trees snapped or uprooted, cars can be tossed.
EF3	136-165 mph	176-566 yards	10-31 miles	Severe damage, walls torn from well-constructed houses, significant damage done to large buildings, trees begin to lose their bark.
EF4	166-200 mph	0.3-0.9 miles	32-99 miles	Devastating damage, well-constructed homes are leveled, cars are thrown significant distances, exterior walls of masonry buildings would likely collapse.
EF5	> 200 mph	1.0-3.1 miles	100-315 miles	Incredible damage, well-constructed homes are swept away, steel-reinforced concrete structures are critically damaged, trees are completely debarked and stripped of branches/snapped.

Table 63: Tornado Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Tornado	County-wide	Localized to tornado path, but impacts may be widespread due to effects on critical infrastructure. Any homes, businesses, critical infrastructure in the path may receive minor to incredible damage, including complete destruction of structures, uprooting trees, and significant debris hazards Rural and suburban areas with limited shelter infrastructure may be more vulnerable. Whereas, in heavily congregated areas, may do more damage due to close proximity of infrastructure and people.	The extent is dependent on the scale, duration, and path of the tornado. Ohio had a record number of 72 tornadoes in 2024.

Figure 45: FEMA National Risk Index – Tornado Risk Map

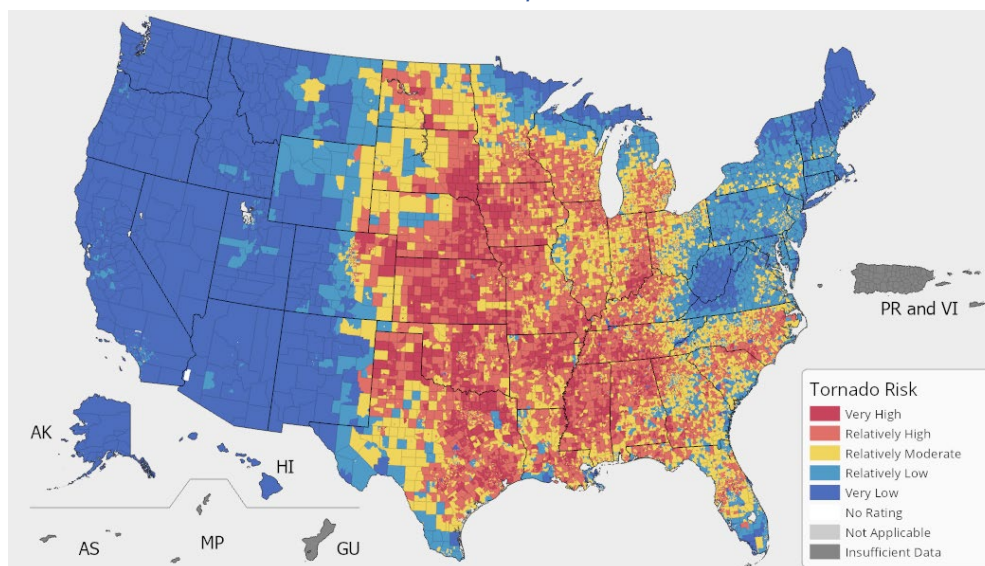


Table 64: FEMA National Risk Index (Tornado) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively Moderate (68.1)	39165030102
Franklin	Relatively Low (54.08)	39165032501
Lebanon	Relatively Moderate (68.25)	39165031500
Mason	Relatively Moderate (65.43)	39165031908
Springboro	Relatively Moderate (57.7)	39165030504
South Lebanon	Relatively High (87.07)	39165032100
Butler	Relatively Moderate (58.72)	39165032400
Corwin	Relatively Low (42.07)	39165031002
Harveysburg	Relatively Moderate (54.59)	39165031100
Maineville	Relatively Moderate (70.19)	39165032205
Morrow	Relatively Moderate (66.34)	39165032300
Pleasant Plain	Relatively Moderate (58.72)	39165032400
Waynesville	Relatively Moderate (73.11)	39165031001
Clearcreek	Relatively Moderate (67.17)	39165030800
Deerfield	Relatively Moderate (61.75)	39165032008
Franklin	Relatively Moderate (55.69)	39165030600
Hamilton	Relatively Moderate (70.19)	39165032205
Harlan	Relatively Moderate (58.75)	39165032400
Massie	Relatively Moderate (54.59)	39165031100
Salem	Relatively Moderate (66.34)	39165032300
Turtlecreek	Relatively High (77.73)	39165030700
Union	Relatively High (87.07)	39165032100
Washington	Relatively Moderate (54.59)	39165031100
Wayne	Relatively Low (42.07)	39165031002

**Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County*

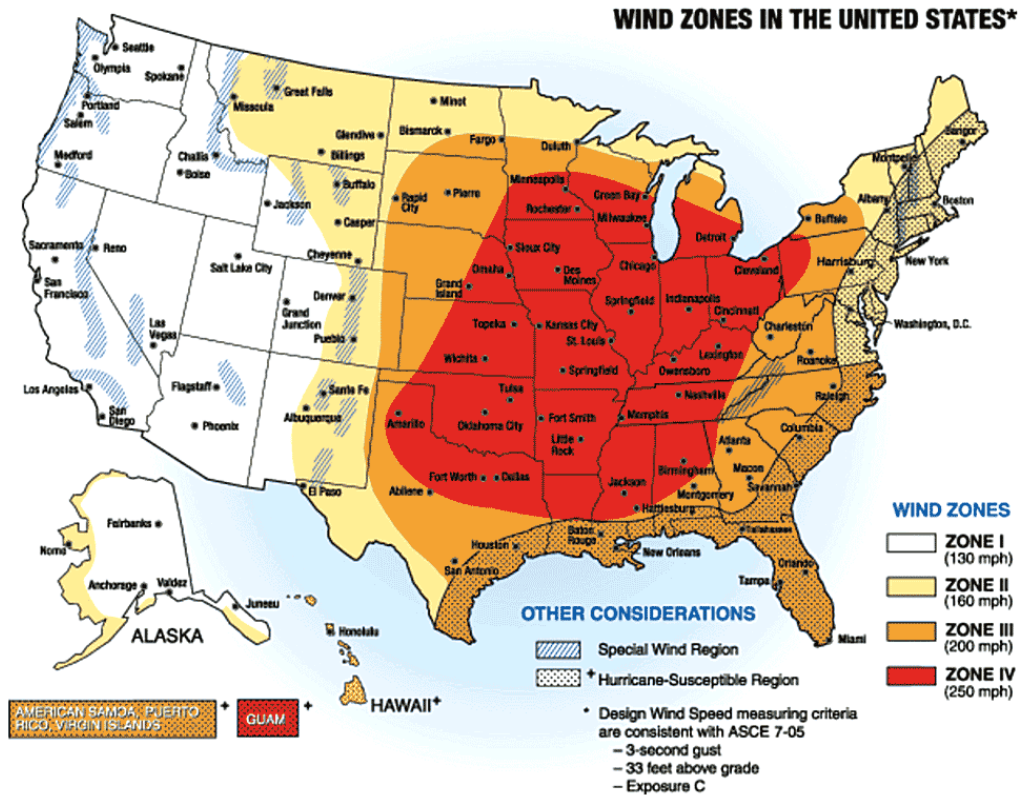
The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability and Community Resilience.

Causes that May Exacerbate Tornado Conditions:

The nature of tornadoes is that they strike at random. While it is known that some areas of the country experience tornadoes more than others, predicting exactly what parts of the community have a greater chance of being struck by a tornado is difficult. Homes and businesses may be built in accordance with local building codes that take into account the effects of minimum design wind speeds for the local area. In most inland tornado-prone regions, the building-code design wind speed is 115mph.

Ohio has been determined to be prone to high wind speed hazards as depicted by the American Society for Engineers (ASCE) wind zones map in Figure 46.

Figure 46: ASCE - Wind Zones Map



Warnings:

The National Weather Service has two (2) levels of warning the public for possible tornadoes:

- **Tornado Watch** - Tornadoes are possible in and near the watch area. Watches are issued by the Storm Prediction Center for counties where tornadoes may occur. The watch area is typically large, covering numerous counties or even states.
- **Tornado Warning** - A tornado has been sighted or indicated by weather radar, thus implying imminent danger to life and property. Warnings are issued by the local forecast office (for Warren County that is the National Weather Service Office in Wilmington, Ohio). Warnings typically encompass a much smaller area around the size of a town or small county.

4.13. UTILITY FAILURE

Definition:

A utility failure is any disruption or loss of essential services necessary for the safe and proper operation of a building or area, including electricity, heating, ventilation, air conditioning, water, and communication utilities.

Primary Sources of Information:

- Duke Energy - <https://www.duke-energy.com/home>
- AES Ohio - <https://www.aes-ohio.com/>
- Warren County Water & Sewer Department - <https://www.co.warren.oh.us/water/>
- Warren County Health District - <https://warrenchd.com/environmental/private-water-systems>
- Climate Central - <https://www.climatecentral.org/>

Historical Occurrences in Warren County:

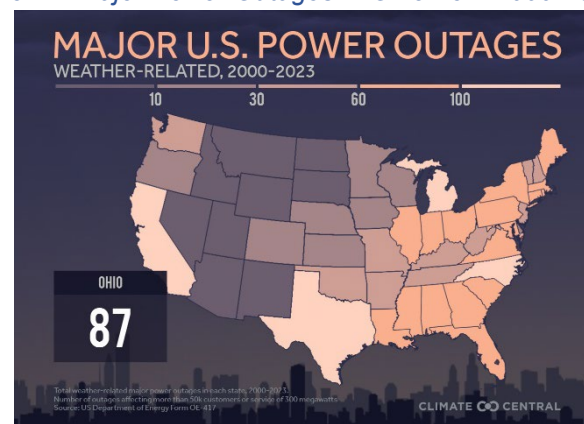
Utility failures can be caused by a variety of things, such as: severe weather events, prolonged periods of extreme heat/cold, equipment failure, and human error. Power outages and water main breaks happen frequently, but they are not typically prolonged and widespread. Many areas in Warren County rely on private water systems for their water, these jurisdictions are further affected due to not having access to water during a power failure.

- September 2008 Hurricane Ike – Hurricane-force winds caused a widespread power failure for over one (1) week in some areas of Ohio, including portions of Warren County.
- June 2012 Derecho – Damaging winds reaching fifty-eight (58) mph+ over 240 miles throughout Illinois, Indiana, Ohio and West Virginia; with Ohio at the apex. The event led to more than a million homes and businesses to be without power in Ohio, some areas up to eight (8) days.
- June 2022 Derecho – Multiple rounds of severe thunderstorms producing widespread and damaging straight-line winds impacted many utilities in Warren County, and throughout Ohio. Power outages lasted multiple days during an extreme heat event. Some pockets of Warren County were without power for three (3) days+.
- December 2022 Winter Storm Elliott – Strong winds, heavy snow, and ice lead to widespread power outages for a couple days throughout Ohio/Midwest, including a majority of Warren County. Depending on location, outages lasted one (1) - three (3) days.
- September 2024 Hurricane Helene – Hurricane force winds and rainfall (leading to flooding) caused widespread utility failures throughout the country. Areas of Warren County were without power for multiple days, and some other utilities (i.e., gas services) were impacted due to the storm.

Per a study done by Climate Central, from 2000 to 2023, 80% of major (affecting 50,000+ customers or interrupt service of 300 megawatts or more) power outages were due to weather. In that timeframe, Ohio had eighty-seven (87) major power outages.

Ohio eighty-seven (87) was in the top five (5) states with the most reported weather-related power outage; following Texas (210), Michigan (157), California (145) and North Carolina (111).

Figure 47: Major Power Outages in Ohio from 2000-2003



Probability of Occurrence:

There are no previous indications that a widespread utility failure, without weather causing the event, has occurred in Warren County, thus there is no historical precedence to determine a frequency. However, it is likely that utility failures in the form of power outages will occur throughout any given year due to severe storms, ice storms, and other natural hazards. Probability of these natural hazards can be found in their respective sections.

Damage Extent/Impact:

- May cause problems with critical infrastructure and services, such as transportation, electric grid, water sanitation systems, communication services, etc.
- The cost of damages may exceed jurisdictional means.
- May disrupt public safety services if the utility failure is prolonged and widespread.

Table 65: Utility Failure Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Utility Failure	County-wide	Localized or Wide-Spread. Failures/outages may last from a few hours to several days and may impact individual areas or be wide-spread. Loss of electricity or gas can affect household temperatures, which can lead to severe dehydration or possibility of loss of life if outdoor temperatures are extreme. Additionally, utility failure affecting the water service has the potential to lead to contamination of the water supply. Can also negatively impact remote working, leading to negative economic impacts.	The extent is dependent on the nature and scale of the utility failure.

Causes that May Exacerbate Utility Failures:

- Lack of maintenance on essential equipment.
- Inability to upgrade outdated equipment.
- Critical infrastructure does not have continuity of operations plans (COOP) in place prior to an event.

Warnings:

There is no national or state level alert system for utility failures. Impending severe weather or extreme temperatures for an extended period of time may be an indicator of potential complications.

4.14. WILDFIRE

Definition:

Wildfire events are unwanted wildland fires, including unauthorized human-caused fires, escaped debris burns, and other ignition sources that lead to fire over wildland areas. Throughout Ohio, communities are increasingly concerned about wildfire safety as increased development and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildland fires affect grass, forest, and brush lands, as well as any structures located within them. Human access to wildland areas, such as urban development in forested areas, increases the risk of fire due to a greater chance of human carelessness.

Primary Sources of Information:

- Ohio Department of Forestry (within ODNR) - <https://nid.sec.usace.army.mil/#/>
- State of Ohio Wildfire Hazard Assessment-
<https://dam.assets.ohio.gov/image/upload/ema.ohio.gov/mip/links/2023/ema-sohmp-Section-2.7.pdf>

Historical Occurrences in Warren County:

Per ODNR, there has not been a documented wildfire in Warren County. Although, according to Warren County Communications Center records, there have been twenty-six (26) calls with the problem nature of “Wildland Fire - Large” or “Brush/Grass Fire – Large” between 2021 – 2024. These problem natures include large, uncontrolled fires impacting vegetation including field fires, forest fires/fires in tree lines, grass fires, etc. The largest incident impacted an estimated 1.5 – 2 acres of agricultural land. No deaths or injuries occurred, nor were any structures impacted in these events.

Additionally, there have been several wildfires throughout Ohio, but the region near Warren County has not yet sustained any substantial damage attributed to these events since records have been maintained. The majority of wildfire risk in Ohio is located in the southern southeastern and eastern parts of the state. Warren County lies within Region 2 of the State of Ohio Wildfire Hazard Assessment, which is outside of the ONDR Wildfire protection area boundary.

Between January 1, 2018, and December 31, 2022, Ohio has experienced 4,885 wildfires that have burned 11,057 acres. (Source: *State of Ohio Hazard Mitigation Plan 2024*)

Probability of Occurrence:

According to the 2024 State of Ohio Hazard Mitigation Plan, there is a 100% probability that a wildfire will occur in any county in any given year. Based on the 26 “Wildland” or “Brush/Grass” fire-related calls in Warren County, an average of 6.5 wildfires occur each year.

In addition, according to the U.S. EPA, the average total area burned by wildfires has increased since the 1980s, and the record-breaking fires tend to occur during record-breaking warm years

Additionally, the average total area burned by wildfires has increased since the 1980s, per the U.S. EPA. As climate change impacts increase in the region, and warmer, drier, more windy conditions are possible, the probability of wildfires is likely to increase.

Figure 48: FEMA National Risk Index – Wildfire Risk Map

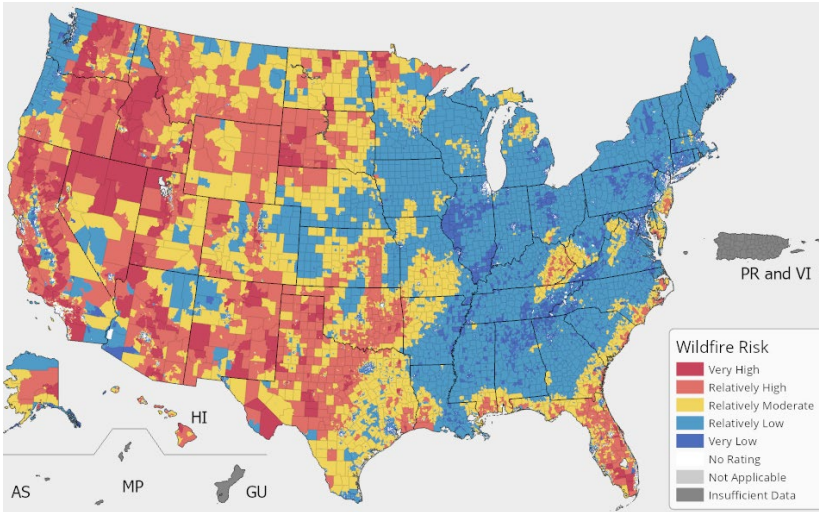
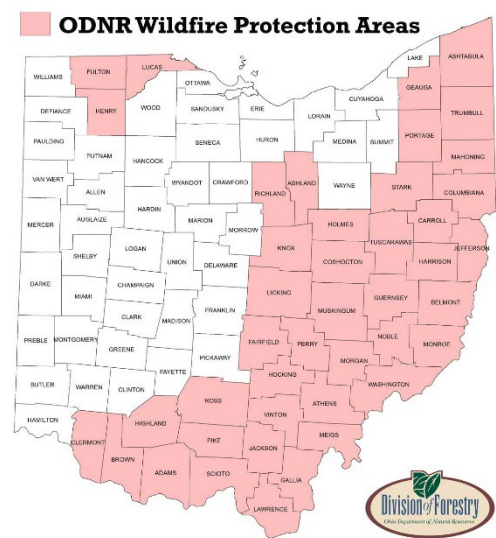


Figure 49: ODNR Wildfire Protection Areas Map



Description and Damage Extent/Impact:

The magnitude and severity of a wildfire event is measured by calculating the number of acres burned in a specific wildfire event and the severity of the burn classifications. The burn severity classifications have been adapted from USDA Natural Resources Conservation Service.

- **Low Fire Severity (Type III)** – Primarily occurs on rangeland and is indicated by decaying leaves and branches with debris partially burned. Soil may be an abnormal color and standing trees may have some brown needles. Natural recovery with root crowns and no significant erosion are likely.
- **Medium Fire Severity (Type II)** – Primarily occurs on steep, lightly timbered slopes with grass and there is some sediment delivery. A medium severity fire is indicated by burned needles, dark-colored ash, brown or reddish-brown soil up to two (2) inches deep, charring on small stumps and blackened lower halves of trees. Most roots and perennial grasses will re-sprout after a Type II Wildfire and some vegetation will recover within one (1) - five (5) years. Soil erosion is more likely to occur with a Type II (Or above) wildfire due to lack of ground cover.
- **High Fire Severity (Type I)** – Primarily occurs in unprotected drainages on steep, timbered, north or east slopes with dense forest canopy. A high severity wildfire is indicated by gray or white ash, absence of stumps or small fuel items, reddish-orange or dark soils up to two (2) inches deep with the soil being physically affected (such as crystallization, crusting, or clustered), burned roots on vegetation, and standing trees are reduced to charcoal up to one (1) inch deep. Natural vegetation will have a hard time recovering from Type I wildfires with only some deep roots re-sprouting which could take up to five (5) or ten (10) years. Soil erosion may be significant.

