CLINTON COUNTY HAZARD MITIGATION PLAN

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1 | Introduction

1.1 Overview

With the 2016 Clinton County Hazard Mitigation Plan set to expire in March of 2021, Clinton County and its constituents are aiming to adopt a new, updated hazard mitigation plan. As outlined in the Disaster Mitigation Act of 2000 (DMA2K), any local jurisdiction seeking funding from the Federal Emergency Management Agency (FEMA) must maintain an up-to-date disaster mitigation plan. This Plan meets the criteria as set forth by FEMA in the DMA2k and provides the County and its participating jurisdictions with a comprehensive guide for future mitigation efforts to combat the hazards that affect their communities.

Natural, geological, and manmade hazards pose a variety of risks to the lives, businesses, and properties within Clinton County. As such, a Core Planning Committee within Clinton County has been established with the goal of developing and implementing the 2021 Clinton County Hazard Mitigation Plan. Through cooperative efforts between local, county, state, and federal government agencies, this Plan is designed to minimize the adverse effects of hazardous events on the lives and properties of residents of Clinton County.

The 2021 Clinton County Hazard Mitigation Plan is a multi-jurisdictional plan which considers the impacts of hazards on incorporated areas (cities and villages) and unincorporated areas (townships). Clinton County's incorporated and unincorporated areas are listed below in **Tables 1.1.1 - 1.1.2**. These jurisdictions are also displayed in **Figure 1.1.1** on the following page. The Plan is designed for a five-year implementation period and describes the methods and procedures utilized in its development, provides the results of community involvement activities such as survey collection, identifies the mitigation activities determined to be the most important to the County, and establishes a timeline for the implementation of the actions.

Table 1.1.1: Clinton County Jurisdictions

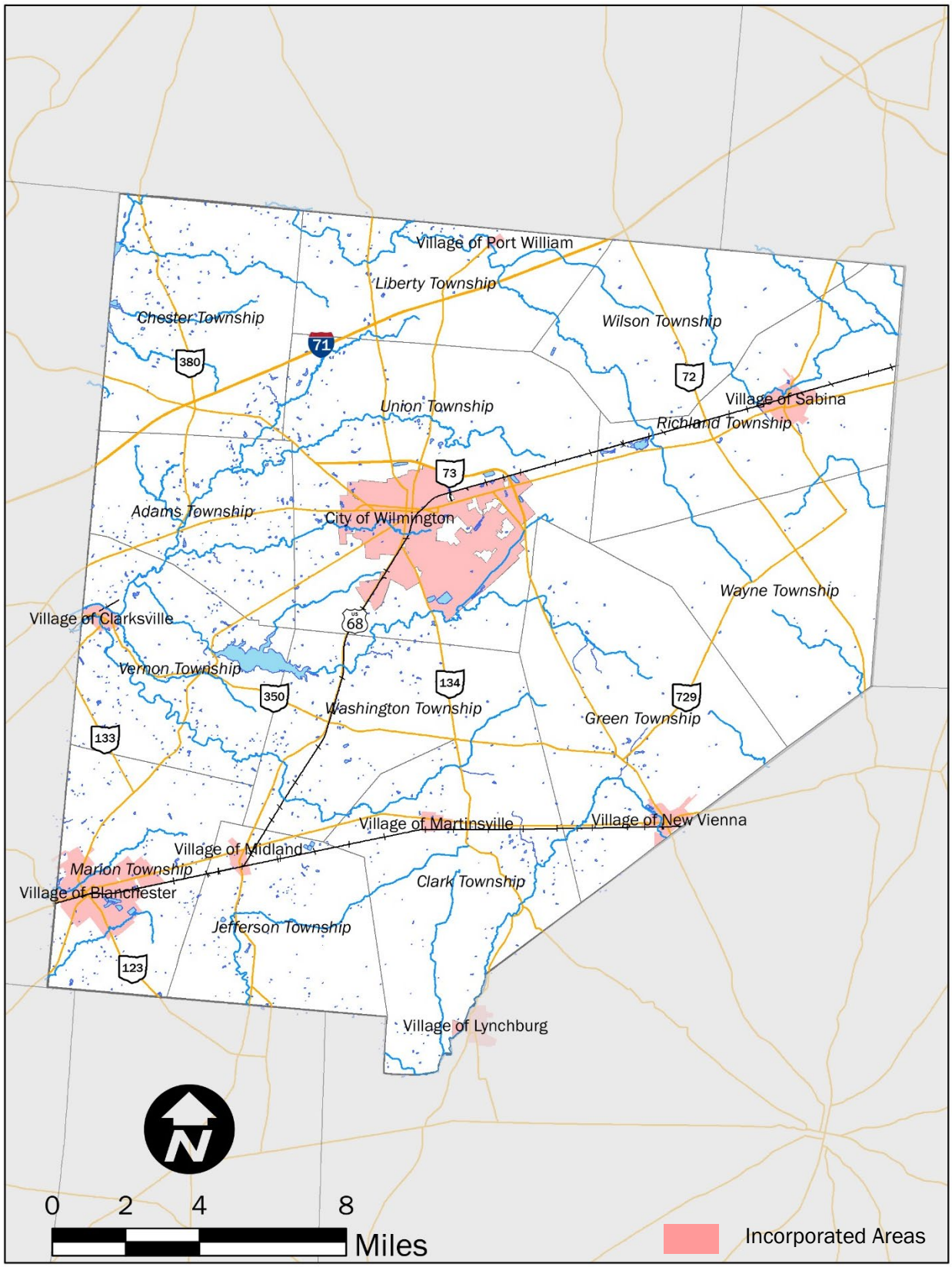
Jurisdictions
City of Wilmington
Village of Blanchester
Village of Clarksville
Village of Martinsville
Village of Midland
Village of New Vienna
Village of Port William
Village of Sabina
(Village of Lynchburg)*

Table 1.1.2: Clinton County Townships

Townships	
Adams Township	Richland Township
Chester Township	Union Township
Clark Township	Vernon Township
Green Township	Washington Township
Jefferson Township	Wayne Township
Liberty Township	Wilson Township
Marion Township	

*Please note: The Village of Lynchburg is located in Highland County on the southeastern border of Clinton County. The Village of Lynchburg previously annexed a partial of a property out of Clinton County for the purpose of building a wastewater plant for the Village. There are two homes in this area which are included in the Clark Township area; however, these homes are included in the Highland County Hazard Mitigation Plan. The Village of Lynchburg continues to actively participate in the Highland County Hazard Mitigation Plan, which was recently updated in 2019.

Figure 1.1.1: Clinton County Jurisdictions Map



This Plan is comprised of six sections, which detail the methods, analysis, and discussion surrounding the various hazards that threaten Clinton County and its jurisdictions. These sections are as follows:

1. This **Introduction** (Section 1) provides a discussion about the general purpose and goals that Clinton 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 2, **History and Demographics**, includes a brief description of Clinton County and each of the jurisdictions participating in this Plan, including their history, population, and other general information.
3. The process for the development of this Plan is detailed in Section 3, **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 how the Plan was developed through public meetings, reviews, and evaluations. This section also details the review and incorporation of existing plans, studies, reports, and technical information.
4. Section 4 contains the **Hazard Identification and Risk Assessment (HIRA)**. This section provides detailed descriptions and a corresponding analysis for each hazard that could potentially affect Clinton County. The nature, location, extent, historical impact, vulnerability, and likelihood of occurrence for each hazard are provided for each hazard. These analyses include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; an estimate of the potential dollar losses to vulnerable structures; and a general description of land uses and development trends within the community.
5. The goals, strategies, and actions for the County are then outlined in Section 5, **Hazard Mitigation**. The proposed actions are presented in tables, categorized by the associated hazard and community, and then ranked from highest to lowest priority based on feedback received from County officials and participating jurisdictions and stakeholders. Excluded hazards are also documented in this section, along with the rationale for exclusion from the Plan.
6. The final section of this Plan, **Schedule and Maintenance**, provides a summary of the proposed Plan adoption, integration, and maintenance schedule. This section describes how the County will review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within five years in order to continue to be eligible for mitigation project grant funding.

The resulting Clinton County Hazard Mitigation Plan will be submitted to the Ohio Emergency Management Agency (Ohio EMA) and subsequently 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 Clinton County as safe and resilient as possible. As such, this Plan aims to:

- Minimize property damage, economic loss, injury, and loss of human life – to achieve the Plan's main goal of reducing the impact of natural and manmade hazards on the County's economy and the well-being of its citizens.
- Enhance public awareness and education – to widen the public's understanding of natural and manmade hazards and how they might affect public health and safety, the environment, the local economy, and basic day-to-day operations.
- Coordinate inter-jurisdictional preparedness measures – to encourage and ensure multi-jurisdictional cooperation in County-wide mitigation actions and programs so that they may be implemented efficiently and effectively.

- Provide decision-making tools for interested stakeholders – to formulate a comprehensive, updated analysis of Clinton County's vulnerability to hazards so that decision makers can better prepare for natural and manmade disasters.
- Achieve regulatory compliance – to ensure that the County and its political subdivisions meet state and federal mitigation planning requirements so that they may be eligible to participate in and receive funding from grant programs, policies, and regulations.

1.2 Setting

Clinton County is located in the southwest region of Ohio and has a total area of approximately 412 square miles. The County contains one city, eight villages (including the Village of Lynchburg), and 13 townships. The City of Wilmington serves as the County seat. Clinton County is bounded by six counties: Greene County (north), Fayette County (northeast), Highland County (southeast), Brown County (south), Clermont County (southwest), and Warren County (west).

Land use patterns in Clinton County are consistent with similar rural counties in Ohio. There are eight land uses in Clinton County, including agriculture, forested land, industrial, mines and quarries, commercial, residential, offices, and government property and institutions (**Figure 1.2.1**). The most common land use in the County is agriculture. Land cover in Clinton County is shown in **Figure 1.2.2**. Land cover types include water, wetlands, forested wetlands, development, pasture, right-of-way, tilled land, towersite, waste, and forest.

1.3 County Features

1.3.1 Transportation

Clinton County contains many major roadways, including Interstates (I), US Routes (US), and State Routes (SR). Notably, I-71 crosses through the northwestern corner of the County. Additional major roadways in Clinton County include: US-22, US-68, SR-28, SR-72, SR-73, SR-123, SR-124, SR-132, SR-133, SR-134, SR-251, SR-350, SR-380, SR-729, and SR-730.

Clinton County contains 15.4 miles of interstate highway, 48.6 miles of US routes, and 145.0 miles of state routes. 26.2 miles of road within the County are part of the National Highway System. Additionally, the County contains 262.3 miles of county roads, 299.6 miles of township roads, and 98.8 miles of municipal roads, which amounts to nearly 660.7 miles of local roads.