Table 66: Wildfire Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Wildfire	County-wide, impacts may be more heavily felt Primarily rural and undeveloped areas of the county; however, all jurisdictions with wildland-urban interface (WUI) zones are at risk in more rural/agricultural-based jurisdictions.	Wildfires can range from small brush fires to large, fast-moving incidents affecting thousands of acres. High winds, dry vegetation, and low humidity can significantly increase spread rates and fire intensity.	The extent is dependent on the weather conditions, fuel load, and location.

Table 67: FEMA National Risk Index (Wildfire) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively Low (72.96)	39165030102
Franklin	Relatively Low (55.93)	39165032501
Lebanon	Relatively Low (67.62)	39165031500
Mason	Relatively Low (67.13)	39165031908
Springboro	Relatively Low (63.02)	39165030504
South Lebanon	Relatively Low (81.26)	39165032100
Butler	Relatively Low (68.49)	39165032400
Corwin	Relatively Low (63.89)	39165031002
Harveysburg	Relatively Low (70.29)	39165031100
Maineville	Relatively Low (76.27)	39165032205
Morrow	Relatively Low (76.84)	39165032300
Pleasant Plain	Relatively Low (68.49)	39165032400
Waynesville	Relatively Low (79.20)	39165031001
Clearcreek	Relatively Low (78.40)	39165030800
Deerfield	Relatively Low (59.65)	39165032008
Franklin	Relatively Low (71.01)	39165030600
Hamilton	Relatively Low (76.84)	39165032205
Harlan	Relatively Low (68.49)	39165032400
Massie	Relatively Low (70.29)	39165031100
Salem	Relatively Low (76.84)	39165032300
Turtlecreek	Relatively Low (78.61)	39165030700
Union	Relatively Low (81.26)	39165032100
Washington	Relatively Low (70.29)	39165031100
Wayne	Relatively Low (63.89)	39165031002

*Partial jurisdictions (Middletown, Monroe, Loveland) not captured in Census Tract for Warren County

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability and Community Resilience.

Causes that May Exacerbate Wildfire Conditions:

Ohio's wildfire seasons occur primarily in the spring (March, April, and May) before vegetation has "greened-up" and the fall (October and November) when leaf drop occurs. During these times and especially when weather conditions are warm, windy and with low humidity, cured vegetation is particularly susceptible to burning. Fuel (vegetation, woody debris), weather (wind, temperature, humidity) and topography (hills and valleys) can combine to present an extreme danger to unwary civilians and firefighters in the path of a wildfire.

The majority of wildfires in Ohio are caused by human action or accident. Public education about wildfire risks could assist with mitigating certain wildfire incidents.

Warnings:

There are a few different warning types for wildfires:

- **Fire Weather Watch** – Means critical fire weather conditions are possible but not imminent or occurring. A fire weather watch alerts land managers and the public that upcoming weather conditions could result in extensive wildland fire occurrence or extreme fire behavior.
- **Red Flag Warning** – Is issued when fire conditions are ongoing or expected to occur shortly. NWS issues Red Flag Warnings in conjunction with land management agencies to alert land managers to an ongoing or imminent critical fire weather pattern.
- **Extreme Fire Behavior** – Implies a wildfire is likely to rage out of control. It is often hard to predict these fires because they behave erratically, sometimes dangerously. In order to receive the extreme fire behavior alert, one (1) of the following criteria must be met:
 - Fire Must Be Fast-Moving
 - Prolific Crowning or Spotting
 - Presence of Fire Whirls
 - Strong Convection Column

4.15. WIND/SEVERE STORM

Definition:

Severe thunderstorms are officially defined as storms capable of producing hail that is one (1) inch or larger, wind gusts over fifty-eight (58) mph, or that could form a possible tornado. Severe storms can also be defined as any destructive summer weather event with the potential to damage property or cause loss of life.

Primary Sources of Information:

- National Weather Service - <https://www.weather.gov/safety/thunderstorm-ww>
- National Centers for Environmental Information - <https://www.ncdc.noaa.gov/stormevents>

Historical Occurrences in Warren County:

Per the NCEIS, there have been over 360 severe wind events in Warren County since 1964. There have also been seventy-six (76) instances of hail reported Warren County during the same timeframe.

Probability of Occurrence:

The National Weather Service tracks wind events on their Storm Events Database.

[current year (2024)] subtracted by [historical year where tracking began (1964)] = 60 Years on Record
[number of historical events (360)] divided by [Years on Record (60)] = 6

It can be assumed that this type of event has occurred 6x every year from 1964 through 2024.

In Warren County, the NWS has reports for the following wind speed events:

Table 68: National Weather Service Wind Speed Reports in Warren County

0-49 mph	50-59 mph	60-69 mph	70+ mph
18%	72%	7%	3%

Figure 50: FEMA National Risk Index – Strong Wind Risk Map

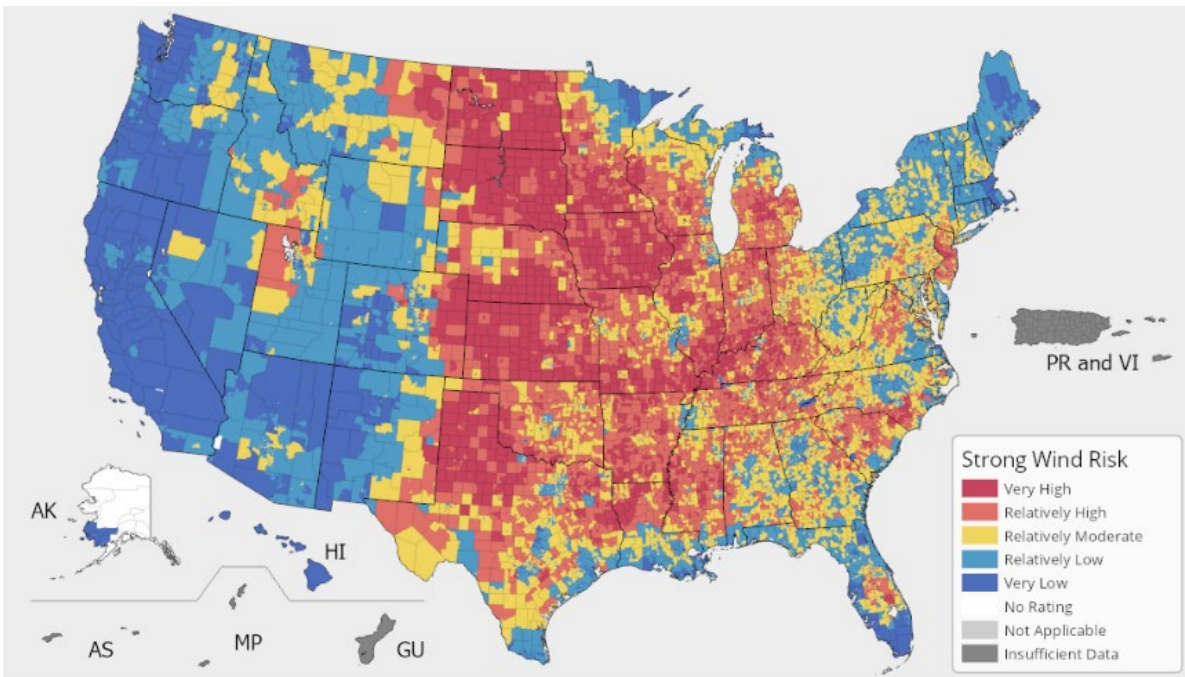
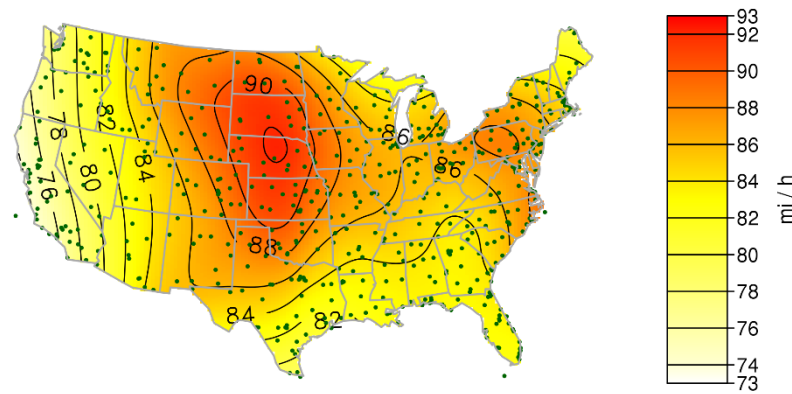


Figure 51: NIST Non-Hurricane, Non-Tornadic Extreme Wind Speeds Map



Description and Damage Extent/Impact:

There are multiple classifications of damaging winds:

- **Straight-Line Wind** – Any thunderstorm wind that is not associated with rotation and is used mainly to differentiate from tornadic winds.
- **Macroburst** – An outward burst of strong winds at or near the surface with horizontal dimensions larger than 2.5 miles and occurs when a strong downdraft reaches the surface. Macroburst winds may begin over a smaller area and then spread over a wider area, sometimes producing damage similar to a tornado.
- **Microburst** – Small, concentrated downburst that produces an outward burst of strong winds at or near the surface. Microbursts are small (less than 2.5 miles across) and short-lived, lasting only five (5) to ten (10) minutes, with maximum windspeeds sometimes exceeding 100 mph.
- **Downburst** – All localized strong wind events that are caused by a strong downdraft within a thunderstorm, while microburst simply refers to an especially small downburst that is less than 2.5 miles across.
- **Gust Front** – The leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm.
- **Derecho** – A widespread, long-lived windstorm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho consists of numerous microbursts, downbursts, and downburst clusters. By definition, if the wind damage swath extends more than 240 miles and includes wind gusts of at least fifty-eight (58) mph+ along most of its length, then the event may be classified as a derecho.

Per the National Weather Service, wind can cause the following damages depending on wind speeds:

Table 69: Wind Speed Damages

Wind Speed	Description of Damage
39-46 mph	Twigs are broken from trees and cars veer on roads.
47-54 mph	Light structural damage occurs.
55-63 mph	Trees are uprooted, and considerable structural damage occurs.
64-75 mph	Widespread structural damage occurs.

There are multiple classifications of thunderstorms:

- **Single-Cell Storms** – Small, brief, weak storms that grow and die within an hour or so and may produce brief heavy rain and lightning. They are typically driven by the heating of the atmosphere on a summer afternoon.

- **Multi-Cell Storms** – Storm where updrafts form along the leading edge of rain-colored air that may produce hail, strong winds, brief tornadoes, and/or flooding. Individual cells usually last thirty (30) - sixty (60) minutes while the system may last for hours.
- **Squall Line** – Group of storms arranged in a line often accompanied by squalls of high winds and heavy rain. Squalls tend to pass quickly and are less prone to produce tornadoes than supercells.
- **Supercell** – Long-duration and highly organized storm feeding off an updraft. Squall lines can be present as much as twenty (20) - sixty (60) minutes before a tornado forms.
- **Mesoscale Convective System (MCS)** – A collection of thunderstorms that act as a system. An MCS can spread across an entire state and last more than twelve (12) hours.
- **Mesoscale Convective Complex** – A large, circular, long-lived cluster of showers and thunderstorms that emerge out of other storm types during late-night and early-morning hours.

Per the National Weather Service, thunderstorms can cause other hazards, such as:

- **Hail** – Form of precipitation consisting of solid ice that forms inside thunderstorm updrafts.
- **Lightning** – A large spark of electricity in the atmosphere between clouds, the air, or the ground.
- **Flash Flooding** – A result of rapid rise of water over low-lying areas which can result from a large thunderstorm.

Table 70: Wind/Severe Storm Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Wind/Severe Storm	County-wide, though localized damage may be more severe in open or unprotected areas	Severe storms may bring straight-line winds exceeding 58 mph, large hail (1 inch or more in diameter), frequent lightning, and potential tornadoes. Wind gusts over 70 mph can result in widespread tree and structural damage.	The extent is dependent on the nature and scale of the wind/severe storm.

Table 71: FEMA National Risk Index (Strong Wind) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively Moderate (70.65)	39165030102
Franklin	Relatively Low (52.93)	39165032501
Lebanon	Relatively Moderate (69.97)	39165031500
Mason	Relatively Moderate (69.50)	39165031908
Springboro	Relatively Moderate (60.36)	39165030504
South Lebanon	Relatively High (87.08)	39165032100
Butler	Relatively Moderate (61.22)	39165032400
Corwin	Relatively Low (42.20)	39165031002
Harveysburg	Relatively Moderate (57.47)	39165031100
Maineville	Relatively Moderate (71.20)	39165032205
Morrow	Relatively Moderate (68.73)	39165032300
Pleasant Plain	Relatively Moderate (61.22)	39165032400
Waynesville	Relatively Moderate (75.65)	39165031001
Clearcreek	Relatively Moderate (71.28)	39165030800
Deerfield	Relatively Moderate (68.17)	39165032008
Franklin	Relatively Moderate (59.65)	39165030600
Hamilton	Relatively Moderate (71.20)	39165032205
Harlan	Relatively Moderate (61.22)	39165032400
Massie	Relatively Moderate (57.47)	39165031100
Salem	Relatively Moderate (68.73)	39165032300
Turtlecreek	Relatively Moderate (80.20)	39165030700
Union	Relatively High (87.08)	39165032100

Table 72 Continued

Jurisdiction	Risk Index (Score)	Census Tract
Washington	Relatively Moderate (57.47)	39165031100
Wayne	Relatively Low (42.20)	39165031002

**Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County*

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability, and Community Resilience.

Causes that May Exacerbate Wind/Severe Storms:

Thunderstorms require three (3) ingredients to form: moisture, unstable air, and a source of lift. After a thunderstorm develops, there is a maturation stage consisting of updrafts and downdrafts. The warm air becomes unstable at this stage which is where severe weather occurs.

El Niño and La Niña patterns can affect the intensity of storms and their effects through their alterations of the jet streams which lift warm, moist air into the atmosphere.

Warnings:

The National Weather Service has the following alerts for winter storms:

Advisory (Be Aware)

- **Wind Advisory** – Indicates that strong wind gusts between forty-six (46) - fifty-seven (57) mph, or sustained winds of thirty-one (31) - thirty-nine (39) mph for an hour+ are occurring. Wind advisories are issued during non-convective weather patterns.

Watch (Be Prepared)

- **High Wind Watch** – Issued when wind gusts of fifty-eight (58) mph or greater are expected, or sustained winds of forty (40) mph or greater for an hour+ are occurring.
- **Severe Thunderstorm Watch** – Issued when severe thunderstorms are possible in and near the watch area. Winds fifty-eight (58) mph or higher and/or hail one (1) inch or larger are possible in a severe thunderstorm.

Warning (Take Action)

- **High Wind Warning** – Issued when sustained winds of forty (40) mph or higher for one (1) hour+, or wind gusts of fifty-eight (58) mph or higher for any duration.
- **Severe Thunderstorm Warning** – Issued when severe thunderstorms are occurring or imminent in or near the warning area. Winds of fifty-eight (58) mph or higher, and/or hail one (1) inch in diameter or larger are possible.
- **Extreme Wind Warning** – Issued for surface winds of 115 mph or greater associated with non-convective downslope, derecho, or sustained hurricane winds are expected to occur within one (1) hour.

4.16. WINTER STORM

Definition:

A winter storm is a combination of heavy snow, blowing snow, and/or dangerous wind chills. Winter storms can be life-threatening.

There are a few types of winter storms:

- **Blizzards** – Dangerous winter storms that are a combination of blowing snow and wind resulting in very low visibilities. While heavy snowfalls and severe cold often accompany blizzards, they are not required. Sometimes strong winds pick up snow that has already fallen, creating a ground blizzard.
- **Ice Storm** – Results in an accumulation of at least .25 inches of ice on exposed surfaces.
- **Snow Squalls** – Brief, intense snow showers accompanied by strong, gusty winds. Usually last for short duration and cause whiteout visibility and rapidly deteriorating road conditions.
- **Freezing Rain** – Occurs when the layer of freezing air is so thin that the raindrops do not have enough time to freeze before reaching the ground. Instead, the water freezes on contact with the surface, creating a coating of ice on whatever the raindrops contact.

Primary Sources of Information:

- National Weather Service - <https://www.weather.gov/safety/winter>
- NOAA Storm Events Database - <https://www.ncdc.noaa.gov/stormevents/>
- National Centers for Environmental Information - <https://www.ncei.noaa.gov/access/monitoring/>

Historical Occurrences in Warren County:

There have been numerous occurrences of winter storms in Warren County, including one (1) Federal Disaster Declaration. The following chart includes other significant winter storm events between 2009 and 2024 for Warren County.

Table 72: History of Recorded Winter Storm Events in Warren County

Date	Event Type	Event Narrative
2/16/2024	Winter Storm	A report from Waynesville indicated that 5.4 inches of snow had fallen. Another from Carlisle had 4 inches. Three inches of snow was reported from Lebanon, Mason, and Loveland.
1/22/2023	Winter Storm	In Mason, 6.3 inches of snow was measured. Six inches was measured 4 miles south-southwest of Mason by a spotter and 2 miles south-southeast of Genntown from a public report.
12/22/2022	Winter Storm	A combination of snow, blowing snow, and bitter wind chills created dangerous conditions for persons traveling and those without sufficient shelter.
2/2/2022	Winter Storm	A report from Springboro had 5.3 inches of snow, while a NWS employee northeast of Maineville had a snow and sleet mix accumulate to 4.3 inches. A public report from Carlisle indicated 0.2 inches of ice accumulation due to freezing rain.
2/15/2021	Winter Storm	The observer in Kings Mills measured 5.6 inches of snow.
2/8/2021	Winter Storm	A spotter in Waynesville reported 8.5 to 9 inches of snow. Other reports across the county were generally in the 6-to-7-inch range.
1/19/2019	Winter Storm	A NWS employee near Maineville reported 3.7 inches of snow. Most reports around the county were around 3 inches, due to being cut down by periods of freezing rain and some sleet.
1/12/2019	Winter Storm	A report from Carlisle showed that 8 inches of snow fell, as did a social media post in South Lebanon. A NWS employee west of Clarksville and two social media posts from Waynesville and Maineville all came in with 7.8 inches of accumulation.