The Federal Aviation Administration (FAA) and Clinton County Emergency Management Agency have record of nine aviation facilities in Clinton County, including six airports and three heliports. The Clinton Field Airport is a public use airport located four nautical miles northwest of the central business district of the City of Wilmington. Clinton Field is owned by the Clinton County Board of Commissioners. Wilmington Air Park is also a public use airport located two nautical miles southeast of the central business district of the City of Wilmington. Wilmington Air Park is owned by the Clinton County Port Authority. The remaining airports are privately owned; one is located in the Village of Blanchester and the other three are located in the City of Wilmington. The three heliports include: Clinton Memorial Hospital, Holiday Inn (at I-71 and US-68), and a private heliport off of SR-730.

The Ohio Department of Transportation (ODOT) has record of two active rail lines in Clinton County. The first is an Indiana & Ohio Railway, which is a freight railroad that runs from the Village of Blanchester through the Village of Midland, the City of Wilmington, and the Village of Sabina. The second is a private rail road owned by the Village of Greenfield (Highland/Ross Counties). This line runs from the Village of Midland through the Villages of Martinsville and New Vienna and continues on to the Village of Greenfield.

Figure 1.2.1: Clinton County Land Use Map

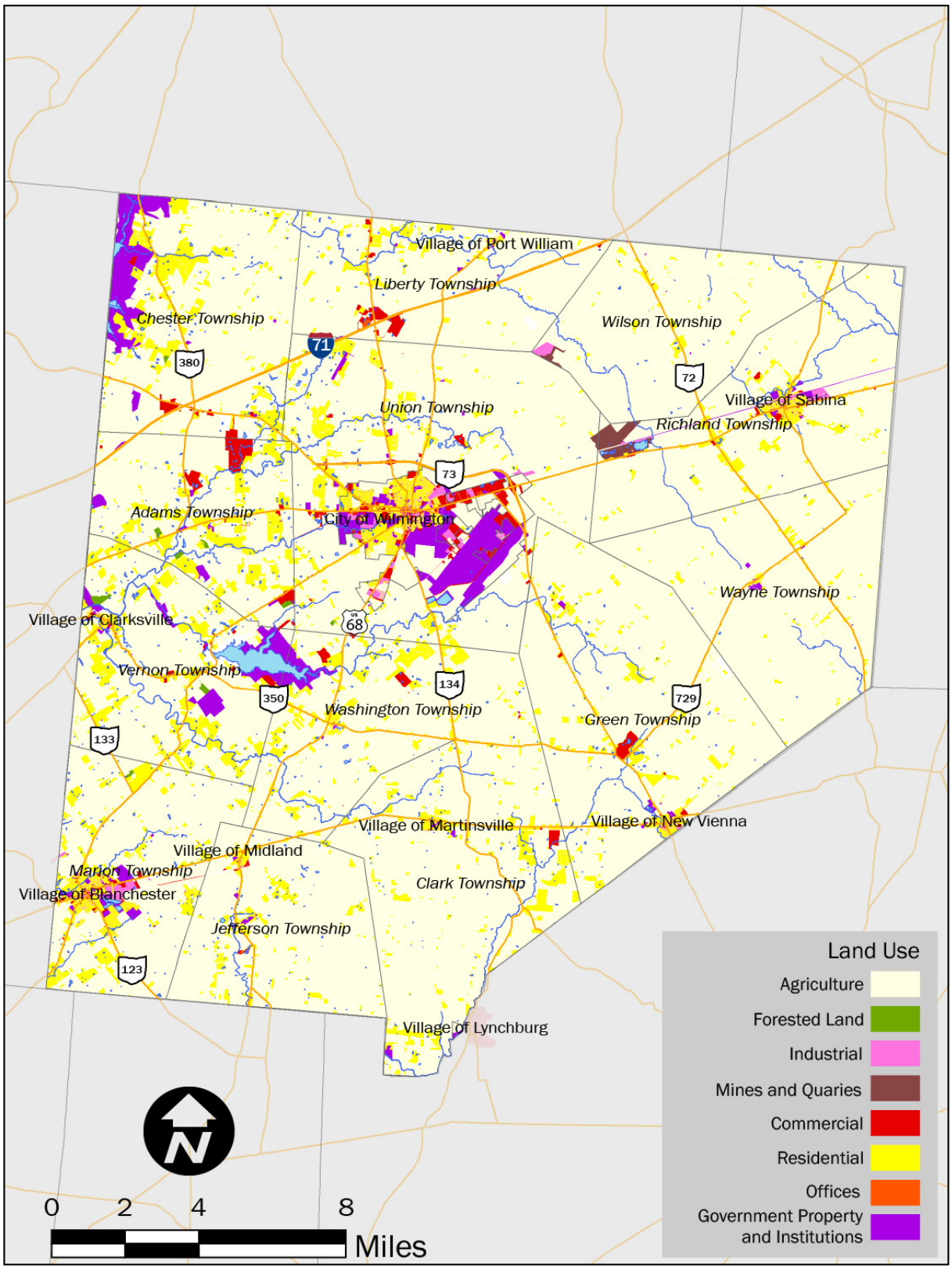
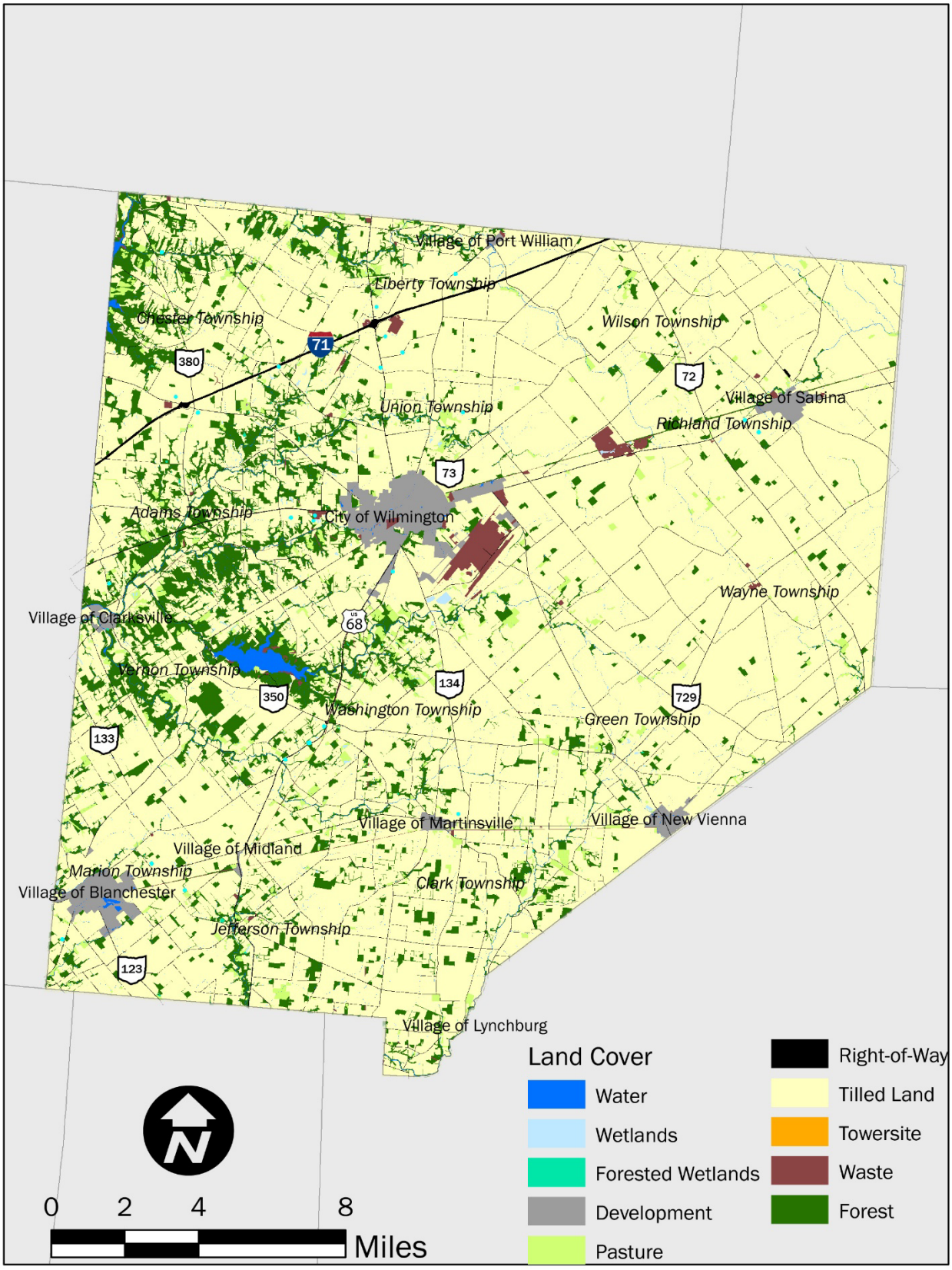


Figure 1.2.2: Clinton County Landcover Map



1.3.2 Natural Features

Tables 1.3.1 and 1.3.2, below, display Clinton County's rivers along with a list of the County's Parks & Nature Preserves.

Table 1.3.1: Clinton County Streams

Name
Anderson Fork
Caesar Creek
Jonahs Run
Lees Creek
Lytle Creek
Rattlesnake Creek
Todd Fork
Wilson Creek

Table 1.3.2: Clinton County Parks & Nature Preserves

Name	Acreage
Anliot-Davidson Woods	58
Caesar Creek State Park	3,741
Caesar Creek Lake State Wildlife Area	10,186
Cherrybend Pheasant Farm	640
Collett Woods Nature Preserve	60
Cowan Lake State Park	1,075
Culberson Woods State Nature Preserve	280
Dr. Nathan Hale Woods	60

2 | History and Demographics

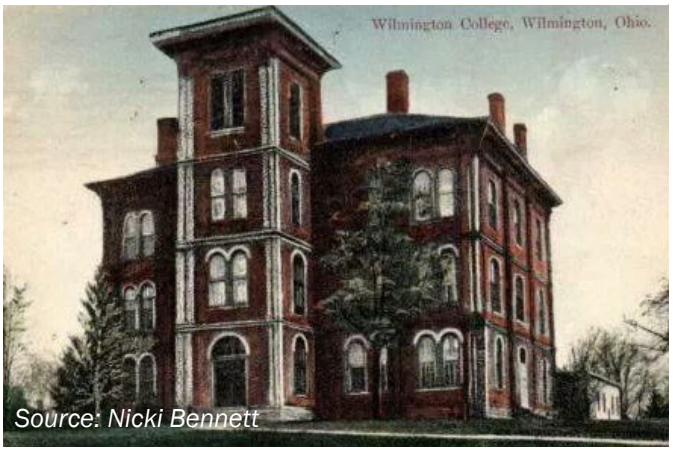
2.1 History

Clinton County's creation was authorized by the Ohio government on February 19, 1810. The County is named after George Clinton, the Vice President of United States in 1810. Early residents of the County were members of the Society of Friends, commonly known as Quakers. They contributed towards the Underground Railroad between the 1830s and 1860s by helping enslaved African Americans escape into the Northern states. They also helped establish the Wilmington College in the 1870s.

There are several locations in Clinton County, Ohio that contribute to its rich history and culture. Historical Markers, as identified by The Clinton County History Center, can be found in the following locations:

- Deserted Camp, Wilmington
- Garrison Corner Community, Blanchester
- Gilbert Van Zandt, Port William
- Beam Farm Woodland Archaeological District, Sabina
- Wilmington College, Wilmington **(Figure 2.1.1)**
- Indian Trails of Clinton County, Wilmington
- Marble Hall, Wilmington
- The Thunderstorm Project, Wilmington
- Wilmington Library, Wilmington
- Military Air Disaster, Wilmington
- 1968 Clinton County AFB C-119G Plane Crash, Wilmington
- Jonah's Run Baptist Church/Underwood Farms Historic District, Wilmington
- Clinton County Courthouse, Wilmington

Figure 2.1.1: College Hall, Wilmington College



Source: Nicki Bennett

Clinton County is primarily rural. Between 1990 and 2000, the County experienced a rapid 14 percent growth in population, raising the total to 40,543 residents. As per 2018 American Community Survey (ACS), the residents of the County mostly work in the educational, healthcare, and social assistance sectors, followed by manufacturing, retail trade, and transportation sectors. Although the County consists of some of the most fertile and productive soil in the United States, fewer people work in the agriculture sector.

Figure 2.1.2: The Thunderstorm Project Historical Marker

Source: NOAA

The Thunderstorm Project

Clinton County has a unique history as being one of two test sites for the Thunderstorm Project, which was launched in 1945 to study the causes and characteristics of thunderstorms, as well as their adverse effects on the aviation industry. The Thunderstorm Project was the nation's first large-scale scientific study of thunderstorms and the first multi-agency meteorological project mandated and funded by the U.S. Congress. In 1947, the second phase of the Thunderstorm Project was conducted in Wilmington given its large military base, the Clinton County Army Force Base, which eventually became Wilmington Air Park.

A historical marker for the Thunderstorm Project is located at the Wilmington College Lytle Creek Greenway on Davids Drive in Wilmington (**Figure 2.1.2**). The Project demonstrated that radar could be used to detect the most dangerous parts of thunderstorms and guide airplanes around them. Ultimately, findings from the Thunderstorm Project formed the foundation for today's understanding of thunderstorms, including the life-cycle of a thunderstorm, and related weather phenomena.

2.2 Communication Outlets

Additional County communication outlets including websites, mass media, and social media are listed in **Table 2.2.1**, below:

Table 2.2.1: Communication Outlets and Social Media

Communication Type	Source
Website	Clinton County https://co.clinton.oh.us/
Facebook	Clinton County Convention & Visitors Bureau https://www.facebook.com/clintoncountyohio/ Clinton County Emergency Management Agency https://www.facebook.com/ClintonEMA/
Instagram	Clinton County History Center https://www.instagram.com/clintoncountyhistory/ Clinton County Convention & Visitors Bureau https://www.instagram.com/clintoncountycvb/ Clinton County Health Department https://www.instagram.com/clintoncountyhealth/
Twitter	Visit Clinton County https://twitter.com/visitclintoncty
Newspaper	Wilmington News Journal https://www.wnewsj.com/
Radio	WALH Radio https://walhradio.com/

2.3 Demographics Overview

The American Community Survey (ACS), provided by the U.S. Census, offers population estimates for Clinton County and all townships within the County. **Table 2.3.1**, below, provides a summary of the total population changes that have occurred in Clinton County between the 2010 U.S. Census and the 2018 ACS. The estimates show that Clinton County's population declined by 144 people (0.34 percent) between 2010 and 2018. Additionally, all but four townships experienced population decline. These four townships are Adams, Chester, Union, and Vernon townships, of which, Chester township experienced the greatest gain in population by an increase of 438 people (22.27 percent). Of the townships experiencing population decrease, Wilson Township experienced the greatest population decline of 77 people (15.25 percent).

A more detailed description of population, housing, and income demographics for Clinton County and each jurisdiction is discussed on the following pages.

Table 2.3.1: County/Township population growth estimates between 2010 Census and 2018 ACS

County/Township	Total Population 2010 Census	Total Population 2018 ACS	2010-2018	
			Population Change	Percent Change
Clinton County	42,040	41,896	-144	-0.34%
Adams Township	2,091	2,101	10	0.48%
Chester Township	1,967	2,405	438	22.27%
Clark Township	2,123	2,076	-47	-2.21%
Green Township	2,473	2,382	-91	-3.68%
Jefferson Township	1,399	1,284	-115	-8.22%
Liberty Township	1,067	1,012	-55	-5.15%
Marion Township	5,394	5,379	-15	-0.28%
Richland Township	3,573	3,557	-16	-0.45%
Union Township	3,085	3,087	2	0.06%
Vernon Township	2,997	3,004	7	0.23%
Washington Township	2,130	2,078	-52	-0.02%
Wayne Township	716	700	-16	-2.23%
Wilson Township	505	428	-77	-15.25%

2.4 Clinton County

Tables 2.4.1 to 2.4.3 summarize Clinton County's population, housing statistics, and income statistics. The tables show that the County's population declined by 144 people (0.34 percent) from 2010 to 2018. For housing units, the County had a combined owned and rental housing vacancy rate of 9.95 percent. Related to income, the largest percentage of households (19.32 percent) had an income between $50,000 and $74,999; approximately 12.11 percent of households had an annual income of less than $15,000.

Table 2.4.1: Clinton County Population Totals 2010-2018

Year & Source	Population Total
2010 Census	42,040
2011 ACS Estimate	42,296
2012 ACS Estimate	42,161
2013 ACS Estimate	42,013
2014 ACS Estimate	41,871
2015 ACS Estimate	41,892
2016 ACS Estimate	41,854
2017 ACS Estimate	41,869
2018 ACS Estimate	41,896

Table 2.4.2: Clinton County Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	18,178
Occupied Housing Units (Owned & Rented)	16,370
Vacant Housing Units (Owned & Rented)	1,808
Vacancy Rate of Owned & Rented Housing (percent)	9.95%

Table 2.4.3: Clinton County Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	1,022
$10,000 to $14,999	961
$15,000 to $24,999	1,856
$25,000 to $34,999	1,881
$35,000 to $49,999	2,289
$50,000 to $74,999	3,163
$75,000 to $99,999	1,930
$100,000 to $149,999	2,292
$150,000 to $199,999	575
$200,000 or more	401
Median Household Income	$51,354
Mean Household Income	$67,669

2.5 City of Wilmington

Tables 2.5.1 to 2.5.3 summarize City of Wilmington's population, housing statistics, and income statistics. The tables show that the City's population declined by 117 people (0.93 percent) from 2010 to 2018. For housing units, the City had a combined owned and rental housing vacancy rate of 13.70 percent. Related to income, the largest percentage of households (17.11 percent) had an income between $15,000 and $24,999; approximately 19.02 percent of households had an annual income of less than $15,000.

Table 2.5.1: City of Wilmington Population Totals 2010-2018

Year & Source	Population Total
2010 Census	12,520
2011 ACS Estimate	12,595
2012 ACS Estimate	12,545
2013 ACS Estimate	12,500
2014 ACS Estimate	12,424
2015 ACS Estimate	12,428
2016 ACS Estimate	12,441
2017 ACS Estimate	12,396
2018 ACS Estimate	12,403

Table 2.5.2: City of Wilmington Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	5,904
Occupied Housing Units (Owned & Rented)	5,095
Vacant Housing Units (Owned & Rented)	809
Vacancy Rate of Owned & Rented Housing (percent)	13.70%

Table 2.5.3: City of Wilmington Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	429
$10,000 to $14,999	540
$15,000 to $24,999	872
$25,000 to $34,999	733
$35,000 to $49,999	757
$50,000 to $74,999	695
$75,000 to $99,999	438
$100,000 to $149,999	456
$150,000 to $199,999	76
$200,000 or more	99
Median Household Income	$34,608
Mean Household Income	$58,430

2.6 Village of Blanchester

Tables 2.6.1 to 2.6.3 summarize Village of Blanchester's population, housing statistics, and income statistics. The tables show that the Village's population declined by 157 people (3.70 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 7.79 percent. Related to income, the largest percentage of households (16.27 percent) had an income between $50,000 and $74,999; approximately 13.81 percent of households had an annual income of less than $15,000.

Table 2.6.1: Village of Blanchester Population Totals 2010-2018

Year & Source	Population Total
2010 Census	4,243
2011 ACS Estimate	4,172
2012 ACS Estimate	4,162
2013 ACS Estimate	4,287
2014 ACS Estimate	4,182
2015 ACS Estimate	4,244
2016 ACS Estimate	4,163
2017 ACS Estimate	4,074
2018 ACS Estimate	4,086

Table 2.6.2: Village of Blanchester Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	1,720
Occupied Housing Units (Owned & Rented)	1,586
Vacant Housing Units (Owned & Rented)	134
Vacancy Rate of Owned & Rented Housing (percent)	7.79%

Table 2.6.3: Village of Blanchester Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	150
$10,000 to $14,999	69
$15,000 to $24,999	271
$25,000 to $34,999	172
$35,000 to $49,999	213
$50,000 to $74,999	258
$75,000 to $99,999	184
$100,000 to $149,999	189
$150,000 to $199,999	73
$200,000 or more	7
Median Household Income	$41,410
Mean Household Income	$60,358

2.7 Village of Clarksville

Tables 2.7.1 to 2.7.3 summarize Village of Clarksville's population, housing statistics, and income statistics. The tables show that the Village's population increased by 133 people (24.27 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 18.86 percent. Related to income, the largest percentage of households (21.16 percent) had an income between $35,000 and $49,999; approximately 18.67 percent of households had an annual income of less than $15,000.

Table 2.7.1: Village of Clarksville Population Totals 2010-2018

Year & Source	Population Total
2010 Census	548
2011 ACS Estimate	595
2012 ACS Estimate	641
2013 ACS Estimate	494
2014 ACS Estimate	457
2015 ACS Estimate	592
2016 ACS Estimate	634
2017 ACS Estimate	596
2018 ACS Estimate	681

Table 2.7.2: Village of Clarksville Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	297
Occupied Housing Units (Owned & Rented)	241
Vacant Housing Units (Owned & Rented)	56
Vacancy Rate of Owned & Rented Housing (percent)	18.86%

Table 2.7.3: Village of Clarksville Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	27
$10,000 to $14,999	18
$15,000 to $24,999	19
$25,000 to $34,999	17
$35,000 to $49,999	51
$50,000 to $74,999	41
$75,000 to $99,999	38
$100,000 to $149,999	27
$150,000 to $199,999	0
$200,000 or more	3
Median Household Income	$44,821
Mean Household Income	$54,391

2.8 Village of Lynchburg

Tables 2.8.1 to 2.8.3 summarize Village of Lynchburg's population, housing statistics, and income statistics. The tables show that the Village's population declined by 168 people (11.21 percent) from 2010 to 2018. For housing units, the County had a combined owned and rental housing vacancy rate of 8.53 percent. Related to income, the largest percentage of households (15.86 percent) had an income between $50,000 and $74,999; approximately 18.10 percent of households had an annual income of less than $15,000.