Table 72 Continued

Date	Event Type	Event Narrative
11/16/2014	Winter Storm	The county garage southwest of the Lebanon airport measured 4.5 inches of snow, as did a public report out of Landen. The cooperative observer in Kings Mills measured 4.2 inches of snow.
3/2/2014	Winter Storm	The observer at Kings mills, along with the highway department in Lebanon and NWS employees in Genntown and Mason all measured 3.5 inches of snow. Combined with icy accumulations, numerous car wrecks were reported and travel across the region was severely impacted.
2/14/2014	Winter Storm	Employees located west of Clarksville and south of Genntown both measured 4.5 inches of snow. Another employee in Lebanon and the cooperative observer in Kings Mills measured 4.1 inches of snow.
2/4/2014	Winter Storm	The county garage in Lebanon measured 5 inches of snow. Numerous reports between 3.5 and 4.5 inches came in across the county.
1/2/2014	Winter Storm	Five and a half inches fell in Mason, with 4.5 inches falling in Lebanon. In Maineville, 4.3 inches fell, and 3.5 inches was reported in Pleasant Plain.
12/6/2013	Winter Storm	Snow across the county was generally 5 to 6 inches deep according to numerous reports. A spotter in Harveysburg measured 7 inches of snow.
3/24/2013	Winter Storm	An employee 1 mile west-northwest of Lytle measured 4 inches of snow.
3/5/2013	Winter Storm	A news report out of Franklin showed 8.5 inches of snow. Eight inches was measured in Springboro, while 7.5 inches fell near Lebanon and near Genntown.
12/28/2012	Winter Storm	A spotter in Mason measured 4 inches of snow. Northwest portions of the county were generally 2-3 inches while the southeast had 3-4 inches.
12/26/2012	Winter Storm	A spotter east of Lebanon measured 4 inches of snow and had a half inch of sleet mixed in. Snow depths across the county ranged greatly, with around two inches of accumulation found in the far southeast.
1/20/2012	Winter Storm	An employee northwest of Clarksville reported .15 ice accrual with .6 snow on top. An employee in Maineville measured a tenth of an inch of ice and a half inch of snow. Another employee southeast of Lebanon measured a tenth of an inch of ice and .4 snowfall.
2/1/2011	Ice Storm	A half inch of ice was measured 3 miles south of Springboro. In and around Lebanon, NWS employees measured a quarter and three tenths of an inch of ice.
1/20/2011	Heavy Snow	An employee in Maineville measured 5.5 inches of snowfall. Five inches fell at the ODOT garage in Lebanon, while spotters in Lebanon and Mason measured 4.5 and 4.4 inches of snow, respectively.
1/11/2011	Heavy Snow	An employee located 2 west of Clarksville measured 6.1 inches of snowfall. Law enforcement in Lebanon measured 5 inches. A spotter located 2 miles east northeast of Springboro measured 3.5 inches of snowfall.
12/16/2010	Winter Storm	Two miles south of Lebanon, ODOT measured 5.5 inches of snowfall. A NWS employee east of Lebanon measured 5 inches, while another west of Clarksville measured 4.7 inches. A spotter in Maineville measured 3.8 inches.
2/15/2010	Heavy Snow	The county garage in Lebanon measured 8 inches of snowfall. A spotter measured 5.8 inches in Landen.
2/9/2010	Heavy Snow	The county garage in Lebanon measured 7.5 inches of snow. A NWS employee in Maineville measured 7 inches, and 6.4 inches fell in Kings Mills.
2/5/2010	Heavy Snow	Snow ranged from 3.8 inches in the south at Landen and Kings Mills, to 4 inches in Mason, up to 6 inches at the county garage in Lebanon and 8.5 inches to the north in Springboro.
2/3/2009	Heavy Snow	Seven and a half inches of snow fell in Mason, while only an inch and a half was measured in Lebanon.
1/27/2009	Heavy Snow	Mason measured 9.6 inches of snow. Icing accumulations across the county ranged from .4 to .8 inches.

*Additional data can be found at:

<https://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=39%2COHIO#>

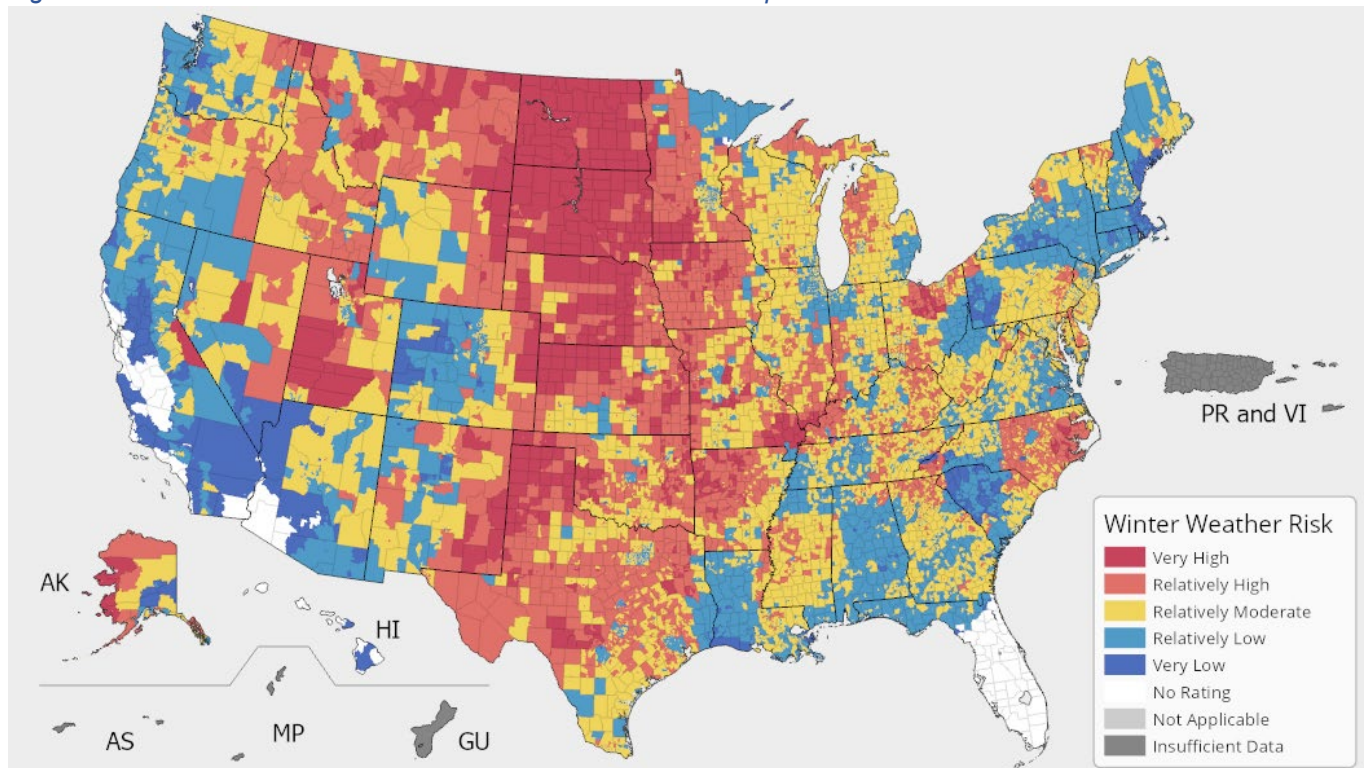
Probability of Occurrence:

The National Weather Service tracks winter storms events on their Storm Events Database. Per their records, there have been thirty-four (34) winter storms events over the last fifteen (15) years (2009-2024) in Warren County.

[current year (2024)] subtracted by [historical year where tracking began (2009)] = 15 Years on Record
[number of historical events (15)] divided by [Years on Record (34)] = 0.44

It can be reasonably assumed that this type of event has a 44% chance of occurring each year.

Figure 52: FEMA National Risk Index – Winter Weather Risk Map



Description and Damage Extent/Impact:

Winter Storms can affect roadways, utilities, business activities, and can cause loss of life, frostbite, and freezing conditions. Winter storms can also cause loss of power, impassible roads, and employee unavailability which could affect operations of critical facilities.

While cold temperatures and power losses can render a structure uninhabitable for a time, they are unlikely to cause structural damages. Snow and ice accumulation, however, can impact structures and infrastructure. Older structures, specifically those constructed before 1970, are more susceptible to the impacts from winter weather due to older construction and insulation methods.

Cascading effects from winter storms could also include flooding (following significant snow melts) and ice jams (that occur when a rapid melt follows an ice event).

Table 73: Winter Storm Hazard Extent

Hazard Type	Affected Jurisdictions	Extent	Comments
Winter Storm	County-wide, impacts may be more heavily felt in more rural jurisdictions	Severe winter storms can result in significant snow and ice accumulation, with ice thickness reaching over 0.25 inches and snow accumulation exceeding 6 inches in a 24-hour period. Wind chills may drop below -15°F.	The extent is dependent on the nature and scale of the winter storm.

Table 74: FEMA National Risk Index (Winter Weather) – Based on Census Tract

Jurisdiction	Risk Index (Score)	Census Tract
Carlisle	Relatively High (88.23)	39165030102
Franklin	Relatively Moderate (79.74)	39165032501
Lebanon	Relatively High (88.90)	39165031500
Mason	Relatively Moderate (85.21)	39165031908
Springboro	Relatively Moderate (79.53)	39165030504
South Lebanon	Relatively High (94.27)	39165032100
Butler	Relatively Moderate (80.89)	39165032400
Corwin	Relatively Moderate (65.23)	39165031002
Harveysburg	Relatively Moderate (75.32)	39165031100
Maineville	Relatively High (90.07)	39165032205
Morrow	Relatively High (87.24)	39165032300
Pleasant Plain	Relatively Moderate (80.89)	39165032400
Waynesville	Relatively High (90.13)	39165031001
Clearcreek	Relatively High (86.31)	39165030800
Deerfield	Relatively Moderate (78.61)	39165032008
Franklin	Relatively Moderate (76.63)	39165030600
Hamilton	Relatively High (90.07)	39165032205
Harlan	Relatively Moderate (80.89)	39165032400
Massie	Relatively Moderate (75.32)	39165031100
Salem	Relatively High (87.24)	39165032300
Turtlecreek	Relatively High (91.38)	39165030700
Union	Relatively High (94.27)	39165032100
Washington	Relatively Moderate (75.32)	39165031100
Wayne	Relatively Moderate (65.23)	39165031002

*Partial jurisdictions (Middletown, Monroe, & Loveland) not captured in Census Tract for Warren County

The FEMA National Risk Index for each natural hazard is calculated using an equation that combines scores for Expected Annual Loss, Social Vulnerability, and Community Resilience.

Causes that May Exacerbate Winter Storm Conditions:

El Niño and La Niña are weather patterns that occur every few years. The water temperatures associated with these weather patterns can push warmer or colder air through the jet streams toward different parts of the country. This can affect winter conditions in the Ohio Valley. Because of its geographic location, Warren County can be susceptible to warmer, drier conditions in El Niño years, and wetter, warmer winters in La Niña patterns.

Warnings:

The National Weather Service has the following alerts for winter storms:

Advisory (Be Aware)

- **Winter Weather Advisory** – Issued when snow, blowing snow, ice, sleet, or a combination of these wintry elements is expected but conditions should not be hazardous enough to meet warning criteria.
- **Cold Weather Advisory** – Issued when seasonably cold air temperatures or wind chill values, but not extremely cold values, are expected or occurring.

Watch (Be Prepared)

- **Winter Storm Watch** – Issued when conditions are favorable for a significant winter storm event (heavy sleet, heavy snow, ice storm and blowing snow or a combination of events.)

Warning (Take Action)

- **Winter Storm Warning** – Issued for a significant winter weather event including snow, ice, sleet or blowing snow or a combination of these hazards. Travel will become difficult or impossible in some situations.
- **Ice Storm Warning** – Issued for ice accumulation of around 1/4 inch or more. This amount of ice accumulation will make travel dangerous or impossible and likely lead to snapped power lines and falling tree branches. Travel is strongly discouraged.
- **Blizzard Warning** – Issued when there is a potential for falling and/or blowing snow with strong winds and extremely poor visibilities. This can lead to whiteout conditions and make travel very dangerous.

5. MITIGATION STRATEGY

The purpose of the mitigation strategy is to provide Warren County and its municipalities with the goals that will serve as the guiding principles for future mitigation policy and project administration, along with a list of proposed actions to meet those goals and reduce the impact of natural and man-made hazards. In this section, mitigation goals and objectives were assigned, and mitigation actions/projects were updated/amended, identified, evaluated, and prioritized.

5.1. MITIGATION GOALS AND OBJECTIVES

Through the planning process, Warren County jurisdictions and stakeholders determined the county is prone to sixteen (16) hazards. After reviewing and prioritizing those hazards, the planning team identified goals representing Warren County's long-term mission to achieve successful mitigation efforts, and reduce the overall risk to life, property, and the environment from the impacts of the aforementioned hazards. The associated objectives are specific to this mitigation plan and contain strategies and steps to assist communities attain the goals that are listed in this plan.

Table 75: 2025 Mitigation Goals & Objectives

Goal 1: Promote Public Awareness of Hazard Risks and Available Mitigation Options	
Obj. 1	Improve public outreach and access to hazard information, data, and maps to enhance understanding of natural hazards and the risks they pose.
Obj. 2	Improve public knowledge of natural and man-made hazards and protective measures so individuals appropriately prepare for and respond to such hazards.
Goal 2: Avoid/reduce the potential for life loss, injury and health issues to Warren County residents from hazard events.	
Obj. 1	Identify and reduce the health and safety impacts of hazards on vulnerable populations.
Obj. 2	Promote enforcement of state and local building codes and support other structural interventions to reduce vulnerability.
Obj. 3	Improve/promote systems that provide early warning communications during and prior to an emergency.
Obj. 4	Adopt and enforce public policies to promote resilient development and enhance safe construction in high hazard areas.
Obj. 5	Increase ability to shelter population before and after disaster events
Obj. 6	Incorporate effective mitigation strategies into capital improvement projects.
Goal 3: Protect all forms of infrastructure including transportation, utilities, and waterways from being compromised by hazard events.	
Obj. 1	Implement mitigation programs that protect and sustain the reliability of lifelines systems to minimize impacts from hazards and expedite recovery in an emergency.
Obj. 2	Improve/create redundancies for critical networks such as water, transportation, energy, sewer, digital, data and power, and communications.
Obj. 3	Promote greater collaboration and communication between infrastructure partners regarding known or possible issues that could affect Warren County infrastructure.
Goal 4: Encourage mitigation activities to increase the disaster resilience of institutions, private companies, and systems essential to the functions of Warren County.	
Obj. 1	Encourage Continuity of Operations planning to assist Warren County jurisdictions, businesses, and private companies sustain operations and recover more quickly following hazard events.
Obj. 2	Form partnerships to leverage and share resources prior to and following hazard events. c. Improve understanding of available funding sources for mitigation efforts.
Obj. 3	Improve understanding of available funding sources for mitigation efforts
Obj. 4	Partner with private sector to promote structural and non-structural hazard mitigation as a part of standard business practices.
Goal 5: Increase the ability of local government to serve the community during and after hazard events.	
Obj. 1	Increase knowledge for jurisdictional leaders and departments relative to disaster planning and mitigation activities.
Obj. 2	Consider the impacts of hazards on future land use decisions in jurisdictions by coordinating with other planning mechanisms.

5.2. CAPABILITY ASSESSMENT

The mitigation strategy includes a capability assessment of Warren County to identify current activities used to mitigate hazards. The capability assessment identifies the policies, regulations, procedures, programs, and projects that contribute to the reduction of damages from a hazardous event.

To gather this information, each jurisdiction within Warren County was provided with an opportunity to complete the Capability Assessment Survey. The survey was provided digitally via email and Google Forms, as well as hard copies at Planning Meeting #1 and/or at individual jurisdictional meetings. Tables forty-nine (49) - fifty-two (52) captures each jurisdiction's current resources, plans and mitigation capabilities that were identified during the plan's development.

PLANNING ASSESSMENT

The table below summarizes each jurisdiction's planning capabilities. These are plans that jurisdictions have in place that can help further mitigation.

Table 76: Planning Assessment Responses

	Master Plan	Capital Improvement Plan	Economic Development Plan	Local EOP	COOP	Transportation Plan	Stormwater Mgmt. Plan
Carlisle	-	-	-	-	-	-	-
Franklin	Yes	Yes	Yes	Yes	Yes	No	Yes
Lebanon	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Loveland	-	-	-	-	-	-	-
Mason	Yes	Yes	Yes	-	No	Yes	Yes
Middletown	-	-	-	-	-	-	-
Monroe	-	-	-	-	-	-	-
Springboro	Yes	Yes	Yes	Yes	Yes	No	Yes
South Lebanon	Yes	Yes	No	No	No	Yes	Yes
Butler	-	-	-	-	-	-	-
Corwin	No	Yes	No	No	No	No	Yes
Harveysburg	-	-	-	-	-	-	-
Maineville	-	-	-	-	-	-	-
Morrow	Yes	Yes	Yes	Yes	Yes	No	Yes
Pleasant Plain	No	No	No	No	No	No	No
Waynesville	Yes	Yes	No	Yes	Yes	No	Yes
Clearcreek Twp	-	-	-	-	-	-	-
Deerfield Twp	Yes	Yes	Yes	-	-	-	Yes
Franklin Twp	No	No	No	No	No	No	No
Hamilton Twp	Yes	No	Yes	No	No	No	Yes
Harlan Twp	-	-	-	-	-	-	-
Massie Twp	-	-	-	-	-	-	-
Salem Twp	-	-	-	-	-	-	-
Turtlecreek Twp	-	-	-	-	-	-	-
Union Twp	-	-	-	-	-	-	-
Washington Twp	-	-	-	-	-	-	-
Wayne Twp	Yes	Yes	No	No	No	Yes	-

“ - ” indicates no response (did not assess/provide an answer)

ORDINANCE ASSESSMENT

The table below summarizes each jurisdiction's regulatory capabilities. These are policies and ordinances that jurisdictions have in place that can help further mitigation.