Table 2.8.1: Village of Lynchburg Population Totals 2010-2018

Year & Source	Population Total
2010 Census	1,499
2011 ACS Estimate	1,471
2012 ACS Estimate	1,355
2013 ACS Estimate	1,429
2014 ACS Estimate	1,290
2015 ACS Estimate	1,350
2016 ACS Estimate	1,310
2017 ACS Estimate	1,361
2018 ACS Estimate	1,331

Table 2.8.2: Village of Lynchburg Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	586
Occupied Housing Units (Owned & Rented)	536
Vacant Housing Units (Owned & Rented)	50
Vacancy Rate of Owned & Rented Housing (percent)	8.53%

Table 2.8.3: Village of Lynchburg Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	28
$10,000 to $14,999	69
$15,000 to $24,999	83
$25,000 to $34,999	75
$35,000 to $49,999	73
$50,000 to $74,999	85
$75,000 to $99,999	75
$100,000 to $149,999	42
$150,000 to $199,999	3
$200,000 or more	3
Median Household Income	$37,800
Mean Household Income	$47,374

2.9 Village of Martinsville

Tables 2.9.1 to 2.9.3 summarize Village of Martinsville's population, housing statistics, and income statistics. The tables show that the Village's population increased by 29 people (6.26 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 9.88 percent. Related to income, the largest percentage of households (27.74 percent) had an income between $50,000 and $74,999; approximately 13.55 percent of households had an annual income of less than $15,000.

Table 2.9.1: Village of Martinsville Population Totals 2010-2018

Year & Source	Population Total
2010 Census	463
2011 ACS Estimate	478
2012 ACS Estimate	454
2013 ACS Estimate	480
2014 ACS Estimate	398
2015 ACS Estimate	406
2016 ACS Estimate	425
2017 ACS Estimate	502
2018 ACS Estimate	492

Table 2.9.2: Village of Martinsville Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	172
Occupied Housing Units (Owned & Rented)	155
Vacant Housing Units (Owned & Rented)	17
Vacancy Rate of Owned & Rented Housing (percent)	9.88%

Table 2.9.3: Village of Martinsville Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	11
$10,000 to $14,999	10
$15,000 to $24,999	15
$25,000 to $34,999	20
$35,000 to $49,999	22
$50,000 to $74,999	43
$75,000 to $99,999	24
$100,000 to $149,999	8
$150,000 to $199,999	2
$200,000 or more	0
Median Household Income	$49,821
Mean Household Income	$51,792

2.10 Village of Midland

Tables 2.10.1 to 2.10.3 summarize Village of Midland's population, housing statistics, and income statistics. The tables show that the Village's population declined by 37 people (11.75 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 27.13 percent. Related to income, the largest percentage of households (24.47 percent) had an income between $50,000 and $74,999; approximately 27.66 percent of households had an annual income of less than $15,000.

Table 2.10.1: Village of Midland Population Totals 2010-2018

Year & Source	Population Total
2010 Census	315
2011 ACS Estimate	325
2012 ACS Estimate	429
2013 ACS Estimate	456
2014 ACS Estimate	441
2015 ACS Estimate	422
2016 ACS Estimate	352
2017 ACS Estimate	302
2018 ACS Estimate	278

Table 2.10.2: Village of Midland Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	129
Occupied Housing Units (Owned & Rented)	94
Vacant Housing Units (Owned & Rented)	35
Vacancy Rate of Owned & Rented Housing (percent)	27.13%

Table 2.10.3: Village of Midland Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	13
$10,000 to $14,999	13
$15,000 to $24,999	3
$25,000 to $34,999	16
$35,000 to $49,999	10
$50,000 to $74,999	23
$75,000 to $99,999	14
$100,000 to $149,999	2
$150,000 to $199,999	0
$200,000 or more	0
Median Household Income	$38,333
Mean Household Income	$41,898

2.11 Village of New Vienna

Tables 2.11.1 to 2.11.3 summarize Village of New Vienna's population, housing statistics, and income statistics. The tables show that the Village's population declined by 10 people (0.82 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 6.95 percent. Related to income, the largest percentage of households (21.81 percent) had an income between $50,000 and $74,999; approximately 15.13 percent of households had an annual income of less than $15,000.

Table 2.11.1: Village of New Vienna Population Totals 2010-2018

Year & Source	Population Total
2010 Census	1,224
2011 ACS Estimate	1,246
2012 ACS Estimate	1,432
2013 ACS Estimate	1,501
2014 ACS Estimate	1,475
2015 ACS Estimate	1,424
2016 ACS Estimate	1,377
2017 ACS Estimate	1,291
2018 ACS Estimate	1,214

Table 2.11.2: Village of New Vienna Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	547
Occupied Housing Units (Owned & Rented)	509
Vacant Housing Units (Owned & Rented)	38
Vacancy Rate of Owned & Rented Housing (percent)	6.95%

Table 2.11.3: Village of New Vienna Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	45
$10,000 to $14,999	32
$15,000 to $24,999	51
$25,000 to $34,999	72
$35,000 to $49,999	101
$50,000 to $74,999	111
$75,000 to $99,999	42
$100,000 to $149,999	48
$150,000 to $199,999	0
$200,000 or more	7
Median Household Income	$43,429
Mean Household Income	$55,673

2.12 Village of Port William

Tables 2.12.1 to 2.12.3 summarize Village of Port William's population, housing statistics, and income statistics. The tables show that the Village's population declined by 28 people (11.02 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 17.76 percent. Related to income, the largest percentage of households (21.59 percent) had an income below $10,000 and approximately 23.86 percent of households had an annual income of less than $15,000.

Table 2.12.1: Village of Port William Population Totals 2010-2018

Year & Source	Population Total
2010 Census	254
2011 ACS Estimate	275
2012 ACS Estimate	324
2013 ACS Estimate	331
2014 ACS Estimate	290
2015 ACS Estimate	249
2016 ACS Estimate	283
2017 ACS Estimate	246
2018 ACS Estimate	226

Table 2.12.2: Village of Port William Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	107
Occupied Housing Units (Owned & Rented)	88
Vacant Housing Units (Owned & Rented)	19
Vacancy Rate of Owned & Rented Housing (percent)	17.76%

Table 2.12.3: Village of Port William Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	19
$10,000 to $14,999	2
$15,000 to $24,999	8
$25,000 to $34,999	9
$35,000 to $49,999	16
$50,000 to $74,999	16
$75,000 to $99,999	13
$100,000 to $149,999	5
$150,000 to $199,999	0
$200,000 or more	0
Median Household Income	$38,750
Mean Household Income	$44,582

2.13 Village of Sabina

Tables 2.13.1 to 2.13.2 summarize Village of Sabina's population, housing statistics, and income statistics. The tables show that the Village's population declined by 110 people (4.29 percent) from 2010 to 2018. For housing units, the Village had a combined owned and rental housing vacancy rate of 13.29 percent. Related to income, the largest percentage of households (21.55 percent) had an income between $50,000 and $74,999; approximately 19.35 percent of households had an annual income of less than $15,000.

Table 2.13.1: Village of Sabina Population Totals 2010-2018

Year & Source	Population Total
2010 Census	2,564
2011 ACS Estimate	2,791
2012 ACS Estimate	2,687
2013 ACS Estimate	2,498
2014 ACS Estimate	2,327
2015 ACS Estimate	2,352
2016 ACS Estimate	2,399
2017 ACS Estimate	2,372
2018 ACS Estimate	2,454

Table 2.13.2: Village of Sabina Housing Statistics 2018 Estimate

Housing Statistics	Number
Total Housing Units	1,204
Occupied Housing Units (Owned & Rented)	1,044
Vacant Housing Units (Owned & Rented)	160
Vacancy Rate of Owned & Rented Housing (percent)	13.29%

Table 2.13.3: Village of Sabina Income Statistics 2018 Estimate

Household Income Statistics	Number of Households
Less than $10,000	114
$10,000 to $14,999	88
$15,000 to $24,999	190
$25,000 to $34,999	171
$35,000 to $49,999	128
$50,000 to $74,999	225
$75,000 to $99,999	78
$100,000 to $149,999	38
$150,000 to $199,999	0
$200,000 or more	12
Median Household Income	$32,670
Mean Household Income	$48,743

3 | Planning Process

3.1 Methodology

The Planning Process chapter describes the steps involved in the development of the Clinton County Hazard Mitigation Plan, including details about who participated, how community involvement was organized and promoted throughout the community, what hazards were included in the Plan and why, as well as how stakeholder involvement played a critical role in the planning process. This chapter also explains how the Core Planning Committee was formed and how member feedback contributed to the updating of the County's Hazard Mitigation Plan.

3.2 Existing Plans and Regulations

Clinton County and the State of Ohio maintain several plans and tools that were pertinent to reference in the development of the 2021 Hazard Mitigation Plan including:

- 2016 Clinton County Hazard Mitigation Plan
- 2019 State of Ohio Hazard Mitigation Plan (SOHMP)
- Clinton County Comprehensive Plan
- Clinton County Subdivision Regulations
- Clinton County Zoning Resolution
- Clinton County Zoning Maps
- Clinton County Parks and Open Space Plan
- Clinton County Emergency Operations Plan

3.3 Clinton County Authority to Adopt Plan

Table 3.3.1 lists the existing authorities and regulations in place in Clinton County and its municipalities.

Table 3.3.1: Existing Authorities and Regulations in Clinton County's Municipalities

Community	Planning Commission	Comprehensive Plan	Floodplain Regulation	Building Codes*	Zoning Ordinances	Capital Budget	Public Works Budget
Clinton County	Yes	Yes	Yes	Yes	Yes	(None)	Limited in-kind wages only
City of Wilmington	Yes	Yes	Yes	Yes	Yes	(None)	Limited in-kind wages only
Village of Blanchester	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only
Village of Clarksville	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only

Community	Planning Commission	Comprehensive Plan	Floodplain Regulation	Building Codes*	Zoning Ordinances	Capital Budget	Public Works Budget
Village of Martinsville	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only
Village of Midland	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only
Village of New Vienna	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only
Village of Port William	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only
Village of Sabina	County**	County**	County**	County**	County**	(None)	Limited in-kind wages only

** All jurisdictions within the State now follow the State Building Code (Ohio Administrative Code 4101:1).*
*** Follows the County's plans.*

3.4 Notification Process

Core Planning Committee members were invited to participate at the beginning of the planning process through a Kickoff Meeting announcement. Prior to each additional meeting, members of the Core Planning Committee were invited to participate via an email notification. Additionally, press releases were issued via the *Wilmington News Journal*. Public announcements were also posted to the County EMA's Facebook page. Representatives from the following entities were invited to participate in the planning process. Additionally, **Table 3.4.1** lists the participating jurisdictions and representatives and how they participated.

Clinton County

- Clinton County Building & Zoning
- Clinton County Commissioners
- Clinton County Economic Development
- Clinton County EMA
- Clinton County Emergency Medical Services
- Clinton County Engineer
- Clinton County GIS
- Clinton County Health District
- Clinton County Port Authority
- Clinton County Regional Planning Commission
- Clinton County Sheriff's Office
- Clinton County Soil & Water Conservation District
- Clinton County Solid Waste Management District
- Clinton County Visitor's Bureau
- Wilmington-Clinton County Chamber of Commerce

City and Village Members

- City of Wilmington
- Village of Blanchester
- Village of Clarksville
- Village of Martinsville
- Village of Midland
- Village of New Vienna
- Village of Port William
- Village of Sabina

Township Members

- Adams Township
- Chester Township
- Clark Township
- Green Township
- Jefferson Township
- Liberty Township
- Marion Township
- Richland Township
- Union Township
- Vernon Township
- Washington Township
- Wayne Township
- Wilson Township

Local Schools and Universities

- Blanchester Local School District
- Clinton-Massie Local School District
- East Clinton Local School District
- Wilmington City School District
- Wilmington Christian Academy
- OSU Extension

Other Organizations

- Alkermes, Inc.
- American Red Cross
- Council on Aging (Southwest Ohio)
- Duke Energy
- LGSTX Services
- National Weather Service Wilmington
- Polaris
- Brown County Emergency Management Agency
- Highland County Emergency Management Agency

Table 3.4.1: Participating Jurisdictions

Community/Organization	Representative(s)	Meetings Attended		
		1	2	Other
County				
Clinton County Emergency Management Agency	Thomas Breckel, Director Misty Dixon, Office Assistant	✓	✓	
Clinton County Commissioners	Brenda K. Woods, Commissioner Kerry Steed, Commissioner Diana Groves, Clerk	✓	✓	
Clinton County Engineer's Office	Jeff Linkous, Engineer Adam Fricke, Deputy Engineer	✓	✓	
Clinton County Health District	Pamela Walker-Bauer, Health Commissioner Brittane Dance, Disaster Health Planner	✓	✓	
Clinton County History Center	Shelby Boatman, Executive Director	✓		

Community/Organization	Representative(s)	Meetings Attended		
		1	2	Other
Clinton County Port Authority	Dan Evers, Executive Director Beth Huber, Associate Director	✓	✓	
Clinton County Recorder's Office	Brenda Huff, Recorder	✓		
Clinton County Regional Planning	Taylor Stuckert, Executive Director Emily Long, Associate Director	✓	✓	
Clinton County Sheriff's Office	Brian Prickett, Chief Deputy	✓	✓	
Clinton-Warren Joint Fire & Rescue District	Bob Wysong, Chief			✓
Wilmington-Clinton County Chamber of Commerce	Dessie Rogers, Executive Director	✓		
Cities & Villages				
City of Wilmington	Rick Schaffer, Public Works Director Andy Mason, Fire Chief Brian Shidaker, Service Director Eric Green, Stormwater Administrator Travis Luncan, Source Water Protection Coordinator Rick Birt, Lieutenant	✓	✓	✓
Village of Blanchester	John M. Carman, Mayor Scott Reinbolt, Police Chief		✓	✓
Village of Clarksville	John Neeley, Mayor Bob Wysong, Fire Chief (Clinton-Warren Joint Fire District – provides service for Clarksville)			✓
Village of Martinsville	Ed King, Mayor			✓
Village of Midland	Jim Burris, Mayor			✓
Village of New Vienna	Kathi Stone, Mayor			✓
Village of Port William	Steve Jones, Mayor			✓
Village of Sabina	Jim Mongold, Mayor Kenyon Young, Police Chief John Grehl, Sergeant	✓		✓

*If representatives were unable to attend the in-person Core Planning Committee meetings, they participated via "Other" formats, including online surveys, as documented in **Appendix G**.*

Core Planning Committee members were invited to participate at the beginning of the planning process through a Kickoff Meeting announcement which was sent out in two formats – via email and via a packet that provided hard copies of the materials to each jurisdiction. Prior to each additional meeting, members of the Core Planning Committee were invited to participate via an email notification. Members of the public were encouraged to attend public meetings through press releases and social media announcements.

In addition to these members of the Core Planning Committee, David Bushelman, Director of the Highland County EMA, and Barb Davis, Director of the Brown County EMA also participated.

3.5 Meetings

The following section details the meetings that took place during the planning process. Documentation of each meeting, including newspaper postings, email announcements and attachments, meeting materials, and completed surveys, can be found in **Appendix G**.

3.5.1 Core Planning Committee Kick-off

A Kickoff Announcement was emailed to stakeholders on May 19, 2020 inviting them to participate in the 2021 Clinton County Hazard Mitigation Plan update process as part of the Core Planning Committee. Physical "Kickoff Packets" were also mailed to each jurisdiction. All kickoff materials were also made available on the project's website (www.burtonplanning.com/Clinton-hmp).

The Announcement outlined the following details regarding the planning process:

- Goals of the Hazard Mitigation Plan;
- A summary of who is involved in the planning process;
- Federal requirements of the hazard mitigation planning process;
- An overview of the hazard mitigation planning process;
- The proposed schedule for the Clinton County Plan update;
- The role of the Core Planning Committee in the update process;
- Contact information for both Clinton County EMA and Burton Planning Services; and
- Dates, times, and GoToMeeting links of upcoming Core Planning and Public Meetings.

3.5.2 Core Planning Committee Meeting 1

The first Core Planning Committee meeting took place on Wednesday, June 24, 2020, at 2:30 PM. Due to the COVID-19 Pandemic, this meeting was held virtually using GoToMeeting (**Figure 3.5.1**). Members of the Core Planning Committee were invited to either attend using the GoToMeeting app on their phone or desktop or call into the meeting using a phone number. A total of 41 people attended the meeting, including four representatives from Burton Planning Services (BPS) and the Director of the Clinton County Emergency Management Agency.

The meeting began with a brief introduction from Anna van der Zwaag, Associate Planner at Burton Planning Services. This introduction included a description of the virtual engagement process, including multiple options for participants to sign in to the meeting virtually. Participants were reminded multiple times throughout the course of the meeting to sign in using the SurveyMonkey survey, via the GoToMeeting Chat, or by sending an email to the County EMA. The introduction also informed attendees that they could ask questions using the chat feature in GoToMeeting, or by unmuting themselves and asking their questions at any time throughout the meeting.

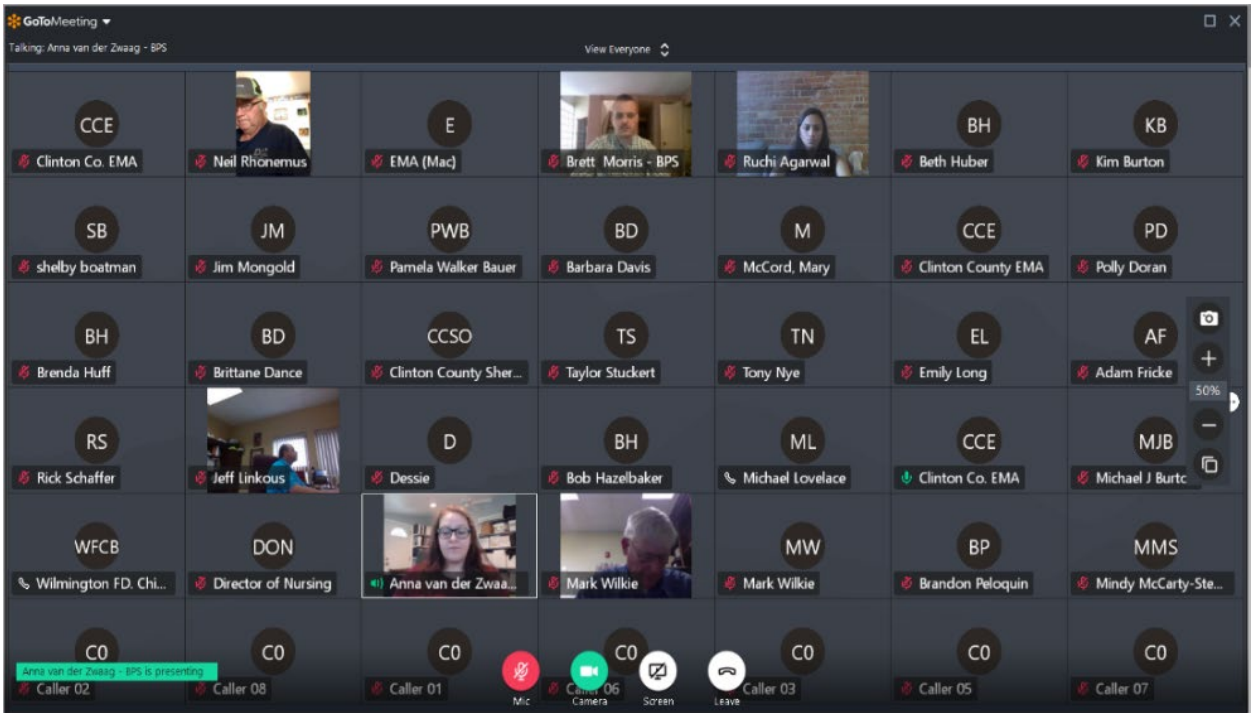
Ms. van der Zwaag then guided the attendees through a presentation which detailed the hazard mitigation planning process, including requirements of the planning process, potential hazards that could be addressed, benefits of hazard mitigation planning, and potential types of projects that could be federally funded as a result of the hazard mitigation plan.

Ms. van der Zwaag also described the role that the Core Planning Committee would serve in the development of the 2021 Clinton County Hazard Mitigation Plan.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through three surveys, detailed below. Each participant was provided multiple methods of completing the survey, including a physical hard copy of the survey, a fillable PDF that could be completed on their

computer, or an online SurveyMonkey version. Links to survey locations were provided throughout the meeting.

Figure 3.5.1: Core Planning Meeting 1 via GoToMeeting



Goals Survey:
The purpose of this survey was to reflect on the goals included in the 2016 Hazard Mitigation Plan to determine if they were still relevant to the 2021 Plan. Each attendee reviewed the previous goals and determined if they were still applicable, provided comments or edits to the goals that needed changed, and generated new goals to potentially be included in the Plan.