Table 77: Ordinance Assessment Responses

	Zoning Ordinance	Subdivision Ordinance	Floodplain Ordinance	Natural Hazard Specific Ordinance	Flood Insurance Rate Maps	Acquisition of Land for Open Space
Carlisle	-	-	-	-	-	-
Franklin	Yes	Yes	Yes	Yes	Yes	Yes
Lebanon	Yes	Yes	Yes	Yes	Yes	Yes
Loveland	Yes	Yes	Yes	Yes	Yes	Yes
Mason	Yes	Yes	Yes	No	Yes	Yes
Middletown	-	-	-	-	-	-
Monroe	-	-	-	-	-	-
Springboro	Yes	Yes	Yes	Yes	Yes	Yes
South Lebanon	Yes	Yes	Yes	No	Yes	No
Butlerville	-	-	-	-	-	-
Corwin	Yes	Yes	No	Yes	Yes	Yes
Harveysburg	Yes	-	-	-	-	-
Maineville	-	-	-	-	-	-
Morrow	Yes	Yes	Yes	Yes	Yes	-
Pleasant Plain	No	No	No	No	No	No
Waynesville	Yes	Yes	Yes	Yes	Yes	Yes
Clearcreek Twp	-	-	-	-	-	-
Deerfield Twp	Yes	Yes	-	-	-	Yes
Franklin Twp	Yes	Yes	Yes	No	No	No
Hamilton Twp	Yes	Yes	Yes	No	Yes	Yes
Harlan Twp	-	-	-	-	-	-
Massie Twp	-	-	-	-	-	-
Salem Twp	-	-	-	-	-	-
Turtlecreek Twp	-	-	-	-	-	-
Union Twp	-	-	-	-	-	-
Washington Twp	-	-	-	-	-	-
Wayne Twp	Yes	Yes	Yes	No	No	No

“ - ” indicates no response (did not assess/provide an answer)

FINANCIAL ASSESSMENT

This section identified the financial tools or resources that each jurisdiction could potentially use to help fund mitigation activities. Responses that included “have access/eligible for”, “funding used in the past”, or “could utilize funding source” are marked with an “X” in the table below.

Table 78: Financial Assessment Responses

	Capital Improvement	Authority to Levy Taxes	Utilities Fees	New Development Impact Fees	Stormwater Utility Fee	General Obligation or Tax Bonds	Private Funding	Community Development Block Grant	Other Federal Funding
Carlisle	-	-	-	-	-	-	-	-	-
Franklin	X	X	X	X	X	X	X	X	X
Lebanon	X	X	X	X	X	X	X	X	X
Loveland	X	X	X	X	X	X	X	X	X
Mason	X	X	X	X	X	X	X	X	X
Middletown	-	-	-	-	-	-	-	-	-
Monroe	-	-	-	-	-	-	-	-	-
Springboro	X	X	X	X	X	X	-	-	X
South Lebanon	X	-	X	-	X	X	-	X	X
Butlerville	-	-	-	-	-	-	-	-	-
Corwin	X	X	-	-	-	-	-	X	-
Harveysburg	-	X	-	-	-	X	-	X	-
Maineville	-	-	-	-	-	-	-	-	-
Morrow	X	X	X	X	-	-	-	X	X
Pleasant Plain	-	-	X	-	X	-	-	X	X
Waynesville	X	X	X	X	X	X	X	X	-
Clearcreek Twp	-	-	-	-	-	-	-	-	-
Deerfield Twp	X	X	X	-	-	-	-	-	-
Franklin Twp	X	X	-	-	-	X	X	X	X
Hamilton Twp	X	X	-	X	-	X	X	X	X
Harlan Twp	-	-	-	-	-	-	-	-	-
Massie Twp	-	-	-	-	-	-	-	-	-
Salem Twp	-	-	-	-	-	-	-	-	-
Turtlecreek Twp	-	-	-	-	-	-	-	-	-
Union Twp	-	-	-	-	-	-	-	-	-
Washington Twp	-	-	-	-	-	-	-	-	-
Wayne Twp	-	-	-	-	-	-	-	X	-

“ - ” indicates no response (did not assess/provide an answer)

ADMINISTRATIVE AND TECHNICAL ASSESSMENT

This section summarizes each jurisdiction's administrative and technical capabilities that can be utilized for mitigation planning, and the implementation of mitigation actions.

Table 79: Administrative and Technical Assessment Responses

	Planning Commission	Mitigation Planning Committee	Maintenance Programs	Mutual Aid Agreements
Carlisle	-	-	-	-
Franklin	Yes	-	Yes	Yes
Lebanon	Yes	No	Yes	Yes
Loveland	Yes	Yes	Yes	Yes
Mason	Yes	No	Yes	Yes
Middletown	-	-	-	-
Monroe	-	-	-	-
Springboro	Yes	-	Yes	Yes
South Lebanon	Yes	No	Yes	Yes
Butler	-	-	-	-
Corwin	No	No	Yes	Yes
Harveysburg	Yes	-	-	Yes
Maineville	-	-	-	-
Morrow	Yes	-	Yes	Yes
Pleasant Plain	Yes	Yes	Yes	-
Waynesville	Yes	No	Yes	Yes
Clearcreek Twp	-	-	-	-
Deerfield Twp	Yes	-	Yes	Yes
Franklin Twp	Yes	Yes	-	Yes
Hamilton Twp	No	No	Yes	Yes
Harlan Twp	-	-	-	-
Massie Twp	-	-	-	-
Salem Twp	-	-	-	-
Turtlecreek Twp	-	-	-	-
Union Twp	-	-	-	-
Washington Twp	-	-	-	-
Wayne Twp	Yes	No	Yes	Yes

“ - ” indicates no response (did not assess/provide an answer)

In addition to capturing the current capabilities, participants were also asked how capabilities could be improved to aid in mitigation. A summary of the responses is below:

Jurisdictions have identified the need for additional funding sources/grants, training opportunities, and expanding plans to improve mitigation efforts. This includes needing funding for infrastructure resiliency improvements, like adding generators to city buildings and addressing erosion/landslides around transportation routes. Additionally, incorporating more trainings and exercises in an effort to have more people involved and trained, as well as placing a focus on current best practices, and updated information on local hazards. Jurisdictions also mentioned increasing planning efforts through further developing interoperability plans with inter-county agencies as well as surrounding counties, and developing special ad hoc committees with a focus on key mitigation projects.

5.3. MITIGATION STRATEGIES, ACTIONS, PROJECTS AND PRIORITIZATION

The mitigation goals and objectives listed in section 5.1 as well as the hazards assessed, influenced the development of actions the county and participating jurisdictions can take to mitigate the impacts of the identified hazards and their effects. Plan participants assessed over 100 hazard mitigation strategies and actions/projects compiled from FEMA documents, neighboring county mitigation plans, the 2020 Warren County Hazard Mitigation Plan, and suggestions from participating communities and stakeholders during Planning Meeting #2. The final list of these mitigation strategies can be found in Appendix 2. Participating jurisdictions and departments selected mitigation projects from this list; these results are included in this section of the plan.

MITIGATION PROJECT PRIORITIZATION STRATEGY

During Planning Meeting #2, on April 17th, 2025, a mitigation strategy workshop was conducted. During this workshop, jurisdictions reviewed the mitigation strategy goals and objectives and chose the mitigation projects, from the compiled list depicted in Appendix, that would reduce risks to the hazards identified. This included reviewing ongoing projects from the 2020 Plan as well. For any jurisdiction not in attendance, selection of mitigation projects was completed at individual jurisdictional meetings.

For each project a jurisdiction selected, they were asked to evaluate and rank each one (1). Each project was ranked on the percentage of the population benefited, cost of the project, cost benefit of the initiative, feasibility of implementation, environmental impact, probability of community acceptance, and the time to complete the project.

To determine jurisdictional priority for each project, the rankings were added together, and the sum was multiplied by the corresponding hazard priority number (see paragraph below). The total combined score per project was divided by 100 to determine its priority score per jurisdiction. An example of the mitigation project ranking sheet with scoring is included in Figure 53. The selected mitigation projects by jurisdictional priority are depicted in Table 82. The same process was done for any county departments or organizations participating, those projects by departmental priority are depicted in Table 83.

The hazard priority number came from the 2025 Hazard Rankings: the top hazard was given a priority score of sixteen (16) since there were sixteen (16) hazards, and the lowest ranked hazard was given a priority score of one (1). For any projects that addressed “all” or “multiple” (three (3) or more) hazards, a priority score of seventeen (17) was given. If a project addressed two hazards, the priority score came from the higher ranked hazard.

Figure 53: Example Hazard Mitigation Project Scoring/Priority Sheet

WARREN COUNTY MITIGATION PROJECT RANKING SHEET

Jurisdiction: _____

REFERENCE SHEET

Project#	Project	Project Assigned To (List Name & Position)	New (N) in 2025 or Continuous (C) from 2020	Percentage of Population Benefited	Cost of Initiative	Cost/Benefit of Initiative	Feasibility of Implementation	Environmental Impact	Probability of Community Acceptance	Time to Complete Projects	Interest	
				1=0% to 25% 2=26% to 50% 3=51% to 75% 4=76% to 100%	1=Additional Funding Sources Needed (Grants) 2= Funding is Possible via Re-allocation or Over Multiple Years 3= Project Could be Funded with Existing Budget	1= Project Impact May Have Long-Term Benefits (Difficult to Quantify) 2= Project Impact will be Visible Over a Long-Term Period 3= Project Impact will be Immediate	1= Very Difficult to Implement 2= Somewhat Difficult to Implement 3= Relatively Easy to Implement 4= No Difficulty Anticipated to Implement	1= Major Changes Affect Environment 2= Minor Changes Affect Environment 3= Changes Only Affect Specific Terrain or Territories 4= No Environmental Impact	1= Likelihood Community will be For the Project. (Note: Projects May Require Surveying Community, Analyzing Demographics, and/or Deferring Project based on Specific Area)	1= Estimated Time to Complete a Project (Include time needed to receive funding through project completion)	1= Interest in Moving Forward with Project	
				Enter N for a new project or C if the project is continuous from the 2020 update. For tracking purposes.	Enter percentage of how many people in your jurisdiction will benefit by this mitigation project.	Estimate how the project will be funded.	Rate how this project will benefit the community/organization. Will it have short term benefits for a few months or long term, on-going benefits?	Enter how easy would this project be to implement. Will it take a lot of staff, money, time, need engineering studies, permits, etc.?	Rate how the physical environment will be impacted by this project. Will there be significant land disturbances, emit pollution, change to landscape, etc.?	Enter the percentage of how likely the overall community will accept the project.	Enter the length of time it will take to implement the project.	Enter how likely your jurisdiction will move forward with this project. Is it project that sounds good but isn't feasible, or is it something that could most likely be implemented?
Instructions				Enter the project number from the list.	Enter the chosen project for easy reference.	Identify who will be responsible for ensuring the projects completion.						
Example				47	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Sydney Renner EMA Operations Manager	N	4	1	2	3	4

UPDATES ON PREVIOUS PROJECTS

Prior to identifying projects for the 2025 plan, participants were asked, via email and at in-person meetings, to indicate the status of mitigation actions included in the previous plan, listing whether each project was complete, deleted, deferred, or ongoing. Those that were listed as ongoing or deferred were given an explanation of whether they should be included in the current plan update. The status update of the mitigation projects from the 2020 Plan are depicted in Table 80 and 81.

In addition to the mitigation strategies listed in the 2020 Plan, the following activities were completed to support mitigation in the Warren County. Note: this list is not an exhaustive list as other projects may have been completed but not reported to be included in this plan.

Jurisdictional Mitigation Projects

- Franklin Township installed a new outdoor warning siren.
- City of Carlisle/JEMS, Lebanon and Clearcreek Township have built new fire departments.
- Clearcreek Township has built a new police station.
- City of Carlisle built a new K-12 school building, and the City of Franklin built a new high school.

County Mitigation Projects

- Warren County Sheriff's Office built a new jail.
- Warren County EMA acquired a virtual EOC platform (D4H) and damage assessment tool (ArcGIS) to make operations more effective.
- Warren County EMA developed and entered into memorandums of understanding (MOUs) with ASPCA and Team Rubicon to provide aid with disaster response efforts.

- Little Miami School District and Mason City Schools performed multiple reunification and active assailant exercises with fire and police.
- City of Lebanon secured authorization to use IPAWS for emergency notifications to the public.
- City of Mason and Kings Island Amusement Park performed a Mass Causality Incident exercise.
- Wayne Township Fire, Massie Township Fire, ODNR and Warren County EMA participated in an exercise focused on response to a Caesar Creek dam breach.
- The Warren County LEPC conducted site visits at Tier II facilities.
- Facilitated exercises for multiple school districts with a focus on reunification.
- Warren County school districts have conducted quarterly fire drills in conjunction with local fire authorities and annual emergency drills.
- The Warren County Engineer's Department continued maintenance and improvements on county roadways and bridges.
- Warren County government departments have implemented and strengthen cybersecurity efforts.

Table 80: Updates on the 2020 Mitigation Projects

Hazard Applied To	Action	Status	Comments
City of Carlisle			
All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	Ongoing	Incorporated into 2025 projects.
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects.
All	Encourage on-going education for seasoned and newly-elected officials to familiarize them with the disaster cycle of prevention, preparedness, mitigation, response and recovery.	Ongoing	Incorporated into 2025 projects. New project number (10).
Multiple	Build/establish shelters with generators that can serve displaced citizens.	Ongoing	Incorporated into 2025 projects. New project number (25).
Multiple	Support and increase participation in the SkyWarn Program (NWS Weather Spotters).	Ongoing	Incorporated into 2025 projects. New project number (27).
HazMat	Create public education campaign about illicit discharge and how to report spills.	Ongoing	Incorporated into 2025 projects. New project number (43).
HazMat	Conduct jurisdictional fire inspections of facilities that contain hazardous materials.	Ongoing	Incorporated into 2025 projects. New project number (45).
HazMat	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Ongoing	Incorporated into 2025 projects. New project number (47).
Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Ongoing	Incorporated into 2025 projects. New project number (53).
Dam Failure, Flood	Relocate structures or systems in flood prone or hazard areas - especially those properties identified as historically or culturally significant to the community.	Ongoing	Incorporated into 2025 projects. New project number (55).
Dam Failure, Flood	Conduct regular maintenance for flood control structures such as dams/levees.	Ongoing	Incorporated into 2025 projects. New project number (61).

Table 80 Continued

Hazard Applied To	Action	Status	Comments
City of Carlisle Continued			
Dam Failure, Flood	Conduct analysis and flood studies to identify risks, evaluate removal of existing structures in flood zone, and/or identify other potential solutions to mitigate flooding.	Ongoing	Incorporated into 2025 projects. New project number (63).
Man-Made	Install physical protective measures for critical infrastructures. (i.e. fences, lighting, bollards, etc.)	Ongoing	Incorporated into 2025 projects. New project number (65).
Winter Storm	Enhance existing snow removal equipment and supplies.	Ongoing	Incorporated into 2025 projects. New project number (71).
Winter Storm	Install or plant snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.	Ongoing	Incorporated into 2025 projects. New project number (75).
Infectious Diseases	Promote seasonal influenza vaccination and facilitate on-campus vaccination clinics.	Ongoing	Incorporated into 2025 projects. New project number (81).
Earthquake	Safeguard and harden critical infrastructure systems to meet seismic design standards for "lifelines".	Ongoing	Incorporated into 2025 projects. New project number (86).
Earthquake	Conduct a public building seismic study to determine which buildings are more at risk for damages from an earthquake.	Ongoing	Incorporated into 2025 projects. New project number (87).
Extreme Temperatures	Establish and implement water conservation programs.	Ongoing	Incorporated into 2025 projects. New project number (89).
Landslide	Establish natural means (such as tree planting and conservation) that protects steep slopes from landslides.	Ongoing	Incorporated into 2025 projects. New project number (92).
Invasive Species	Develop jurisdictional educational programs for public works to better identify and report possible invasive species.	Ongoing	Incorporated into 2025 projects. New project number (96).
Invasive Species	Remove infected vegetation or organisms to eradicate invasive species.	Ongoing	Incorporated into 2025 projects. New project number (97).
Wildfire	Clear fuel loads created by downed trees and dry brush.	Ongoing	Incorporated into 2025 projects. New project number (99).
City of Franklin			
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. New project number (3).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (9).
Multiple	Educate the public on what "shelter-in-place" means and how this action is performed.	Ongoing	Incorporated into 2025 projects. New project number (21).
Man-Made, Terrorism	Install physical protective measures for critical infrastructures. (i.e. fences, lighting, bollards, etc.)	Ongoing	Incorporated into 2025 projects. New project number (65).

Table 80 Continued

Hazard Applied To	Action	Status	Comments
City of Lebanon			
All	Increase the use of social media to warn residents and visitors of extreme weather and man-made events.	Ongoing	Incorporated into 2025 projects. (2).
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. (3).
All	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	Ongoing	Incorporated into 2025 projects. New project number (5).
Multiple	Educate the public on what “shelter in place” means and how this action is performed.	Ongoing	Incorporated into 2025 projects. New project number (21).
HazMat, Utility Failure	Require public permitting process to include calling 811 and providing a copy of their dig ticket.	Ongoing	Incorporated into 2025 projects. New project number (35).
Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Ongoing	Incorporated into 2025 projects. New project number (57).
Dam Failure, Flood	Install and support additional river gauges, especially in communities with repetitive flood events or repetitive (flood) loss structures.	Ongoing	Incorporated into 2025 projects. New project number (58).
HazMat, Utility Failure	Require public permitting process to include calling 811 and providing a copy of their dig ticket.	Ongoing	Incorporated into 2025 projects. New project number (35).
City of Mason			
All	Identify and install hazard notification systems (consider device-neutral systems as well as conventional notification systems)	Completed	
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Generators installed and regularly maintained. Incorporated into 2025 projects. Project number (3).
All	Protect propane tanks or other external fuel sources.	Completed	
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Regularly assessed by the Service Director. Incorporated into 2025 projects. New project number (9).
Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Completed	Plan completed and managed by public works.
Severe Storm, Tornado	Install safe rooms to shelter the population during tornado events.	Completed	Safe rooms installed where available and building EOPs updated to include tornado safety procedures.
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Ongoing	Incorporated into 2025 projects. New project number (33).

Table 80 Continued

Hazard Applied To	Action	Status	Comments
City of Mason Continued			
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
Winter Storm	Develop a resource manual that can be used to inventory emergency resources that can be deployed to aid in the event of a severe winter storm.	Completed	Completed and last updated in 2020.
City of Monroe			
All	Increase the use of social media to warn residents and visitors of extreme weather and man-made events.	Ongoing	Incorporated into 2025 projects. Project number (2).
All	Procure generators and transfer switches for critical facilities such as admin and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. Project number (3).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (9).
Multiple	Educate the public on what "shelter in place" means and how this action is performed.	Ongoing	Incorporated into 2025 projects. New project number (21).
Multiple	Build/establish shelters with generators that can serve displaced citizens. Include how animals (domestic and rural) will be addressed in sheltering.	Ongoing	Incorporated into 2025 projects. New project number (25).
Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Ongoing	Incorporated into 2025 projects. New project number (26).
Severe Storm, Tornado	Adopt and enforce building codes for residential and commercial construction that prevents wind damage.	Deleted	
HazMat, Utility Failure	Promote use of 811 to residents and businesses that sell products that require digging.	Ongoing	Incorporated into 2025 projects. New project number (36).
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
Dam Failure, Flood	Conduct engineering/impact studies for flood mitigation.	Deferred	Waiting on funds.
Man-Made	Develop a training and education program for active aggressor incidents in facilities.	Deleted	
Winter Storm	Enhance existing snow removal equipment and supplies.	Deleted	
City of Springboro			
All	Protect propane tanks or other external fuel sources.	Completed	
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Completed	

Table 80 Continued

Hazard Applied To	Action	Status	Comments
City of Springboro Continued			
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Completed	
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
Village of Butlerville			
All	Procure generators and transfer switches for critical facilities such as admin and public safety buildings, schools, etc.	No Update Provided	
All	Protect propane tanks or other external fuel sources.	No Update Provided	
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	No Update Provided	
Severe Storm, Tornado	Install safe rooms to shelter the population during tornado events.	No Update Provided	
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	No Update Provided	
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	No Update Provided	
Flood	Adopt or amend zoning ordinance for better floodplain regulations.	No Update Provided	
Winter Storm	Evaluate and retrofit older buildings, especially large span buildings that may have inadequate snow load tolerances.	No Update Provided	
Village of Harveysburg			
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Deleted	
Severe Storm, Tornado	Install safe rooms to shelter the population during tornado events.	Deleted	
Village of Morrow			
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects; grade changes and installing new catch basins. New project number (9).
Severe Storm, Tornado	Adopt and enforce building codes for residential and commercial construction that prevents wind damage.	Ongoing	Incorporated into 2025 projects; zoning is currently being revised. New project number (30).
Flood	Place depth markers on frequently flooded roads to advise travelers of flooding depths.	Ongoing	Incorporated into 2025 projects; installing depth markers on Front Street. New project number (52).
Winter Storm	Enhance existing snow removal equipment and supplies.	Completed.	A new dump truck with a snow blade and salt spreaders was purchased.

Table 80 Continued

Hazard Applied To	Action	Status	Comments
Village of Pleasant Plain			
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. New project number (3).
All	Protect propane tanks or other external fuel sources.	Ongoing	Incorporated into 2025 projects. New project number (4).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (16).
Severe Storm, Tornado	Install safe rooms/tornado shelters for the population during tornado events.	Ongoing	Incorporated into 2025 projects. New project number (29).
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Ongoing	Incorporated into 2025 projects. New project number (33).
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
Winter Storm	Evaluate and retrofit older buildings, especially large span buildings that may have inadequate snow load tolerances.	Ongoing	Incorporated into 2025 projects. New project number (72).
Village of Waynesville			
Severe Storm, Tornado	Adopt and enforce building codes for residential and commercial construction that prevents wind damage.	Ongoing	Incorporated into 2025 projects. New project number (30).
Dam Failure, Flood	Relocate structures or systems in flood prone or hazard areas - especially those properties identified as historically or culturally significant to the community.	Ongoing	Incorporated into 2025 projects. New project number (55).
Dam Failure, Flood	Purchase properties susceptible to repeated flooding, remove structures, and enforce permanent restrictions on development.	Ongoing	Incorporated into 2025 projects. New project number (56).
Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Ongoing	Incorporated into 2025 projects. New project number (57).
Dam Failure, Flood	Conduct analyses and flood studies to identify risks, evaluate removal of existing structures in flood zone, and/or identify other potential structural or nature-based solutions to mitigate flooding.	Ongoing	Incorporated into 2025 projects. New project number (63).
Clearcreek Township			
Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Ongoing	Incorporated into 2025 projects. New project number (32).

Table 80 Continued

Hazard Applied To	Action	Status	Comments
Deerfield Township			
All	Protect propane tanks or other external fuel sources.	Completed	Businesses are inspected annually by the fire depart. for compliance, and any new businesses must go through the inspection/compliance process.
All	Require event planners to incorporate emergency and disaster planning into their event plans and to submit a copy of this plan to local elected/public safety officials.	Completed	Event staff work with the inspection team to develop a plan, then the fire department reviews it and adds additional info as needed. IAP is implemented based on this process.
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (9).
Multiple	Develop a plan for evacuating populations at any given time. **To also include consideration for people with access & functional needs. **	Complete	Continuous training and technology improvements occurring to assist.
Multiple	Educate the public on what "shelter in place" means and how this action is performed.	Ongoing	Incorporated into 2025 projects; currently utilize TV, email and social media, but would like to find an independent platform for power outages. New project number (21).
Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Ongoing	Incorporated into 2025 projects. New project number (26).
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Ongoing	Incorporated into 2025 projects. New project number (33).
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Ongoing	Incorporated into 2025 projects. New project number (57).
Franklin Township			
All	Procure generators and transfer switches for critical facilities such as admin and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. New project number (3).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (9).
All	Establish MOU's to provide potable and non-potable water to meet the public's needs.	Ongoing	Incorporated into 2025 projects. New project number (14).
Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Ongoing	Incorporated into 2025 projects. New project number (26).

Table 80 Continued

Hazard Applied To	Action	Status	Comments
Franklin Township Continued			
Winter Storm	Enhance existing snow removal equipment and supplies.	Completed	
Landslide	Install stream bank erosion prevention methods.	Ongoing	Incorporated into 2025 projects. New project number (95).
Hamilton Township			
All	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	Deleted	
Multiple	Educate the public on what “shelter-in-place” means and how this action is performed.	Ongoing	Incorporated into 2025 projects. New project number (21).
Harlan Township			
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. New project number (3).
All	Protect propane tanks or other external fuel sources.	Ongoing	Incorporated into 2025 projects. New project number (4).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (9).
Severe Storm, Tornado	Install safe rooms/tornado shelters for the population during tornado events.	Ongoing	Incorporated into 2025 projects. New project number (29).
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Ongoing	Incorporated into 2025 projects. New project number (33).
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Ongoing	Incorporated into 2025 projects. New project number (53).
Winter Storm	Evaluate and retrofit older buildings, especially large span buildings that may have inadequate snow load tolerances.	Deleted	
Turtlecreek Township			
All	Increase the use of social media to warn residents and visitors of extreme weather and man-made events.	Ongoing	Incorporated into 2025 projects. New project number (2).
All	Procure generators and transfer switches for critical facilities such as admin and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects; generator procure and waiting on installation. New project number (3).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Deferred	
Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Ongoing	Incorporated into 2025 projects. New project number (26).

Table 80 Continued

Hazard Applied To	Action	Status	Comments
Turtlecreek Township Continued			
Severe Storm, Tornado	Install safe rooms to shelter the population during tornado events.	Deleted	
Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Ongoing	Incorporated into 2025 projects. New project number (33).
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Completed	
Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Deleted	
Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Deleted	
Wayne Township			
All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Ongoing	Incorporated into 2025 projects. New project number (3).
All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Ongoing	Incorporated into 2025 projects. New project number (9).
Multiple	Educate the public on what “shelter-in-place” means and how this action is performed	Ongoing	Incorporated into 2025 projects. New project number (21).
Severe Storm, Tornado	Install safe rooms/tornado shelters for the population during tornado events.	Ongoing	Incorporated into 2025 projects. New project number (29).
Severe Storm, Tornado	Promote Ohio's Safe Room application program to residents for installation of tornado safe rooms in their homes.	Ongoing	Incorporated into 2025 projects. New project number (31).
HazMat, Utility Failure	Promote use of 811 to residents and businesses that sell products that require digging.	Ongoing	Incorporated into 2025 projects. New project number (36).
HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (46).
HazMat	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Ongoing	Incorporated into 2025 projects. New project number (47).

Table 81: Updates on the 2020 Mitigation Projects by County Department/Regional Organization

Hazard Applied To	Action	Status	Comments
Miami Conservancy District			
Dam Failure, Flood	Conduct analyses and flood studies to identify risks, evaluate removal of existing structures in flood zone, and/or identify other potential structural or nature-based solutions to mitigate flooding in Franklin.	No Update Provided	
Dam Failure, Flood	Conduct Stream Restoration and Floodplain enhancement via Re-establish/remove fill to enhance floodplain, natural channel design.	No Update Provided	
Dam Failure, Flood	Conduct Buyout/Demolition of Carlisle and/or Franklin properties susceptible to flood losses.	No Update Provided	
Dam Failure, Flood	Conduct Buyout/Acquisition - Relocation of the Franklin & Carlisle Great Miami River Overflow.	No Update Provided	
Warren County Career Center			
All	Procure generators and transfer switches for critical facilities such as admin and public safety buildings, schools, etc.	No Update Provided	
Warren County Department of Emergency Services			
All	Conduct hazard vulnerability assessments on critical infrastructures.	Ongoing	Incorporated into 2025 projects. New project number (12).
Multiple	Develop a plan for evacuating populations at any given time.	Ongoing	Incorporated into 2025 projects; transportation MOUs in the works. New project number (20).
Man-Made	Designate an Intelligence Liaison Officer (ILO) to help facilitate intelligence and information sharing regarding man-made events/threats.	Deleted	
HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Complete	
Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Ongoing	Incorporated into 2025 projects; sheltering MOUs in progress. New project number (32).
All	Develop and maintain an intelligence and information sharing platform with private and public agencies to identify and reduce threats/hazards.	Complete	
Multiple	Educate the public on what "shelter in place" means and how this action is performed.	Complete	
HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Ongoing	Incorporated into 2025 projects; applied for grant funding to complete. New project number (43).

Table 81 Continued

Hazard Applied To	Action	Status	Comments
Warren County Health District			
Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Ongoing	Incorporated into 2025 projects. New project number (32).
HazMat Incident	Create public education campaign about illicit discharge/reporting spills.	Completed	Completed social media campaign, and information on website.
Dam Failure, Flood	Develop inspection and regular maintenance programs on dams in coordination with dam owners.	Deleted	Does not align with current Health District services.
Man-Made	Designate an Intelligence Liaison Officer (ILO) to help facilitate intelligence and information sharing regarding man-made events/threats.	Ongoing	Incorporated into 2025 projects. New project number (67).
Invasive Species	Increase Public Health prevention and awareness programs for disease caused by invasive species for county residents.	Completed	Completed social media campaign, and information on website.
Warren County Regional Planning Commission			
All	Increase the use of social media to warn residents/visitors of severe weather & man-made events.	Deleted	Does not fit within the Commission's responsibilities.
Multiple	Develop a plan for evacuating populations at any given time.	Deleted	Does not fit within the Commission's responsibilities.
Sever Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Deleted	Does not fit within the Commission's responsibilities.
Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Deleted	Does not fit within the Commission's responsibilities.
HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Deleted	Does not fit within the Commission's responsibilities.
All	Encourage on-going education for seasoned and newly elected officials to familiarize them with the disaster cycle of prevention, preparedness, mitigation, response, and recovery.	Deleted	Does not fit within the Commission's responsibilities.
Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Deleted	Does not fit within the Commission's responsibilities.
HazMat Incident	Create public education campaign about illicit discharge and how to report spills.	Deleted	Does not fit within the Commission's responsibilities.
Man-Made	Develop a training and education program for active aggressor incidents in facilities.	Deleted	Does not fit within the Commission's responsibilities.
Winter Storm	Install or plant snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.	Deleted	Does not fit within the Commission's responsibilities.
Invasive Species	Increase Public Health prevention and awareness programs for disease caused by invasive species for county residents.	Deleted	Does not fit within the Commission's responsibilities.

Table 81 Continued

Hazard Applied To	Action	Status	Comments
Warren County Regional Planning Commission Continued			
Infectious Diseases	Develop plans to respond to infectious diseases, including but not limited to reporting illnesses, social distancing, telecommuting, and facility closures.	Deleted	Does not fit within the Commission's responsibilities.
Wildfire	Promote conservation of open space or wildland-urban boundary zones to separate developed areas from high-hazard areas.	Deleted	Does not fit within the Commission's responsibilities.
Wildfire	Construct defensible zones around power lines, oil and gas lines, and other infrastructure systems.	Deleted	Does not fit within the Commission's responsibilities.
Wildfire	Establish wildfire mitigation planning requirements for large scale developments or planned unit developments.	Deleted	Does not fit within the Commission's responsibilities.
Warren County Sheriff's Office			
All	Develop a plan for evacuating populations at any given time. **To also include consideration for people with access and functional needs.**	Ongoing	Incorporated into 2025 projects. New project number (12).
Multiple	Educate the public on what "shelter-in-place" means and how this action is performed.	Ongoing	Incorporated into 2025 projects. New project number (20).
Multiple	Conduct all-hazard vulnerability assessments at critical infrastructures.	Ongoing	Incorporated into 2025 projects. New project number (21).
Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Ongoing	Incorporated into 2025 projects. New project number (32).
HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Ongoing	Incorporated into 2025 projects. New project number (46).
HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Ongoing	Incorporated into 2025 projects. New project number (47).
Man-Made	Develop an active public reporting system for suspicious activity.	Ongoing	Incorporated into 2025 projects. New project number (69).

IDENTIFIED MITIGATION PROJECTS FOR 2025

Mitigation projects that were selected as a part of the 2025 Hazard Mitigation Plan are depicted in the tables below. Projects are in order of priority per jurisdiction/organization ranking.

Table 82: 2025 Mitigation Projects by Jurisdiction

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Carlisle						
10	All	Encourage on-going education for seasoned and newly-elected officials to familiarize them with the disaster cycle of prevention, preparedness, mitigation, response and recovery.	Village Manager	Continuous Project	Existing Funds	4.08
27	Multiple	Support and increase participation in the SkyWarn Program (NWS Weather Spotters).	Village Manager	Continuous Project	Existing Funds	4.08
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	Village Manager	Continuous Project	Existing Funds	3.74
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Village Manager	1 to 3 Years	Grants	3.23
45	HazMat Incident	Conduct jurisdictional fire inspections of facilities that contain hazardous materials.	Fire Chief	Continuous Project	Existing Funds	2.52
25	Multiple	Build/establish shelters with generators that can serve displaced citizens.	Village Manager	Greater than 3 Years	Grants	2.38
53	Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Zoning Official	Greater than 3 Years	Existing Funds	2.31
81	Infectious Diseases	Promote seasonal influenza vaccination and facilitate on-campus vaccination clinics.	Fire Chief/Village Manager	Less than 1 Year	Grants	2.3
43	HazMat Incident	Create public education campaigns about illicit discharge and how to report spills.	Fire Chief/Village Manager	Continuous Project	Existing Funds	2.28
47	HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Service Dept	Continuous Project	Existing Funds	2.28
63	Dam Failure, Flood	Conduct analysis and flood studies to identify risks, evaluate removal of existing structures in flood zone, and/or identify other potential solutions to mitigate flooding.	Floodplain Manager/Village Manager	Greater than 3 Years	Existing Funds	1.98

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Carlisle Continued						
55	Dam Failure, Flood	Relocate structures or systems in flood prone or hazard areas - especially those properties identified as historically or culturally significant to the community.	Floodplain Manager/Village Manager	Greater than 3 Years	Grants	1.87
61	Dam Failure, Flood	Conduct regular maintenance for flood control structures such as dams/levees.	Floodplain Manager/Village Manager	Continuous Project	Grants	1.87
78	Extreme Temperatures, Winter Storm	Acquire warming and/or cooling equipment for facilities with inadequate systems or for response to power outages.	Village Manager	Less than 1 Year	Existing Funds	1.6
65	Man-Made	Install physical protective measures for critical infrastructures. (i.e. fences, lighting, bollards, etc.).	Service Dept	1 to 3 Years	Grants	1.53
71	Winter Storm	Enhance existing snow removal equipment and supplies.	Service Dept	1 to 3 Years	Grants	1.36
75	Winter Storm	Install or plant snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.	Service Dept	1 to 3 Years	Grants	1.36
86	Earthquake	Safeguard and harden critical infrastructure systems to meet seismic design standards for "lifelines".	Village Manager	1 to 3 Years	Grants	1.26
89	Extreme Temperatures	Establish and implement water conservation programs.	Village Manager	Greater than 3 Years	Existing Funds	1.12
87	Earthquake	Conduct a public building seismic study to determine which buildings are more at risk for damages from an earthquake.	Village Manager	Greater than 3 Years	Grants	0.96
96	Invasive Species	Develop jurisdictional educational programs for public works to better identify and report possible invasive species.	Village Manager	1 to 3 Years	Existing Funds	0.66
92	Landslide	Establish natural means (such as tree planting and conservation) that protects steep slopes from landslides.	Service Dept	1 to 3 Years	Grants	0.64
97	Invasive Species	Remove infected vegetation or organisms to eradicate invasive species.	Service Dept	1 to 3 Years	Existing Funds	0.48
99	Wildfire	Clear fuel loads created by downed trees and dry brush.	Fire Chief	1 to 3 Years	Existing Funds	0.18

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Franklin						
21	Multiple	Educate the public on what “shelter-in-place” means and how this action is performed.	Police/Fire	Less than 1 Year	Existing	4.59
15	All	Perform regular exercises and drills related to the county's different hazards.	Public Works/PD/FD/Schools	Less than 1 Year	Existing	4.59
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Public Works	1 to 3 Years	Existing	4.25
19	All	Coordinate with utility providers to develop a plan to decrease the risk of outages.	Public Works/FD	Continuous Project	Grants	3.57
22	Multiple	Bury power lines to reduce the likelihood of interrupted services.	Public Works/FD	Continuous Project	Grants	3.57
35	HazMat Incident, Utility Failure	Require public permitting process to include calling 811 and providing a copy of their dig ticket.	Public Works/FD	Continuous Project	Existing	3.3
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Public Works	Continuous Project	Grants	3.23
65	Man-Made	Install physical protective measures for critical infrastructures. (i.e. fences, lighting, bollards, etc.).	Public Works/Police Chief	Less than 1 Year	Grants	2.4
City of Lebanon						
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Fire Chief	Less than 1 Year	Existing	4.08
5	All	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	City Manager/Fire Chief	Less than 1 Year	Existing	4.08
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	City Manager	Less than 1 Year	Existing	3.74
21	Multiple	Educate the public on what “shelter-in-place” means and how this action is performed.	City Manager/Fire Chief	Less than 1 Year	Existing	3.68

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Lebanon Continued						
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Fire Chief	1 to 3 Years	Grants	3.36
38	Cyber Incident	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	City Manager/IT	1 to 3 Years	Grants	2.52
39	Cyber Incident, Man-Made	Enhance security at critical public safety technology infrastructure site(s).	City Manager/IT	1 to 3 Years	Grants	2.52
40	Cyber Incident	Enhance firewalls and backup/replicator servers.	City Manager/IT	1 to 3 Years	Grants	2.52
41	Cyber Incident	Implement cyber security training/programs.	City Manager/IT	1 to 3 Years	Grants	2.52
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Engineer/Public Works	Continuous	Grants	2.38
35	HazMat Incident, Utility Failure	Require public permitting process to include calling 811 and providing a copy of their dig ticket.	City Manager	Less than 1 Year	Existing	2.34
57	Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	City Manager/Floodplain Admin	Less than 1 Year	Existing	2.2
58	Dam Failure, Flood	Install and support additional river gauges, especially in communities with repetitive flood events or repetitive (flood) loss structures.	City Manager/Floodplain Admin	Less than 1 Year	Existing	2.2
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Engineer/Public Works	Less than 1 Year	Existing	2.16
51	Flood	Complete a stormwater drainage/engineering impact study for known problem areas to identify further mitigation actions.	Public Works Dept.	1 to 3 Years	Grants	2.09