Hazard Priority Survey:
The purpose of this survey was to review all hazards that could be included in the 2021 Hazard Mitigation Plan and prioritize them. As such, attendees were asked to rate each hazard on a scale of zero to five, with five meaning the hazard poses the greatest possible threat to the County or their community and zero meaning the hazard should not be included in the 2021 Plan. Attendees rated hazards that were included in the 2016 Hazard Mitigation Plan, as well as all potential hazards that could be included in the 2021 Plan.

Following the completion of this survey, Ms. van der Zwaag guided a discussion on which hazards were deemed most important and which hazards attendees did not think needed to be included. Several attendees indicated it would be important to discuss train derailment, and other representatives mentioned their desire for including Epidemic as a hazard.

Previous Mitigation Actions Status Survey
The purpose of the Previous Mitigation Actions Status Survey was to have attendees review the mitigation actions that were included in the 2016 Hazard Mitigation Plan, reflect on the status of each action, and determine if that action should be included in the 2021 Hazard Mitigation Plan.

3.5.3 Public Meeting 1

The first public meeting took place on Wednesday, June 24, 2020, at 5:30 PM. Due to the COVID-19 Pandemic, this meeting was held virtually using GoToMeeting. Members of the Core Planning Committee were invited to either attend using the GoToMeeting app on their phone or desktop, or call into the meeting using a phone number. A total of 21 people attended the meeting, including three representatives from Burton Planning Services (BPS) and the Director of the Clinton County Emergency Management Agency.

The meeting began with a brief introduction from Anna van der Zwaag, Associate Planner at BPS. This introduction included a description of the virtual engagement process, including multiple options for participants to sign in to the meeting virtually. Participants were reminded multiple times throughout the course of the meeting to sign in using the SurveyMonkey survey, via the GoToMeeting Chat, or by sending an email to the County EMA. The introduction also informed attendees that they could ask questions using the chat feature in GoToMeeting, or by unmuting themselves and asking their questions at any time throughout the meeting.

Ms. van der Zwaag then guided the attendees through a presentation which detailed the hazard mitigation planning process, including requirements of the planning process, potential hazards that could be addressed, benefits of hazard mitigation planning, and potential types of projects that could be federally funded as a result of the hazard mitigation plan. Ms. van der Zwaag also described the role of the public in updating the 2021 Clinton County Hazard Mitigation Plan.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through the three surveys described above. Each participant was provided multiple methods of completing the survey, including a physical hard copy of the survey, a fillable PDF that could be completed on their computer, or an online SurveyMonkey version. Links to survey locations were provided throughout the meeting and were posted on the website.

Following the meeting, additional public input was requested using social media. Links to the videos of each meeting were provided on the project's website (www.burtonplanning.com/Clinton-hmp) so residents could watch and compete surveys at their own pace.

3.5.4 Core Planning Committee Meeting 2

The second Core Planning Committee meeting took place on Wednesday, August 5, 2020, at 2:30 PM. Due to the COVID-19 Pandemic, this meeting was held virtually using GoToMeeting. Members of the Core Planning Committee were invited to either attend using the GoToMeeting app on their phone or desktop or call into the meeting using a phone number. A total of 18 people attended the meeting, including three representatives from Burton Planning Services (BPS) and the Director of the Clinton County Emergency Management Agency.

The meeting began with a brief introduction from Anna van der Zwaag, Associate Planner at Burton Planning Services. Ms. van der Zwaag then guided the attendees through a presentation which provided an update on the hazard mitigation planning process, including requirements of the planning process and results from the Hazard Priority Survey distributed at the previous meeting.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through the Mitigation Actions Scoring Matrix, which determines the mitigation actions attendees would like to see in their community to mitigate the impacts of hazards. Attendees were provided a list of proposed mitigation actions and were asked if the action was relevant to their community. If attendees indicated that the mitigation action was relevant, attendees were asked to score the mitigation action in five categories: cost effective, technically feasible, environmentally sound,

immediate need, and total risk reduction. These scores will be used to determine the priority of all mitigation actions included in the 2021 Hazard Mitigation Plan. There was both a printable and digital version of this survey to accommodate different needs.

3.5.5 Public Meeting 2

The second public meeting took place on Wednesday, August 5, 2020, at 5:30 PM. Due to the COVID-19 Pandemic, this meeting was held virtually using GoToMeeting. Members of the public were invited to either attend using the GoToMeeting app on their phone or desktop or call into the meeting using a phone number. A total of 10 people attended the meeting, including three representatives from BPS and the Director and Office Assistant of the Clinton County Emergency Management Agency.

The meeting began with a brief introduction from Anna van der Zwaag, Associate Planner at Burton Planning Services. Ms. van der Zwaag then guided the attendees through a presentation which provided an update on the hazard mitigation planning process, including requirements of the planning process, and results from the Hazard Priority Survey distributed at the previous meeting.

Following the completion of the presentation, Ms. van der Zwaag guided the attendees through the Mitigation Actions Scoring Matrix, which determines the mitigation actions attendees would like to see in their community to mitigate the impacts of hazards. Attendees were provided a list of proposed mitigation actions and were asked if the action was relevant to their community. If attendees indicated that the mitigation action was relevant, attendees were asked to score the mitigation action in five categories: cost effective, technically feasible, environmentally sound, immediate need, and total risk reduction. These scores will be used to determine the priority of all mitigation actions included in the 2021 Hazard Mitigation Plan. There was both a printable and digital version of this survey to accommodate different needs.

Please note, the public was invited to participate via public notices in the *Wilmington News Journal* for both the June 24 meeting, as well as the August 5 meeting. Following these meetings, the public was also invited to participate via Facebook posts that directed members of the public to the project's website, where they could watch videos of the GoToMeetings and complete the surveys. Participants could complete either printable or digital versions of the surveys (see **Appendix G**).

3.6 Public Comment Period

The 2021 Clinton County Hazard Mitigation Plan will be made available to the public and Core Planning Committee for review for a 15-day public comment period beginning November 2020. Hard copies of the Hazard Mitigation Plan were made available for review in-person at the Clinton County EMA office, and a digital Draft Plan was made available online. Both physical and digital surveys were provided to the public and the Core Planning Committee for their comments on the Plan.

3.7 Planning Process

Stakeholder and public input were essential for determining the hazard prioritization, as well as which hazards were included or excluded from the Plan. Based on feedback from the Core Planning Committee, it was determined that hurricanes or tropical storms were not hazards of concern to Clinton County and its communities. As such, these hazards were not included in the plan outright. If remnants of a hurricane or tropical storm were witnessed in the County, those narratives are included in Severe Summer Storms. Other hazards, such as coastal erosion and coastal flooding, are not applicable to Clinton County and have not been included in previous hazard mitigation plans, nor

were they included in this plan. More details about how survey feedback assisted in the determination of which hazards to exclude can be found in **Chapter 5, Hazard Mitigation**.

Chapter 4, Hazard Identification and Risk Assessment follows this chapter. Please note that **Chapter 4** is organized alphabetically and not in order of risk. The ranking of hazard priorities can be found in **Chapter 5, Hazard Mitigation**.

4 | Hazard Risk Assessment

4.1 Dam Failure

4.1.1 Description

FEMA defines a dam as "any artificial barrier of at least a minimum size, including appurtenant works, that impounds or diverts water or liquid-borne solids on a temporary or long-term basis." Dam failure occurs when that impounded water is suddenly released in an uncontrollable manner. A dam/levee failure can result in the uncontrolled release of floodwaters downstream of a facility. Water released from the dam during failure will always flow downhill, and the resulting flood wave can cause significant damage to buildings and infrastructure downstream. The unexpected nature of the flood wave also increases the likelihood of loss of life in the impacted area due to reduced warning times.

Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam
- Structural failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settle and cracking of concrete or embankment dams
- Inadequate maintenance and upkeep
- Deliberate acts of sabotage

According to Ohio Administrative Code Rule 1501:21-13-01 (2010), dams are classified as Class I-IV dams based on the following criteria:

- Class I: Dams having a total storage volume greater than 5,000 acre-feet or a height of greater than 60 feet.
- Class II: Dams having a total storage volume greater than 500 acre-feet or a height of greater than 40 feet.
- Class III: Dams having a total storage volume greater than 50 acre-feet or a height of greater than 25 feet.
- Class IV: Dams having a total storage volume of 50 acre-feet or less and a height of 25 feet or less.

4.1.2 Location

Dam locations can be seen in **Figure 4.1.1**. Dam properties are also listed in **Table 4.1.1.** The status of each dam's Emergency Action Plan as of October 1, 2020 is indicated in the table (Source: ODNR).

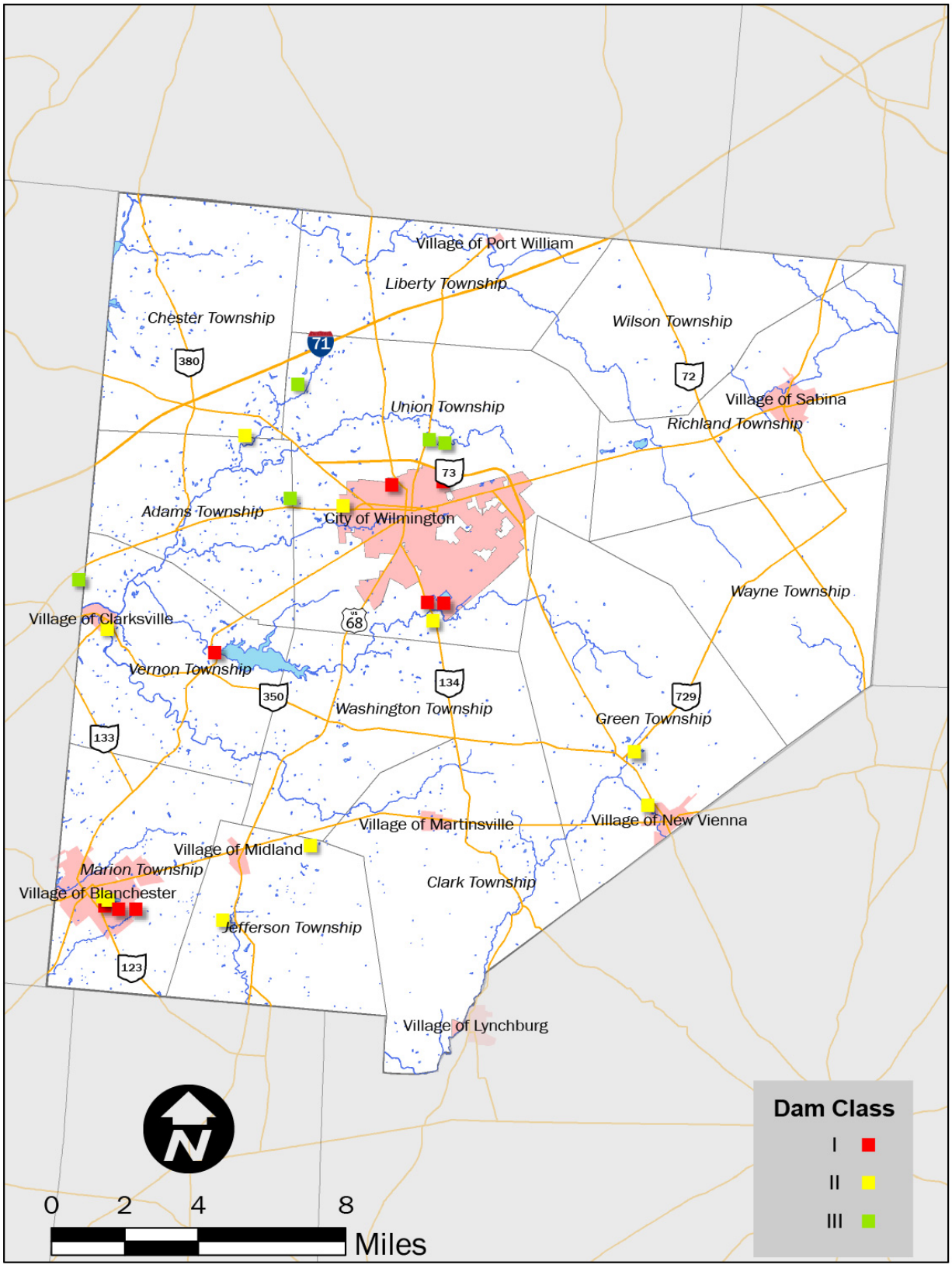
Table 4.1.1: Dam Locations in Clinton County, Ohio

Class	Name	Owner	Impoundment	Length (ft)	Height (ft)	Pool Acres	Storage (ac-ft)	EAP Status
I	Blanchester Reservoir No. 3 Dam	Village of Blanchester	Dam and Spillway	420	15.1	11.4	94	Not Approved
I	Blanchester Reservoir No. 4 Dam	Village of Blanchester	Upground	2,900	16	11.4	164	Not Approved
I	Blanchester Reservoir No. 6 Dam	Village of Blanchester	Upground	3,560	24	16.31	258.2	Approved

Class	Name	Owner	Impoundment	Length (ft)	Height (ft)	Pool Acres	Storage (ac-ft)	EAP Status
I	Clinton County Tributary No. 4 Dam	Clinton County	Dam and Spillway	624	20.2	0	220	Approved
I	Clinton County Tributary No. 1 Dam	Clinton County	Dam and Spillway	665	14.6	0	102	Approved
I	Cowan Lake Dam	ODNR, Division of Parks and Watercraft	Dam and Spillway	860	62.5	670	24,974	Approved
I	Wilmington Upground Reservoir No. 1	City of Wilmington	Upground	3,570	18.6	15.6	371	Approved
I	Wilmington Upground Reservoir No. 2	City of Wilmington	Upground	6,200	31	55.6	1382	Approved
II	Blanchester Reservoir No. 1 & 2 Dam	Village of Blanchester	Upground	2,585	10.4	7.1	68	Not Approved
II	Blanchester Reservoir No. 5 Dam	Village of Blanchester	Upground	4,574	14	17.9	227	Not Approved
II	Clarksville Upground Reservoir	Village of Clarksville	Upground	820	18	1.9	33.7	Not Approved
II	Baptist Foundation Lake Dam	Mathew 25 Ministries	Dam and Spillway	530	35.8	4.5	64.6	Not Approved
II	Houston Upground Reservoir	Village of Blanchester	Upground	2,200	12.9	6	71.1	Not Approved
II	Clinton County WWT Lagoon	Clinton County Sewer District	Upground	5,000	10	22.7	199	Approved
II	Roberts Lake Dam	Scott & Heidemarie Lewis	Dam and Spillway	250	19.1	3.3	27.4	Not Approved
II	Burtonville Lake Dam	Burtonville Heights Lake Assoc.	Dam and Spillway	390	24.8	4.4	41.2	Not Approved
II	Snow Hill Inc. Lake Dam	Snowhill Country Club, LLC	Dam and Spillway	410	23.6	4.4	54	Approved
II	New Vienna Wastewater Treatment Lagoons	Village of New Vienna	Upground	3,200	14	8.9	86.3	Not Approved
III	Stokes Lake Dam	Dale Stokes Raspberry Farm LLC	Dam and Spillway	600	16.6	5.8	51.9	Not Approved

Class	Name	Owner	Impoundment	Length (ft)	Height (ft)	Pool Acres	Storage (ac-ft)	EAP Status
III	Ellis Lake Dam	Jeff & Shelly Higgins	Dam and Spillway	530	30.7	3.8	38.2	Not Approved
III	Pheasant Run Dam 1	Union Township	Dam and Spillway	350	14	3.8	-	Not Approved
III	Pheasant Run Dam 2	LASUSA CORP	Dam and Spillway	470	18	6.7	-	Not Approved

Figure 4.1.1: Dam Locations in Clinton County, Ohio



4.1.3 Extent

As previously mentioned, Class I dams have a total storage volume greater than 5,000 acre-feet or a height of greater than 60 feet. Sudden failures of Class I dams would increase the probability that one of the following conditions would result in:

- Loss of human life.
- Structural collapse of at least one residence or one commercial or industrial business.
- All items listed below for failure of Class II and III dams.

Sudden failures of Class II dams would result in at least one of the following conditions:

- Disruption of a public water supply or wastewater treatment facility, release of health hazardous industrial or commercial waste, 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 correction facilities as determined by the chief.
- Damage or disruption to railroads or public utilities.
- Damage to downstream class I, II, or II dams or levees or other dams or levees of high value. Damage to dams or levees can include, but is not limited to, overtopping of the structure. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potential affected property.

Sudden failures of Class III dams would result in at least one of the following conditions:

- Property losses including, but not limited to, rural buildings not otherwise described in the Ohio Administrative Code Rule 1501:21-12-01 (2010), and class IV dams and levees not otherwise listed as high-value properties in this rule.
- Damage or disruption to local roads including, but not limited to, roads not otherwise listed as major roads.

Sudden failures of Class IV dams would result in property losses restricted mainly to the dam and rural lands, and the loss of human life is not probable.

4.1.4 History

There have been no reported dam failures in Clinton County.

4.1.5 Probability

Dam failures are unlikely but are never impossible. All dams, especially Class I dams, should have an Emergency Action Plan (EAP) in place.

4.1.6 Vulnerability Assessment

Infrastructure Impact

Failures of Class I and Class II dams could flood roadways, including major routes and local roads. Utility infrastructure (wastewater, drinking water, and commercial and industrial waste lines) may be disrupted or destroyed.

Population Impact
The local population could be impacted by loss of utilities, including the local water supply. Health hazards may also be released into the flood waters during a dam failure which may cause indirect harm to the local population.

Property Damage
At least one residential or commercial property is likely to face structural collapse during a Class I dam failure. Class II dam failure has the potential to damage high value properties. Residential, commercial, and industrial properties may be damaged, as well as publicly owned properties. Properties that are owned by the dam owner may be exempt from the property damage calculation.

Loss of Life
Loss of life is likely during a Class I dam failure. Loss of life during a Class II or Class III dam failure is unlikely.

Economic Losses
Economic losses can include damages from flooding crops, damaged goods, and the flooding of vital roadways.

Emergency Action Plans (EAPs) have been completed for some of the Class I and Class II dams; however, the data is subjected to agreements where it cannot be published publicly. The Ohio Department of Natural Resources (ODNR) holds record of these EAPs.

4.1.7 Land Use and Development Trends
Development that has occurred in areas that will flood after a dam failure should be prepared for rapid flooding. Land use plans can limit development in these areas. To better understand where development should be limited, dam failure inundation maps should be completed for as many dams as possible.

4.2 Drought

4.2.1 Description

A drought is a shortage in atmospheric moisture or precipitation over an extended period of time resulting in a water shortage for some activity, group, or environmental sector. Droughts are common throughout all climatic zones and can range in length from a couple weeks to multiple years or decades in some areas. According to the National Oceanic and Atmospheric Administration (NOAA), there are three common types of drought: (1) meteorological, (2) agricultural, and (3) hydrological. Each type of drought has different indicators and occur at different times after a prolonged absence of water.

Meteorological drought severity is calculated by the amount of the rainfall deficit (compared to annual averages) and the length of the dry period. Impacts of a meteorological drought may extend beyond the borders of the precipitation-deficient area.

Agricultural drought is based on the effects to agriculture by factors such as rainfall and soil water deficits or diminished groundwater/reservoir levels needed for irrigation. The volume of water available for agricultural use depends on prevailing weather conditions, biological characteristics of the specific crop, its stage of growth, and the physical and biological properties of the soil.

Hydrological drought is based on the effects of rainfall shortages on the water supply, such as stream flow, reservoir and lake levels, and groundwater table decline. Snowfall can also impact the water supply level. Hydrological droughts are often defined at the watershed or river basin scale, as deficiency in the hydrologic system can have negative impacts within hydrologic storage systems. Competition for water between hydrologic storage systems, such as reservoirs and rivers, can result in conflicts between water users.

4.2.2 Location

Drought is a countywide hazard that can affect all locations and jurisdictions in Clinton County. More specifically, this hazard typically occurs at a regional scale. Droughts most commonly occur in Ohio from spring through autumn; however, they may occur at any time throughout the year.

4.2.3 Extent

Due to the regional nature of droughts, impacts may be noticed throughout the County in the urbanized and rural areas. All jurisdictions with the County may be affected in a single drought event. In Clinton County, droughts are often linked to prolonged periods of above average temperatures and little to no precipitation. Compared to more urban counties in Ohio, Clinton County will likely experience more effects on agricultural production. As such, drought conditions are also likely to impact the economy.

Initial effects of drought can be noticed within a short period, as soils may dry out and plants may wither and die. When drought conditions persist over several weeks, months, or years, effects may be more pronounced with reductions in water levels of wells, lakes, reservoirs, streams, and rivers. Water supply issues for agriculture, commercial/industrial activities, and private consumption may arise if drought conditions persist over a long term.

The extent of the drought is determined by the Palmer Drought Severity Index (PDSI). In this way, the Index can be utilized as a tool to help define disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential for forest

fires. The PDSI depicts prolonged (in months or years) abnormal dryness or wetness and is slow to respond, changing little from week to week. It also reflects long-term moisture runoff, recharge, and deep percolation, as well as evapotranspiration.

The PDSI is a standardized index with values typically falling between -4.00 and +4.00, although extreme conditions can be greater in value (**Table 4.2.1**). Negative values indicate drought conditions while positive values represent wet conditions. Values around zero represent near-normal conditions.