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Mason						
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	City PIO/Public Safety	1 to 3 Years	Existing	4.42
16	All	Promote the acquisition of NOAA weather radios for all businesses, critical facilities, and public use.	Public Safety	1 to 3 Years	Existing	4.08
5	All	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	City PIO/Public Safety	1 to 3 Years	Existing	3.91
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	City PIO/Public Safety	Continuous	Existing	3.68
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Safety Director/Fire Chief	Continuous	Existing	3.5
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Safety Director/Fire Chief	Greater than 3 Years	Existing	3.4
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Service Dept.	Greater than 3 Years	Existing	3.4
18	All	Develop/update emergency operations plans and standard operating procedures.	Public Safety	Continuous	Existing	3.23
12	All	Conduct all hazard vulnerability assessments at critical infrastructures	Public Safety	Continuous	Existing	3.06
City of Monroe						
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	City Manager	Less than 1 Year	Existing	4.76
21	Multiple	Educate the public on what "shelter-in-place" means and how this action is performed.	Fire	1 to 3 Years	Existing	4.59
26	Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Public Works	Less than 1 Year	Existing	4.42

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Monroe Continued						
14	All	Establish MOUs to provide potable and non-potable water to meet the public's needs.	Public Works	1 to 3 Years	Existing	4.42
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Fire	1 to 3 Years	Existing	4.16
36	HazMat Incident, Utility Failure	Promote use of 811 to residents and businesses that sell products that require digging.	Public Works	Less than 1 Year	Existing	3.9
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Fire	Less than 1 Year	Existing	3.78
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Public Works	Greater than 3 Years	Grants	3.57
25	Multiple	Build/establish shelters with generators that can serve displaced citizens.	Fire	Continuous	Grants	3.4
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Public Works	1 to 3 Years	Grants	3.23
41	Cyber Incident	Implement cyber security training/programs.	IT	1 to 3 Years	Existing	2.88
68	Man-Made	Acquire personal protective equipment for public safety personnel to respond to active aggressor events.	Fire	1 to 3 Years	Existing	2.4
59	Dam Failure, Flood	Replace/upgrade deteriorated/restricted culverts, waterlines, and water infrastructure.	Public Works	Greater than 3 Years	Existing	2.31
40	Cyber Incident	Enhance firewalls and backup/replicator servers.	IT	Greater than 3 Years	Grants	2.28
51	Flood	Complete a stormwater drainage/engineering impact study for known problem areas to identify further mitigation actions.	Public Works	1 to 3 Years	Grants	2.09
56	Dam Failure, Flood	Purchase properties susceptible to repeated flooding, remove structures, and enforce permanent restrictions on development.	Public Works	Continuous	Grants	1.54

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
City of Springboro						
38	Cyber Incident	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	IT Director	Continuous	Existing	3.3
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	City Engineer	1 to 3 Years	Grants	2.28
97	Invasive Species	Remove infected vegetation or organisms to eradicate invasive species.	Public Works Director	Continuous	Existing	0.45
Village of Corwin						
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Village Staff	1 to 3 Years	Grants	3.68
19	All	Coordinate with utility providers to develop a plan to decrease the risk of outages.	Village Staff	1 to 3 Years	Grants	3.57
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Village Staff	1 to 3 Years	Grants	3.23
22	Multiple	Bury power lines to reduce the likelihood of interrupted services.	Village Staff	1 to 3 Years	Grants	2.88
31	Severe Storm, Tornado	Promote Ohio's Safe Room application program to residents for installation of tornado safe rooms in their homes.	Village Staff	1 to 3 Years	Grants	2.88
52	Flood	Place depth markers on frequently flooded roads to advise travelers of flooding depths.	Village Staff	1 to 3 Years	Grants	1.76
Village of Harveysburg						
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Mayor	Continuous	Grants	3.91
4	All	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	Mayor	Continuous	Grants	3.91
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Mayor	Continuous	Grants	3.84

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Village of Harveysburg Continued						
49	Flood	Require a drainage study with new development within jurisdictional boundaries.	Mayor	Continuous	Grants	2.53
51	Flood	Complete a stormwater drainage/engineering impact study for known problem areas to identify further mitigation actions.	Mayor	Continuous	Grants	2.53
71	Winter Storm	Enhance existing snow removal equipment and supplies.	Mayor	Continuous	Grants	2.25
Village of Morrow						
19	All	Coordinate with utility providers to develop a plan to decrease the risk of power outages.	Mayor/Administration	Continuous	Existing	3.4
30	Severe Storm, Tornado	Adopt and enforce building codes for residential and commercial construction that prevents wind damage.	Zoning Inspector	Continuous	Existing	3.2
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Public Works	Continuous	Existing	3.06
26	Multiple	Develop a debris management plan that allows the jurisdiction to recover quicker from hazard incidents.	Public Works	Continuous	Existing	2.89
52	Flood	Place depth markers on frequently flooded roads to advise travelers of flooding depths.	Public Works	Less than 1 Year	Existing	2.86
59	Dam Failure, Flood	Replace/upgrade deteriorated/restricted culverts, waterlines, and water infrastructure.	Public Works	Continuous	Existing	2.2
Village of Pleasant Plain						
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Village Council	Less than 1 Year	Grants	4.25
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Village Council	Continuous	Existing	4.08
12	All	Conduct all-hazard vulnerability assessments at critical infrastructures.	Village Council	Continuous	Existing	3.57
18	All	Develop/update emergency operations plans and standard operating procedures.	Village Council	Continuous	Existing	3.4

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Village of Pleasant Plain Continued						
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Village Council	Continuous	Grants	3.36
4	All	Protect propane tanks or other external fuel sources.	Village Council	Greater than 3 Years	Grants	3.23
29	Severe Storm, Tornado	Install safe rooms/tornado shelters for the population during tornado events.	Village Council	1 to 3 Years	Grants	2.56
53	Flood	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Village Council	Greater than 3 Years	Existing	2.42
46	HazMat	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Village Council	Continuous	Existing	2.4
72	Winter Storm	Evaluate and retrofit older buildings, especially large span buildings that may have inadequate snow load tolerances.	Village Council	1 to 3 Years	Grants	1.68
Village of Waynesville						
30	Severe Storm, Tornado	Adopt and enforce building codes for residential and commercial construction that prevents wind damage.	Village Administrator	Less than 1 Year	Existing	4.5
56	Dam Failure, Flood	Purchase properties susceptible to repeated flooding, remove structures, and enforce permanent restrictions on development.	Public Works	1 to 3 Years	Existing	2.8
57	Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Village Council	Continuous	Existing	2.8
55	Dam Failure, Flood	Relocate structures or systems in flood prone or hazard areas - especially those properties identified as historically or culturally significant to the community.	Village Council	Continuous	Existing	2.3
63	Dam Failure, Flood	Conduct analyses and flood studies to identify risks, evaluate removal of existing structures in flood zone, and/or identify other potential structural or nature-based solutions to mitigate flooding.	Public Works	1 to 3 Years	Existing	2.1

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Clearcreek Township						
19	All	Coordinate with utility providers to develop a plan to decrease the risk of outages.	Administrator	Less than 1 Year	Existing	4.59
32	Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Fire Chief	Continuous	Existing	3.36
50	Flood	Remove debris in rivers and streams that does or could contribute to flooding. *To also include storm related debris and trees down*	Road Superintendent	Continuous	Existing	2.31
56	Dam Failure, Flood	Purchase properties susceptible to repeated flooding, remove structures, and enforce permanent restrictions on development.	Administrator	Continuous	Grants	1.1
95	Landslide	Install stream bank erosion prevention methods.	Road Superintendent	Continuous	Grants	0.56
Deerfield Township						
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	Fire Department/PIO	Continuous	Existing	4.08
21	All	Educate the public on what "shelter-in-place" means and how this action is performed.	Fire Department	Continuous	Existing	3.74
26	All	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Township/Public Works	1 to 3 Years	Grants	3.57
33	Wind/Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Fire Department	Continuous	Grants	2.94
1	All	Identify and install hazard notification systems. **To also include consideration for people with access and functional needs.**	Fire Department	Continuous	Existing	2.89
57	Dam Failure, Flood	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Fire Department/Zoning	Continuous	Existing	2.53
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Fire Department/Property Owner	Continuous	Existing	2.4

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Deerfield Township Continued						
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Zoning	Continuous	Grants	2.21
78	Extreme Temps, Winter Storm	Acquire warming and/or cooling equipment for facilities with inadequate systems or for response to power outages.	Fire Department	1 to 3 Years	Grants	1.84
Franklin Township						
6	All	Conduct an annual review of emergency response policies.	Administration	1 to 3 Years	Existing	4.08
17	All	Develop a continuity of operations plan.	Administration	1 to 3 Years	Existing	4.08
18	All	Develop/update emergency operations plans and standard operating procedures.	Administration	1 to 3 Years	Existing	4.08
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Township Admin	1 to 3 Years	Grants	3.74
37	Man-Made, Utility Failure	Install surge protectors and battery-backups on critical or sensitive electronic equipment.	Administration	Less than 1 year	Existing	3.6
14	All	Establish MOUs to provide potable and non-potable water to meet the public's needs.	Township Admin	Continuous	Grants	3.4
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Service Department	Greater than 3 Years	Grants	3.06
26	Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Township Admin	Greater than 3 Years	Grants	3.06
47	HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	EMA	Greater than 3 Years	Grants	2.52
76	Winter Storm	Develop a resource manual that can be used to inventory emergency resources that can be deployed to ad in the event of severe winter storms.	EMA	Continuous	Existing	1.89

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Franklin Township Continued						
50	Flood	Remove debris in rivers and streams that does or could contribute to flooding. *To also include storm related debris and trees down*	Conservancy Dist.	Continuous	Grants	1.54
95	Landslide	Install stream bank erosion prevention methods.	Township Administrator	Greater than 3 Years	Grants	0.56
Hamilton Township						
46	Multiple	Develop and conduct training between first responders and chemical facilities for a response to a chemical incident.	Div. Chief of Training	Continuous	Existing	3.74
33	Severe Storm, Tornado	reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Fire Chief	1 to 3 Years	Grants	3.04
21	Multiple	Educate the public on what "shelter-in-place" means and how this action is performed.	Fire Chief	Greater than 3 Years	Grants	2.55
66	Man-Made	Develop a training and education program for active aggressor incidents in facilities.	Fire Chief	Continuous	Existing	2.4
51	All	Complete a stormwater drainage/engineering impact study for known problem areas to identify further mitigation actions.	Township Administrator	Greater than 3 Years	Grants	2.38
68	Man-Made	Acquire personal protective equipment or public safety personnel to respond to active aggressor events.	Fire Chief	1 to 3 Years	Grants	2.3
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	Fire Chief	Less than 1 Year	Existing	1.68

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Harlan Township						
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	Administrator	Less than 1 Year	Existing	4.25
16	All	Promote the acquisition of NOAA weather radios for all businesses, critical facilities, and public use.	Fire chief	Less than 1 Year	Grants	3.91
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Administrator	1 to 3 Years	Grants	3.74
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Assistant Fire Chief	Less than 1 Year	Grants	3.36
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	Administrator	1 to 3 Years	Grants	3.06
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Assistant Fire Chief	1 to 3 Years	Grants	3.04
29	Severe Storm, Tornado	Install safe rooms/tornado shelters for the population during tornado events.	Administrator	1 to 3 Years	Grants	2.88
4	All	Protect propane tanks or other external fuel sources.	Fire Chief	1 to 3 Years	Grants	2.72
38	Cyber Incident	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	Administrator	Less than 1 Year	Existing	2.4
53	Flood	Adopt or amend zoning ordinance for better floodplain regulations.	Administrator	1 to 3 Years	Grants	2.31
Salem Township						
20	Multiple	Develop a plan for evacuating populations at any given time. **To also include consideration for people with access and functional needs.**	Fire Chief	1 to 3 Years	Existing	3.91
38	Cyber Incident	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	Township Administrator	Less than 1 Year	Grants	3.6

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Salem Township Continued						
39	Cyber Incident	Enhance security at critical public safety technology infrastructure site(s).	Township Administrator	Less than 1 Year	Grants	3.6
40	Cyber Incident	Enhance firewalls and backup/replicator servers.	Township Administrator	Less than 1 Year	Grants	3.6
41	Cyber Incident	Implement cyber security training/programs.	Township Administrator	Less than 1 Year	Grants	3.6
68	Man-Made	Acquire personal protective equipment for public safety personnel to respond to active aggressor events.	Fire Chief	Less than 1 Year	Grants	2.16
Turtlecreek Township						
2	All	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	Township Administrator	1 to 3 Years	Existing	4.42
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Township Administrator	Continuous	Existing	3.68
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Township Administrator	Greater than 3 Years	Existing	3.57
26	Multiple	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Road Supervisor	1 to 3 Years	Grants	3.57
1	All	Identify and install hazard notification systems. **To also include consideration for people with access and functional needs.**	Fire Chief		Grants	1.36
16	All	Promote the acquisition of NOAA weather radios for all businesses, critical facilities, and public use.	Fire Chief		Grants	1.36
51	Flood	Complete a stormwater drainage/engineering impact study for known problem areas to identify further mitigation actions.	Road Supervisor		Grants	0.99
71	Winter Storm	Enhance existing snow removal equipment and supplies.	Road Supervisor		Grants	0.81

Table 82 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Wayne Township						
21	Multiple	Educate the public on what “shelter-in-place” means and how this action is performed	Fire Chief	1 to 3 Years	Existing	3.91
36	HazMat Incident, Utility Failure	Promote use of 811 to residents and businesses that sell products that require digging.	Administrator	Continuous	Grants	3.3
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Administrator	1 to 3 Years	Grants	2.89
33	Severe Storm, Tornado	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm	Fire Chief	Greater than 3 Years	Grants	2.88
29	Severe Storm, Tornado	Install safe rooms/tornado shelters for the population during tornado events.	Administrator	Continuous	Grants	2.72
47	HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Administrator	Less than 1 Year	Grants	2.66
31	Severe Storm, Tornado	Promote Ohio's Safe Room application program to residents for installation of tornado safe rooms in their homes.	Administrator/Fire Chief	Continuous	Existing	2.56
9	All	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	County Engineer	Continuous	Grants	2.55
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Fire Chief	Less than 1 Year	Existing	2.38
52	Flood	Place depth markers on frequently flooded roads to advise travelers of flooding depths	Road Supervisor	1 to 3 Years	Existing	2.31

Table 83: 2025 Mitigation Projects by County Departments

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Warren County Board of Developmental Disabilities						
19	Multiple	Coordinate with utility providers to develop a plan to decrease the risk of outages.	Operations Director	1 to 3 Years	Existing	4.42
28	Multiple	Establish standards regarding tree pruning and vegetation removal around utilities in an effort to reduce outages.	Operations Director	1 to 3 Years	Existing	4.42
3	All	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	Operations Director	1 to 3 Years	Existing	3.91
38	Cyber Incident	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	Operations Director	1 to 3 Years	Existing	3.75
71	Winter Storm	Enhance existing snow removal equipment and supplies.	Operations Director	1 to 3 Years	Grants	1.76
76	Winter Storm	Develop a resource manual that can be used to inventory emergency resources that can be deployed to aid in the event of severe winter storms.	Operations Director	1 to 3 Years	Grants	1.6
Warren County Department of Emergency Services						
16	All	Promote the acquisition of NOAA weather radios for all businesses, critical facilities, and public use.	Operations Manager	Continuous	Existing	4.08
20	Multiple	Develop a plan for evacuating populations at any given time. **To also include consideration for people with access and functional needs.**	Emergency Services Director	Continuous	Existing	3.57
12	All	Conduct all-hazard vulnerability assessments at critical infrastructures.	Emergency Services Director	1 to 3 Years	Existing	3.4
15	All	Perform regular exercises and drills related to the county's different hazards.	Operations Manager	Continuous	Existing	3.4
25	Multiple	Build/establish shelters with generators that can serve displaced citizens.	Emergency Services Director	1 to 3 Years	Existing	3.23
47	HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Operations Manager	1 to 3 Years	Grants	3.22

Table 83 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Warren County Department of Emergency Services Continued						
32	Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Emergency Services Director	Continuous	Existing	3.04
0	All	Develop and construct a secondary/backup county 911 dispatch and emergency operations center.	Emergency Services Director	Greater than 3 Years	Grants	2.72
Warren County Health District						
5	All	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	PIO	1 to 3 Years	Grants	3.91
18	All	Develop/update emergency operations plans and standard operating procedures.	Emergency Response Coordinator	Continuous	Grants	3.74
32	Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Emergency Response Coordinator/Assist. Health Commissioner	1 to 3 Years	Grants	3.68
38	Cyber Incident	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	IT Manager	1 to 3 Years	Existing	3
67	Man-Made	Designate an Intelligence Liaison Officer (ILO) to help facilitate intelligence and information sharing regarding man-made events/threats.	Emergency Response Coordinator	1 to 3 Years	Existing	2.5
84	Infectious Diseases	Complete a public health plan to identify risk factors in the County, including epidemics, pandemics, drug abuse, and other public health issues.	Emergency Response Coordinator/Assist. Health Commissioner	1 to 3 Years	Grants	1.76
Warren County Sheriff's Office						
20	Multiple	Develop a plan for evacuating populations at any given time. **To also include consideration for people with access and functional needs.**	Sheriff	Continuous	Existing	3.74
21	Multiple	Educate the public on what "shelter-in-place" means and how this action is performed.	Sheriff	Continuous	Existing	3.74
12	All	Conduct all-hazard vulnerability assessments at critical infrastructures.	Sheriff	Continuous	Existing	3.06

Table 83 Continued

Mitigation Action #	Hazard Applied To	Action	Responsible Party	Timeframe	Potential Funding Source	Priority
Warren County Sheriff's Office Continued						
32	Severe Storm, Tornado	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Sheriff	Continuous	Existing	2.88
47	HazMat Incident	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Sheriff	1 to 3 Years	Existing	2.66
46	HazMat Incident	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Sheriff	1 to 3 Years	Existing	2.52
69	Man-Made	Develop an active public reporting system for suspicious activity.	Sheriff	1 to 3 Years	Existing	2.4
Warren County Soil & Water						
64	Dam Failure, Flood	Create a public information and education program to sensitize residents to the floodplain and the benefits of preserving these areas.	Director	Continuous	Existing	2.31
95	Landslide	Install stream bank erosion prevention methods.	Director	Greater than 3 Years	Grants	0.76
Warren County Telecommunications						
17	All	Develop a continuity of operations plan.	Director	1 to 3 Years	Existing	4.25
0	All	Develop and construct a secondary/backup county 911 dispatch and emergency operations center.	Director	1 to 3 Years	Grants	4.08

6. PLAN MAINTENANCE

The Warren County Hazard Mitigation Plan is designed to be a “living” document that serves as a tool for county resources to ensure possible damage from a hazard event is reduced. This section discusses the adoption, implementation, monitoring, evaluating, and updating the HMP. Plan implementation and maintenance procedures will ensure that the HMP remains relevant and continues to address the changing environment and inherent hazards in Warren County.

Being a living document, and to meet the prerequisite requirements for the Hazard Mitigation Assistance Grant Program under the Disaster Mitigation Act of 2000, this plan will be reviewed and updated within five years from its approval date.

6.1. PLAN INCORPORATION

The 2025 Warren County Hazard Mitigation Plan will be adopted by all jurisdictions that chose to participate: including cities, villages and townships. By adopting the plan, jurisdictions meet the eligibility requirement for federal mitigation funding.

Following FEMA review and Approval Pending Adoption, the participating jurisdictions intend to formally adopt the 2025 Plan by resolution or ordinance. Once adopted by each jurisdiction, the corresponding signed resolutions or ordinances will be added to the plan as an appendix.

6.2. MONITORING THE PLAN

The Warren County Emergency Management Agency (within the Department of Emergency Services), under the direction of the Warren County Board of Commissioners, shall monitor the plan. This includes routine collection of the status of mitigation projects listed in the plan, and whether those projects have been completed, deleted, are ongoing, unchanged, or deferred. New projects will also be added where appropriate based on changing risk levels and/or perceived or actual hazard events. Updates will be obtained through an annual survey and through collaboration with local public safety officials.

6.3. EVALUATING AND UPDATING THE PLAN

To ensure the plan continues to provide appropriate risk-reduction strategies, it is necessary to regularly evaluate and update it. The planning team will be responsible for monitoring the status of the plan and gathering appropriate parties to report on the status of mitigation actions on an annual basis. This will be done via an electronic survey to stakeholders, and in-person surveys at regularly scheduled meetings with public safety partners (i.e., at the Warren County Fire Chief's Association meetings).

The public will continue to have the opportunity to provide feedback on the plan, as it will be available through the Warren County EMA and Ohio EMA websites and will be available for review at the EMA booth at public events. Warren County EMA will provide access to the plan to all county, municipal, and township offices, and will make the plan available in hardcopy/electronic format to the public as appropriate. Warren County EMA will utilize other opportunities as they present themselves to solicit feedback from stakeholders and public sources. Warren County EMA will post notices of any meetings for updating and evaluating the

plan, using the usual methods for posting meeting announcements in the county to invite the public to participate (i.e., media, social media and other methods).

The Warren County Emergency Management Agency, on behalf of the Warren County Board of Commissioners, shall be the responsible party for updating the Warren County Hazard Mitigation Plan. It shall be updated by addendum either annually or as updates are needed due to changes in risk or risk-reduction strategies. The plan updates will include a record of changes including:

- Status of mitigation activity items
- Changes in prioritization of mitigation action items
- New mitigation activities/items to be added and the priority of the activities/items
- Descriptions of why any actions/items have been deleted or deferred
- One year prior to the expiration of the five (5)-year FEMA plan approval date, the Plan shall be reevaluated and reviewed per the five (5)-year planning update process as required by law

6.4. PLAN INTERGRATION

Hazard mitigation practices must be incorporated within existing plans, projects, and programs. The involvement of all departments, private non-profits, private industry, and appropriate jurisdictions is necessary in order to discover mitigation opportunities within existing or planned projects and programs. Each community will be responsible for updating and integrating elements of the plan into their own respective plans and ordinances. Warren County EMA will be responsible for notifying county departments of the completed Hazard Mitigation Plan so that the respective departments can update their internal documents to reflect the county's mitigation strategy.

APPENDIX 1

PLANNING PARTICIPATION DOCUMENTS

APPENDIX 1.1 – LIST OF PARTICIPANTS IN THE 2025 HMP PLANNING PROCESS

Title	First Name	Last Name	Agency	Community Survey	Capability Survey	Planning Meeting 1	Planning Meeting 2	Planning Meeting 3	Mitigation Project Updates	Individual Jurisdictional Meeting	Additional Contact with EMA
Office Administrator	Melissa	Abrams	Warren County Emergency Services			X	X				
Fire Chief	Steve	Agenbroad	Clearcreek Township Fire Department			X					
Operations Coordinator	Mike	Arlinghaus	Lebanon City Schools			X					
Sargent	Randy	Asencio	Warren County Sheriff's Office			X					
Councilman	Gene	Baldwin	Village of Corwin	X	X						
	Chris	Balster	Warren County Health District				X	X	X		
Fire Chief	Jason	Beckett	Wayne Township Fire Department	X	X	X	X	X	X		
Fire Chief	Paul	Benard	Massie Township Fire			X		X			
Assistant Chief	Dan	Berkebile	Hamilton Township Fire Department			X	X	X	X		
Director	Amy	Bidinger	Warren County Common Pleas			X					
Administrator	Tammy	Boggs	Turtlecreek Township						X	X	
Director	Melissa	Bour	Warren County Emergency Services			X	X	X			
Fire Chief	Bryan	Brumagen	City of Mason Fire Department	X	X			X	X		X
City Manager	Scott	Brunka	City of Lebanon	X	X						
Director	Scott	Butler	Lebanon City Schools			X					
School Safety Coordinator	Jason	Byrge	Warren County ESC			X	X				
Fire Chief	John Paul	Campbell	Turtlecreek Township Fire Department							X	
Fiscal Officer	Mary Beth	Campbell	Village of Maineville						X		
Township Administrator	Matt	Clark	Clearcreek Township				X		X		
Fiscal Officer	Sharon	Coffman	Washington Township							X	
Police Chief	Adam	Colon	City of Franklin Police	X	X	X					
Director	Molly	Conley	Warren County Soil & Water Conservancy District			X	X		X		
Police Chief	Gary	Copeland	Waynesville Police Department	X	X	X		X			
Mayor	Jess	Cordery	Village of Corwin	X	X				X	X	
Administrator	Darryl	Cordrey	Hamilton Township & Franklin Township			X			X		
Councilman	Kevin	Cummings	Village of Corwin	X	X				X		
Fire Chief	Ryan	Dipzinski	Lebanon Fire Department			X	X		X		
Trustee	Doug	Drook	Village of Maineville							X	
	Nicole	Earley	Hamilton Township Parks & Rec			X					
Administrator	Gus	Edwards	Wayne Township			X	X	X	X		
Fire Chief	Chris	Eisele	Deerfield Township Fire Department	X		X		X			
Deputy Director	Gary	Estes	Warren County Telecommunications				X		X		
Clerk/Treasurer	Debra	Femmer	Village of Corwin	X	X						
LEPC/Grants Coordinator	Frances	Ficke	Warren County Emergency Management			X	X	X			
Executive Director	Amy	Fornshell	Mental Health Recovery Board			X					
Prosecutor	David	Fornshell	Warren County Prosecutor			X					
Business Manager	Kelli	Fromm	Franklin City Schools			X		X			

APPENDIX 1.1 – LIST OF PARTICIPANTS IN THE 2025 HMP PLANNING PROCESS

Title	First Name	Last Name	Agency	Community Survey	Capability Survey	Planning Meeting 1	Planning Meeting 2	Planning Meeting 3	Mitigation Project Updates	Individual Jurisdictional Meeting	Additional Contact with EMA
Mayor	Jonathon	Funk	Village of Harveysburg				X		X		
Senior Engineer	Kathryn	Gilbert	Warren County Water & Sewer			X					
Administrator	Jerry	Haddix	City of South Lebanon	X	X						
Trustee	Scott	Hagemeyer	Washington Township							X	
Fire Chief	Michael	Hannigan	Franklin Township Fire Department	X	X	X	X		X		
Deputy Fire Chief	Matt	Hannigan	Deerfield Township Fire Department				X		X		
Battalion Chief	Derek	Harper	Lebanon Fire Department					X			
Dog Warden	Nathan	Harper	Dog Warden			X	X				
Administrator	William	Harrison	Salem Township						X		
	Keeny	Hickey	Turtlecreek Township Road Department							X	
Public Works	Harry	Holbert	South Lebanon	X	X	X	X	X			
Administrative Assistant	Sherri	Holliday	Warren County Emergency Services			X	X	X			
Fire Chief	Jason	Jewett	Hamilton Township Fire Department				X		X		
Coordinator	Dawn	Johnson	Warren County GIS			X	X				X
	Joshua	Jones	Enterprise Products								X
City Manager	David	Kennedy	City of Loveland	X	X						
Director	Paul	Kindell	Warren County Telecommunications				X		X		
	Chas	Kunkle	Little Miami Schools			X					
Treasurer-Elect	Randy	Kuven	Warren County Treasurer			X					
Fire Chief	David	Leverage	Monroe Fire Department	X	X	X	X	X	X		
Director	Matt	Luecke	Kings Local Schools				X				
Deputy Director	Jesse	Madden	Warren County Emergency Services				X	X			
	Nick	Maroni	WCSO					X			
	Pete	Mason	Warren County Board of Developmental Disabilities			X	X		X		
Emergency Response Coordinator	Jenny	McCoy	Warren County Health District			X	X	X	X		
Assistant Director	Zach	McNatt	City of Monroe Public Works				X		X		
	Kim	Mehl	Warren County Regional Planning Commission						X		
	Candace	Miller	Warren County Economic Development								X
Intern	Mikayla	Minton	Warren County Emergency Management								
Police Chief	Jeff	Mitchell	Lebanon Police Department	X	X	X	X		X		
Fire Chief	John	Muenster	Salem Township Fire			X			X	X	
EMA Specialist	Matthew	Mumma	Warren County Emergency Management			X	X	X			
Fire Chief	Bob	Napier	Union Township Fire Department							X	
Councilman	James	Nelson	Village of Harveysburg								X
Captain	Brian	Pacifico	City of Franklin Police				X		X		
Councilman	Kenneth	Patrick	Village of Corwin	X	X						

APPENDIX 1.1 – LIST OF PARTICIPANTS IN THE 2025 HMP PLANNING PROCESS

Title	First Name	Last Name	Agency	Community Survey	Capability Survey	Planning Meeting 1	Planning Meeting 2	Planning Meeting 3	Mitigation Project Updates	Individual Jurisdictional Meeting	Additional Contact with EMA
Fire Chief	Steve	Pegram	Harlan Township Fire Department	X	X	X	X	X	X		
Warning Coordination Meteorologist	Brandon	Peloquin	National Weather Service								X
City Manager	Chris	Pozzuto	City of Springboro						X	X	
Chief	Barry	Puskas	Miami Conservancy District			X			X		
Trustee	Jami	Ramsey	Pleasant Plain							X	
Captain	Joshua	Reed	City of Franklin Police				X		X		
Operations Managers	Sydney	Renner	Warren County Emergency Management			X	X	X			
Deputy Director	Jeff	Rhien	Mental Health Recovery Board			X		X			
Sheriff	Barry	Riley	Warren County Sheriff's Office				X	X	X		
Police Chief	Will	Rogers	Carlisle Police Department			X	X		X		
Administrator	Martin	Russell	Warren County			X					
Superintendent	Mike	Sander	Franklin City Schools			X	X	X			
	Hayes	Santa	Warren County Regional Planning Commission					X			
Director	Matt	Schnipke	Warren County Economic Development								X
Superintendent	Isaac	Seevers	Lebanon City Schools			X					
Trustee	Dale	Settlemyer	Washington Township							X	
Deputy Fire Chief	Bryan	Shaw	City of Mason Fire Department				X		X		
Regional Health Coordinator	Jessica	Skelton	Tristate Health Coalition			X		X			
Director of Safety	Joe	Smith	Little Miami Schools			X		X			
Road Supervisor	Allen	Stanforth	Washington Township							X	
Health Director	Duane	Stansbury	WCHD					X			
Fire Chief	Daniel	Stitzel	City of Franklin Fire Department	X	X			X			
Supervisor	Mike	Stock	Warren County Probation				X				
Councilman	Mark	Tipton	Village of Harveysburg				X	X	X		
Director of Communications	Brad	Underwood	Little Miami Schools			X	X	X			
	Katie	Wang	Warren County Health District					X			
Deputy Clerk	Ashley	Watts	Warren County								X
Administrator	Caroline	Whitacre	Village of Morrow	X	X	X	X	X	X		
Administrator	Jeff	Wright	Hamilton Township						X		
	Sabrina	Wyrick	Warren County IT (GIS)								X

APPENDIX 1.2 – COMMUNITY PARTICIPATION

Jurisdiction	Community Profile Survey	Jurisdictional Capabilities Survey	Meeting #1	Hazard Ranking	Meeting #2	Mitigation Projects	Meeting #3	Individual Jurisdictional Meeting
Carlisle			X	X	X	X		
Franklin	X	X	X	X	X	X	X	
Lebanon	X	X	X	X	X	X	X	
Loveland	X	X						
Mason	X	X		X	X	X	X	
Middletown	Not Participating in the 2025 Plan							
Monroe	X		X	X	X	X	X	
Springboro	X	X		X		X		X
South Lebanon	X	X	X	X	X		X	
Butler	Not Participating in the 2025 Plan							
Corwin								X
Harveysburg					X	X	X	
Maineville	X			X				X
Morrow	X	X	X	X	X	X	X	
Pleasant Plain								X
Waynesville	X	X					X	
Clearcreek Twp			X	X	X	X		
Deerfield Twp	X		X	X	X	X	X	
Franklin Twp	X	X	X	X	X	X	X	
Hamilton Twp	X	X	X	X	X	X	X	
Harlan Twp	X	X	X	X	X	X	X	
Massie Twp			X	X			X	
Salem Twp			X	X		X	X	
Turtlecreek Twp				X		X		X
Union Twp								X
Washington Twp	X							X
Wayne Twp	X	X	X	X	X	X	X	

“X” indicates participation by attendance or submission of documentation to EMA.

Note: only jurisdictions that were not in attendance at Meetings #1 or #2 were contacted for individual jurisdictional meetings.

APPENDIX 1.3 – PLANNING MEETING SIGN-IN SHEETS

Meeting 1 Attendance

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #1 - Sign In Sheet
February 19th, 2025

Name	Home Agency or Organization	Position	Email
Jessie Byrge	Warren County ESC	Safety Coordinator	Jessie.Byrge@warrencountyesc.com
RYAN DIERLOUSE	LEBAWON	FIRE CHIEF	Rdierlousk1@lebanonchicago.gov
Joe Smith	Little Miami Schools	Dir. of Safety	josmith@lmsdoh.org
Harry Holthorst	City of South Lebanon	Public Work	hholthorst@southlebanonchicago.gov
David Farnsworth	WCPO	Planning Advisor	david.farnsworth@warrencountyesc.com
Jonny McCoy	WCHD	Emergency Prep Coord.	mccojp@warrencountyesc.org
Nicole Enley	Hamilton Township	Public Rec	nenley@hamilton.tn.us
Alicia Harper	Warren County	Deputy Director	alicia.harper@warrencountyesc.com
Angie Bidinger	Warren County Common Pleas	Director	angie.bidinger@co.warren.oh.us
Scott Butler	Lebanon City Schools	Business Director	butler.scott@lebanonchicago.gov
Steve Perrineau	Harlow Twp	Fire	SPerrineau@harlowtwp.us
Kathy Kuhn	Treasurer	Treasurer-Elect	randall.kuhn@co.warren.oh.us
Dwight Cording	HTEFT	Assistant Trustee	Dwight.Cording@hankinsbankchicago.gov
Pete Masen	WCSD	Asst. Director	Pete.Masen@wv.warren.oh.us
Caroline Whitacre	Village of Moscow	Administrative	Caroline.Whitacre@moscowchicago.gov

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #1 - Sign In Sheet
February 19th, 2025

Name	Home Agency or Organization	Position	Email
Steve Agnewhead	Clearcreek Twp	Fire Chief	
Don Burkhle	Heathcote Twp	Aid Fire Chief	donburkhle@clearcreek-twp.org
Dennis L. Swanson	Mondak	Fire Chief	lswanson@mondak.org
CHRIS EKELE	DEERFIELD TWP	FIRE CHIEF	rene@deerfieldtwp.com
CHUCK BASTIAN	WCHD	ASSISTANT HC	PAUL SETCHEL@wchd.org
Walter Gilbert	Warren County Water Sewer	Senior Engineer	Walter.Gilbert@co.warren.oh.us
Jeff Mitchell	Lebanon	Chief of Police	jeffmitchell@lebanonohio.gov
Kelli Fennell	Franklin City Schools	Business Manager	KFennell@franklincityschools.edu
Barry Foster	MILWAU (CONSECO) CO DISTRICT	CHIEF Twp & FIRE STATION	barry.foster@consec.org
Isaac Severs	Lebanon City Schools	Superintendent	severs.isaac@lebanonschools.org
Amy Forsshell	MtRB	Executive Director	a.forsshell@mtwbwcc.org
Michael Haimovich	PROBATION TRAINING PD	Fire Chief	michael.haimovich@probationtraining.org
Martin Russell	Warren County	Administrator	
Colleen Moran	Franklin PD	Chief of Police	colleen@franklinohio.us

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #1 - Sign In Sheet
February 19th, 2025

Name	Home Agency or Organization	Position	Email
Dwight Edwards	Wayne Twp	Admin	gws.edu@wayne.twp.pa.us
Cheryl Kunkle	Little Miami Schools		ckunkle@lmschools.org
William Rogers	Carlsdale Police Dep	Chief	wrogers@carlsdale.gov
John Moenster	Salmon/Morrow FD	Chief	chief71@station71.com
Randy Ascareo	Shelby's Office	Sgt	Randy.ascar@evanchick.org
Alec Broward	Harris Twp	Chief	Alec.Broward@harris.twp.pa.us
MIKE SANDER	Fridmans City Schools	Superintendent	msander@fridmanschools.org
Mike Arlington	Indian Creek Schools	Operations Manager	arlington.michael@indianschools.org
Melissa Abrams	WC Emergency Services	Office Admin	melissa.abrams@wecnet.net
Melissa Brown	WC Emergency Services	Director	melissa.brown@wecnet.net
Frances Fike	WC EMA	LEPC/Grants Coord	frances.fike@wecnet.net
Sydney Renner	WC EMA	Operations Manager	sydney.renner@wecnet.net
Melissa Murrena	WC EMA	EMA Specialist	nmelissa.murrena@wecnet.net
Sharon Holliday	WC Emergency Services	Admin Assistant	sharon.holliday@wecnet.net

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #1 - Sign In Sheet
February 19th, 2025

[illegible]

APPENDIX 1.3 – PLANNING MEETING SIGN-IN SHEETS

Meeting 2 Attendance

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #2 - Sign In Sheet
April 17, 2025

Name	Home Agency or Organization	Position	Email
Sydney Renner	WCCEMA	Ops Manager	sydney.renner@wccema.net
Frances Ficke	WCCEMA	LEPC/Grants C	frances.ficke@wccema.net
Melissa Abrams	WCEmergency Services	Office Admin	melissa.abrams@wccema.net
Shari Holliday	WCEmergency Services	Office Admin	shari.holliday@wccema.net
Matthew Mullen	WCEMA	EMSA Specialist	matthew.mullen@wccema.net
Jesse Madden	WCEMA	Dep Director	Jesse.Madden@wccema.net
Melissa Bow	WCEMA	Director	Melissa.bow@wccema.net
BEAD UNDERWOOD	LITTLE MOUNTAIN	Director of Grants	beadunderwood@wccema.net
Nathan Horne	Loganville	"	nathan.horne@loganville.org
Harry Holbert	South Echem	Public Works	holbert@south-echem.org
Jean Byrge	WCEMA	Public Safety Officer	jean.byrge@wccema.net
Jenny McLeary	Warren Co. Health District	Emergency Response Coordinator	jenny.mcleary@warrencounty.org
Michael Haggard	WCEMA	Fire Chief	michael.haggard@warrencounty.org
Benny Riley	WCEMA	Fire Chief	benny.riley@warrencounty.org
Jason Beckwith	Waynes Twp	Fire Chief	jason.beckwith@waynes-twp.org

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #2 - Sign In Sheet
April 17, 2025

Name	Home Agency or Organization	Position	Email
Chris Bruster	WCHO	Assistant NC	chris.bruster@warrencounty.org
Will Rogers	Coastal Police	Chief	will.rogers@coastalpolice.org
Matt Clark	Clearcreek Twp	Administrator	matt.clark@clearcreek-twp.org
Mark Hamilton	Dorcas Twp	Dorcas Fire Chief	mark.hamilton@dorcas-twp.org
Steve Pogram	Harlow Twp	Fire Chief	steve.pogram@harlow-twp.org
Mikayla Minton	WCEMA	Intern	mikayla.minton@wccema.net
Brian Pacifico	City of Franklin Police	Chief	brian.pacifico@franklin-nj.org
Chris Edwards	Waynes Twp	Admin	chris.edwards@waynes-twp.org
Jeff Mitchell	Lebanon PD	Chief	jeff.mitchell@lebanon-nj.org
Milly Conley	Warren Co. SWCD	Director, SWCD	milly.conley@warrencounty.org
Zachary Matt	City of Monroe	AD Public Works	zachary.matt@monroe-nj.org
Jason Jansel	Hamilton Township Fire	Fire Chief	jason.jansel@hamilton-twp.org
Gary Esos	THE TELECOM	Dep. Dir.	gary.esos@wccema.net
Dawn Johnson	Warren Co. GIS	Coordinator	dawn.johnson@warrencounty.org
Bryan Shaw	City of Mon	Dep. Chief	bryan.shaw@monroe-nj.org
Mike Sander	PERMITS & UTILITIES	Supervisor	mike.sander@warrencounty.org

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #2 - Sign In Sheet
April 17, 2025

Name	Home Agency or Organization	Position	Email
Mike Stahl	CPC PERMITS	Supervisor	mike.stahl@warrencounty.org
Mark Tish	Village of Morro	"	mark.tish@morro-nj.org
Joshua Red	City of Franklin	Admin	jred@franklin-nj.org
Matt Locke	Kings Local Schols	Business Director	mlocke@kingslocal.org
Peter D'Amico	LEBANON	FIRE CHIEF	peter.damico@lebanon-nj.org
David Loring	Monroe	Chief	david.loring@monroe-nj.org
Caroline Whitman	Village of Morro	Administrator	caroline.whitman@morro-nj.org
Don Davis	Hamilton Township	AC	don.davis@hamilton-twp.org
Paul Kiedoll	Firecom	Director	paul.kiedoll@firecom.org
Jonathan Fink	Waynes Twp	Mayor	jonathan.fink@waynes-twp.org
Pete Major	Warren Co. Bd. of EDD	"	"

APPENDIX 1.3 – PLANNING MEETING SIGN-IN SHEETS

Meeting 3 Attendance

2025 Warren County Hazard Mitigation Plan Update
Community Meeting #3 - Sign In Sheet
June 18, 2025

Name	Home Agency or Organization	Position	Email
Gary Copeland	Waynesville	Police Chief/Manager	gscopeland@waynesville-nc.org
Sydney Renner	WCEMA	Ops Manager	sydney.renner@wccoh.net
Sherril Holliday	WCDES	Admin. Asst.	Sherril.Holliday@wccoh.net
Frances Fike	WCEMA	LEPC/Grants Coord.	frances.fike@wccoh.net
Brenda Underwood	Little Miami	Dir. of Cons.	bunderwood@cmsdoh.org
Mark Tipton	Village of Hamburg		mark.tipton@gmail.com
William Hartzel	Salem Twp	Administrator	WHHARTZEL@SALAMTWP.ORG
Jason Buckner	Wayne Twp	Fire Chief	jason.buckner@wayne-twp.org
Joe Smith	Little Miami USD	Safety Director	j.smith@cmsdoh.org
Wade Marshall	WCSD	Cartman	wmarshall@warrencountydc.org
Chris Barker	WCHD	Assistant HC	chrisbarker@warrencountydc.org
Diana Stawski	WCHD	HC	on file
Steve Pessier	Hartland Twp	Fire Chief	spessier@hartlandtwp.us
Paul Toward	Marion Twp	Fire Chief	Paul.Toward@mariontwp.org
Adam Celon	Franklin OH	Police Chief	acelon@franklinohio.org

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June 18, 2025

Name	Home Agency or Organization	Position	Email
Matt Munn	WCEMA	Specialist	matthew.munn@wccoh.net
Melissa Burr	WCDES	Director	melissa.burr@wccoh.net
Jesse Madden	WCDES	Deputy Director	jessie.madden@wccoh.net
Kevin Fenn	Franklin City Schools	Business Manager	kfenn@franklincityschools.com
Katie Wang	WCDC	INTEEN	wkatie1026@gmail.com
Don Barkle	Hamilton Twp	Asst. Fire Chief	dbarkle@hamiltontwp.org
Amy Biedinger	WCCPC	Director	ambiedinger@warrencountydc.org
Nicole Farley	Hamilton Twp	Parks & Rec	neerlay@hamiltontwp.org
Nick Esche	Deepfield Twp	ARE	reiscadeelfieldtwp.com
Candice Whitacre	Harrow	Administrative	Whitacre.3@osu.edu
Bryan Brummen	Moson	Fire Chief	bbrummen@mosontwp.org

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June 18, 2025

Name	Home Agency or Organization	Position	Email
David Liversidge	Monroe Fire	Chief	liversidge@monroefire.org
Derek Harper	Lebanon Fire	Battalion Chief	dharper@lebanonfire.org
Anthony	FTFD	Chief	
Jenny McLeay	Warren Co Health District	ERC	mcleay@warrencohealth.org
Harry Haley	South Lebanon	P.L.	
Hayes Santa	Warren County RPC	Planning chairman	jsanta@co.warren.oh.us
Gus Edwards	Wayne Twp	Admin	
Jeff Rhein	MHRB	Dep Dir	jeff.rhein@mhrcb.org
Dan Stree	Franklin Fire	Chief	dstree@franklinfire.org
Mike Sander	Franklin City Schools	Superintendent	msander@franklincityschools.com
Jessica Skehan	THC/ISPC	Director	jskehan@healthcollaboratory.org
Benny Riley	Shenandoah	Shenandoah	briley@shenandoahva.gov
Matt Munn	WCEMA	EMA Specialist	matthew.munn@wccoh.net

APPENDIX 2

LIST OF ALL IDENTIFIED MITIGATION STRATEGIES

APPENDIX 2 – LIST OF ALL IDENTIFIED MITIGATION STRATEGIES

Project #	Project	Hazard(s) Addressed
0	Develop and construct a secondary/backup county 911 dispatch and emergency operations center.	All
1	Identify and install hazard notification systems. <i>**To also include consideration for person's with access and functional needs.**</i>	All
2	Increase the use of social media to educate and warn residents and visitors of extreme weather, cyber security, and man-made events.	All
3	Procure generators and transfer switches for critical facilities such as administration and public safety buildings, schools, etc.	All
4	Protect propane tanks or other external fuel sources.	All
5	Develop education programs for residents, tourists, businesses, etc. for hazard-specific threats.	All
6	Conduct an annual review of emergency response policies.	All
7	Collaborate with the visitor's bureau and other local businesses that draw in tourists/visitors to provide hazard preparedness and response information.	All
8	Require event planners to incorporate emergency and disaster planning into their event plans and to submit a copy of this plan to local elected and public safety officials.	All
9	Develop/upgrade storm water drainage systems and maintenance to guide surface water and increase capacity.	All
10	Encourage on-going education for seasoned and newly elected officials to familiarize them with the disaster cycle of prevention, preparedness, mitigation, response and recovery.	All
11	Track and trend locations that have received damage from hazard events in order to more adequately identify mitigation options to prevent further damages.	All
12	Conduct all-hazard vulnerability assessments at critical infrastructures.	All
13	Develop and maintain an intelligence and information sharing platform with private and public agencies to identify and reduce threats/hazards.	All
14	Establish MOUs to provide potable and non-potable water to meet the public's needs.	All
15	Perform regular exercises and drills related to the county's different hazards.	All
16	Promote the acquisition of NOAA weather radios for all businesses, critical facilities, and public use.	All
17	Develop a continuity of operations plan.	All
18	Develop/update emergency operations plans and standard operating procedures.	All
19	Coordinate with utility providers to develop a plan to decrease the risk of outages.	All
20	Develop a plan for evacuating populations at any given time. <i>**To also include consideration for person's with access and functional needs.**</i>	Dam/Levee Failure, Flood, Hazmat Incident, Landslide, Man-Made, Wildfire
21	Educate the public on what "shelter-in-place" means and how this action is performed.	Earthquake, Hazmat Incident, Man-Made, Tornado, Severe Storm
22	Bury power lines to reduce the likelihood of interrupted services.	Earthquake, Landslide, Man-Made, Tornado, Utility Failure, Severe Storm, Winter Storm, Wildfire
23	Upgrade existing overhead utilities lines (e.g., adjust utility pole sizes, utility pole span widths, and/or line strength). Create smaller sections rather than as a complete system to enable faster restoration.	Earthquake, Landslide, Man-Made, Tornado, Utility Failure, Severe Storm, Winter Storm, Wildfire

APPENDIX 2 – LIST OF ALL IDENTIFIED MITIGATION STRATEGIES

Project #	Project	Hazard(s) Addressed
24	Implement a leak detection and repair program to reduce lost water.	Dam/Levee Failure, Drought, Flood
25	Build/establish shelters with generators that can serve displaced citizens.	Dam/Levee Failure, Earthquake, Extreme Temperatures, Flood, Hazmat Incident, Landslide, Man-Made, Tornado, Utility Failure, Severe Storm, Winter Storm, Wildfire
26	Adopt a debris management plan that allows the jurisdiction to recover quicker from hazard events.	Dam/Levee Failure, Earthquake, Flood, Landslide, Tornado, Severe Storm
27	Support and increase participation in the SkyWarn Program (NWS Weather Spotters).	Drought, Extreme Temperatures, Flood, Tornado, Severe Storm, Winter Storm
28	Establish standards regarding tree pruning and vegetation removal around utilities in an effort to reduce outages.	Tornado, Utility Outage, Severe Storms, Winter Storm, Wildfire
29	Install safe rooms/tornado shelters for the population during tornado events.	Severe Storm; Tornado
30	Adopt and enforce building codes for residential and commercial construction that prevents wind damage.	Severe Storm; Tornado
31	Promote Ohio's Safe Room application program to residents for installation of tornado safe rooms in their homes.	Severe Storm; Tornado
32	Assist jurisdictional plan for debris management, mass sheltering, and animal sheltering operations.	Severe Storm; Tornado
33	Reduce damages resulting from straight line winds/tornadoes by providing warning to citizens to store loose/unsecured items on property in advance of the storm.	Severe Storm; Tornado
34	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.	Severe Storm; Tornado
35	Require public permitting process to include calling 811 and providing a copy of their dig ticket.	Hazmat Incident, Utility Failure
36	Promote use of 811 to residents and businesses that sell products that require digging.	Hazmat Incident, Utility Failure
37	Install surge protectors and battery-backups on critical or sensitive electronic equipment.	Man-Made, Utility Failure
38	Increase cyber security protocols to reduce risk of intrusion and subsequent interruption of service.	Cyber Incident
39	Enhance security at critical public safety technology infrastructure site(s).	Cyber Incident, Man-Made
41	Implement cyber security training/programs.	Cyber Incident
42	Maintain up-to-date Safety Data Sheets.	Hazmat Incident
43	Create public education campaign about illicit discharge and how to report spills.	Hazmat Incident
44	Increase soil depth over underground pipelines.	Hazmat Incident
45	Conduct jurisdictional fire inspections of facilities that contain hazardous materials.	Hazmat Incident
46	Develop and conduct training between first responders and chemical facilities for response to a chemical incident.	Hazmat Incident
47	Conduct a commodity flow study to determine the amount of hazardous materials that travel through communities/county.	Hazmat Incident

APPENDIX 2 – LIST OF ALL IDENTIFIED MITIGATION STRATEGIES

Project #	Project	Hazard(s) Addressed
48	Educate and encourage businesses and organizations to follow Tier II Reporting guidelines (federal requirement to report hazardous and extremely hazardous materials on property to local officials).	Hazmat Incident
49	Require a drainage study with new development within jurisdictional boundaries.	Flood
50	Remove debris in rivers and streams that does or could contribute to flooding. <i>*To also include storm-related debris and trees down*</i>	Flood
51	Complete a stormwater drainage/engineering impact study for known problem areas to identify further mitigation actions.	Flood
52	Place depth markers on frequently flooded roads to advise travelers of flooding depths.	Flood
53	Adopt or amend zoning ordinance for better floodplain regulations.	Flood
54	Elevate electrical panels, mechanical equipment, and generators above base flood elevation in facilities located in flood prone areas.	Dam Failure, Flood
55	Relocate structures or systems in flood prone or hazard areas - especially those properties identified as historically or culturally significant to the community.	Dam Failure, Flood
56	Purchase properties susceptible to repeated flooding, remove structures, and enforce permanent restrictions on development.	Dam Failure, Flood
57	Provide information to property owners in flood-prone areas on the need for NFIP coverage.	Dam Failure, Flood
58	Install and support additional river gauges, especially in communities with repetitive flood events or repetitive (flood) loss structures.	Dam Failure, Flood
59	Replace/upgrade deteriorated/restricted culverts, waterlines, and water infrastructure.	Dam Failure, Flood
60	Create dry-access roads by elevating roads above base flood elevation level.	Dam Failure, Flood
61	Conduct regular maintenance for flood control structures such as dams/levees.	Dam Failure, Flood
62	Develop inspection and regular maintenance programs on dams in coordination with local dam owners.	Dam Failure, Flood
63	Conduct analyses and flood studies to identify risks, evaluate removal of existing structures in flood zone, and/or identify other potential structural or nature-based solutions to mitigate flooding.	Dam Failure, Flood
64	Create a public information and education program to sensitize residents to the floodplain and the benefits of preserving these areas.	Dam Failure, Flood
65	Install physical protective measures for critical infrastructures. (i.e. fences, lighting, bollards, etc.)	Man-Made
66	Develop a training and education program for active aggressor incidents in facilities.	Man-Made
67	Designate an Intelligence Liaison Officer (ILO) to help facilitate intelligence and information sharing regarding man-made events/threats.	Man-Made
68	Acquire personal protective equipment for public safety personnel to respond to active aggressor events.	Man-Made
69	Develop an active public reporting system for suspicious activity.	Man-Made
70	Conduct Homeland Security training for critical infrastructure employees.	Man-Made
71	Enhance existing snow removal equipment and supplies.	Winter Storm
72	Evaluate and retrofit older buildings, especially large span buildings that may have inadequate snow load tolerances.	Winter Storm
73	Improve the traffic control on rural roads that are subject to snow drifting and white-out driving conditions.	Winter Storm

APPENDIX 2 – LIST OF ALL IDENTIFIED MITIGATION STRATEGIES

Project #	Project	Hazard(s) Addressed
74	Install roof and wall devices on public buildings to prevent damage from "ice dams".	Winter Storm
75	Install or plant snow fences or "living snow fences" (rows of trees or vegetation) to limit blowing and drifting of snow over critical roadway segments.	Winter Storm
76	Develop a resource manual that can be used to inventory emergency resources that can be deployed to aid in the event of severe winter storms.	Winter Storm
77	Create a public information and education campaign for information dissemination about snow emergency alerts and snow levels.	Winter Storm
78	Acquire warming and/or cooling equipment for facilities with inadequate systems or for response to power outages.	Extreme Temperatures, Winter Storm
79	Promote education campaigns revolving around tips citizens can take to combat extreme temperatures (i.e., leaving faucets dripping to avoid freezing pipes, closing blinds to help block out the heat, etc.)	Extreme Temperatures, Winter Storm
80	Develop plans to respond to infectious diseases, including but not limited to reporting illnesses, social distancing, telecommuting, and facility closures.	Infectious Diseases
81	Promote seasonal influenza vaccination and facilitate on-campus vaccination clinics.	Infectious Diseases
82	Promote proper coughing and sneezing etiquette and hand hygiene.	Infectious Diseases
83	Develop comprehensive sick leave policies that enable sick employees to stay home when they are ill to reduce the risk of spreading the illness in the workplace.	Infectious Diseases
84	Complete a public health plan to identify risk factors in the County, including epidemics, pandemics, drug abuse, and other public health issues.	Infectious Diseases
85	Develop/update plans addressing remote working.	Infectious Diseases
86	Safeguard and harden critical infrastructure systems to meet seismic design standards for "lifelines".	Earthquake
87	Conduct a public building seismic study to determine which buildings are more at risk for damages from an earthquake.	Earthquake
88	Educate homeowners on safety techniques to follow during and after an earthquake.	Earthquake
89	Establish and implement water conservation programs.	Extreme Temperatures
90	Establish ordinances on non-essential use of water during drought conditions.	Extreme Temperatures
91	Increase canopy coverage by planting more trees in public areas and rights-of-way to reduce urban heat.	Extreme Temperatures
92	Establish natural means (such as tree planting and conservation) that protects steep slopes from landslides.	Landslide

APPENDIX 3

**COPIES OF LOCAL RESOLUTIONS
ADOPTING THE
2025 HAZARD MITIGATION PLAN**