Table 4.2.1: Palmer Drought Severity Index Classifications

Palmer Classifications	
4.0 or greater	Extremely Wet
3.0 to 3.99	Very Wet
2.0 to 2.99	Moderately Wet
1.0 to 1.99	Slightly Wet
0.5 to 0.99	Incipient Wet Spell
0.49 to -0.49	Near Normal
-0.5 to -0.99	Incipient Dry Spell
-1.0 to -1.99	Mild Drought
-2 to -2.99	Moderate Drought
-3.0 to -3.99	Severe Drought
-4.0 or less	Extreme Drought

4.2.4 History

According to the U.S. Drought Monitor, since 2000, the longest duration of drought in Ohio lasted 44 weeks beginning on July 23, 2002 and ending on May 20, 2003. Additionally, the most intense period of drought occurred the week of September 4, 2007. Periods of drought specific to Clinton County are provided in **Table 4.2.2** (Source: U.S. Drought Monitor).

Table 4.2.2: Periods of Drought in Clinton County, Ohio, 2000-2020

Start Date	End Date	Consecutive Weeks
1/4/2000	2/22/2000	8
3/27/2001	5/22/2001	9
7/23/2002	10/1/2002	11
6/21/2005	6/28/2005	2
7/12/2005	8/30/2005	8
10/11/2005	11/8/2005	5
5/15/2007	11/27/2007	29
8/26/2008	1/27/2009	23
3/24/2009	5/5/2009	7
6/9/2009	6/23/2009	3

Start Date	End Date	Consecutive Weeks
4/27/2010	5/11/2010	3
8/31/2010	11/30/2010	14
12/28/2010	2/15/2011	8
6/19/2012	1/29/2013	33
9/30/2014	10/14/2014	3
5/26/2015	6/16/2015	4
10/20/2015	10/27/2015	2
6/21/2016	8/16/2016	9
11/15/2016	12/13/2016	5
8/6/2019	11/5/2019	14
7/7/2020	7/28/2020	4

In Clinton County, the NCEI has record of one ongoing drought event from July – August 1999, which did not result in any reported crop or property damages through the NCEI. Another drought event was recorded by the National Weather Service (NWS) and the United States Department of Agriculture (USDA) during the summer of 2012. Additionally, local news sources reported moderate drought conditions during late summer to early autumn in 2019.

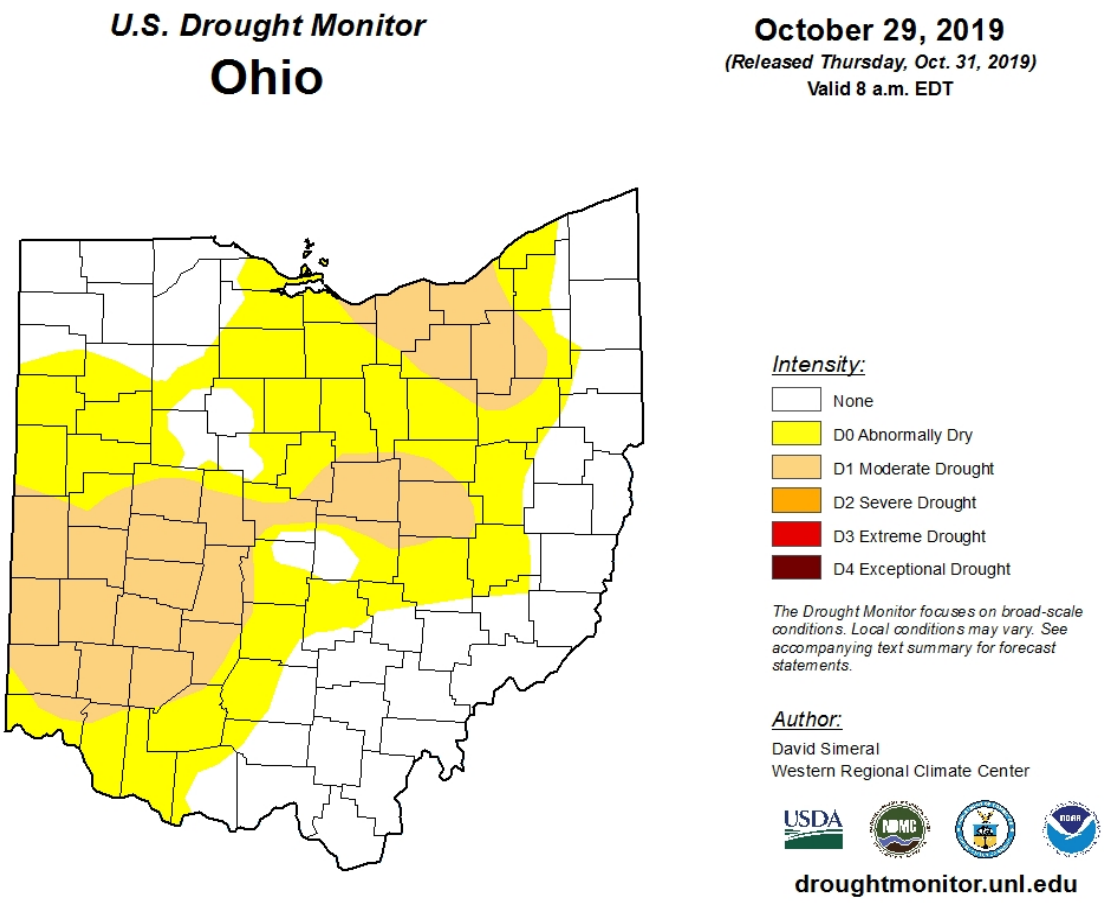
While not all drought events resulted in disaster declarations made for drought events in the County, all drought events with descriptions provided by the NCEI, NWS, USDA, or local news sources are described below.

Drought, Summer 2019

Dry weather persisted throughout the Miami Valley. On October 18, 2019, local news channel WHIO TV 7 reported, "The most recent US Drought Monitor released October 17, shows that the Miami Valley has seen no real improvement. The moderate drought has gotten worse, spreading to Butler, Warren and Clinton counties. Looking at the state, 26 percent of it is now in a moderate drought with another 68 percent considered to be abnormally dry! Several inches of rain will be needed to bring the soil back to normal." (Source: WHIO).

Following this report, the drought conditions continued to spread into Clinton County over the next several weeks. The U.S. Drought Monitor for October 29, 2019 is provided below in **Figure 4.2.1**.

Figure 4.2.1: U.S. Drought Monitor for October 29, 2019



Source: U.S. Drought Monitor

Drought, Summer 2012

The National Weather Service recorded the drought of Summer 2012 with the following description:

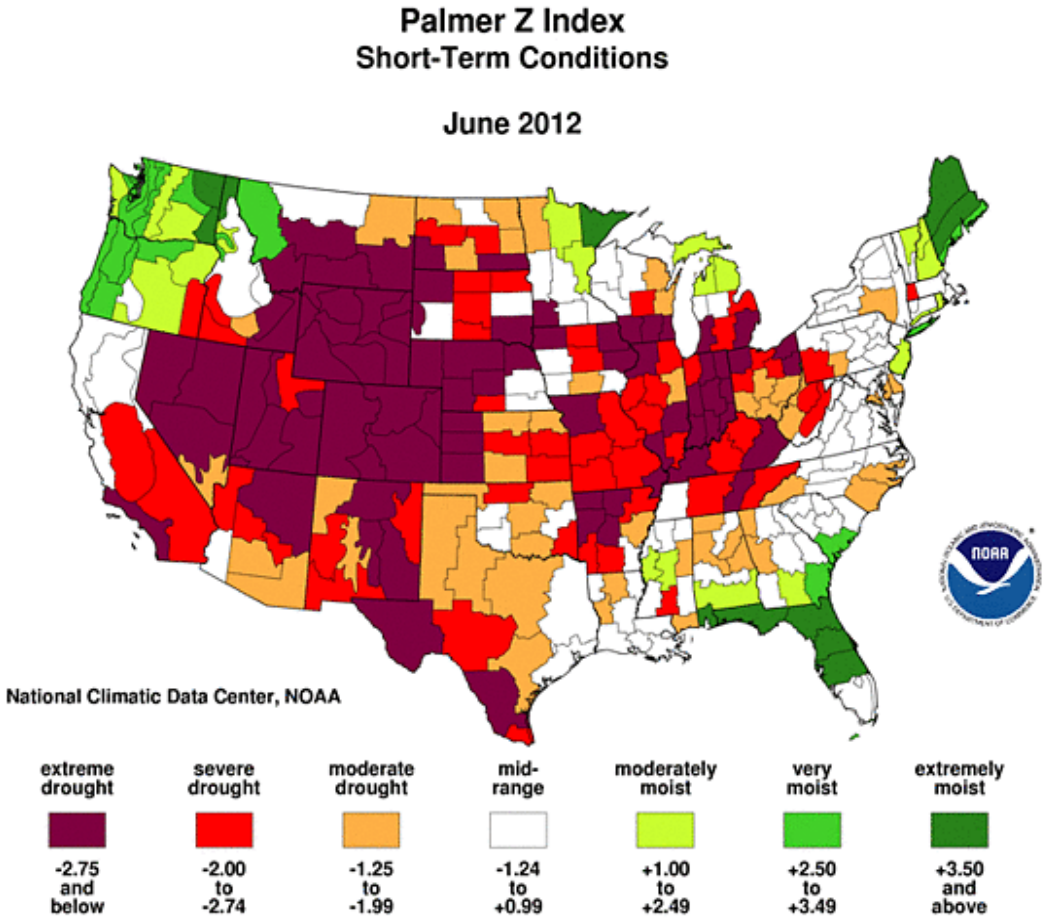
"The warm and dry spring of 2012 became the hot and dry summer of 2012. Temperatures in June and July were well above normal, with monthly temperatures in July averaging 4 to 5 degrees above normal. High temperatures reached 90 or above on dozens of days. The mercury topped 90 degrees 28 times at Cleveland and 32 times at Toledo. At Toledo, the temperature soared above 100 degrees 4 times! Other locations in northern Ohio and northwest Pennsylvania got close to 100 or exceeded 100 at least once or twice. There was little relief at night, with many nights seeing low temperatures barely dropping into the 70s, especially in July. The lack of rain compounded the summer stress. Rainfall was below normal in most areas from April through July. The combination of heat and drought left many farmers with parched soil. Rainfall in September and October was much above normal but was too little too late for many of the farmers."

Furthermore, by mid-June, Clinton County was designated with moderate drought conditions. On July 30, 2012, the Governor of Ohio sent a memorandum to the USDA Ohio State Executive Director requesting primary county natural disaster designations for eligible counties due to agricultural losses caused by drought and additional disasters during the 2012 crop year. The USDA reviewed the Loss Assessment Reports and determined that there were sufficient production losses in 85

counties, including Clinton County, to warrant a Secretarial Disaster Declaration. This declaration was issued on September 5, 2012.

Figure 4.2.2 displays the PDSI of June 2012 for the continental United States. This image shows that the region containing Clinton County experienced extreme drought, with a Palmer Index of -2.75 or below, during the 2012 drought. Further estimates of crop losses associated with this drought are located in **Table 4.2.3**.

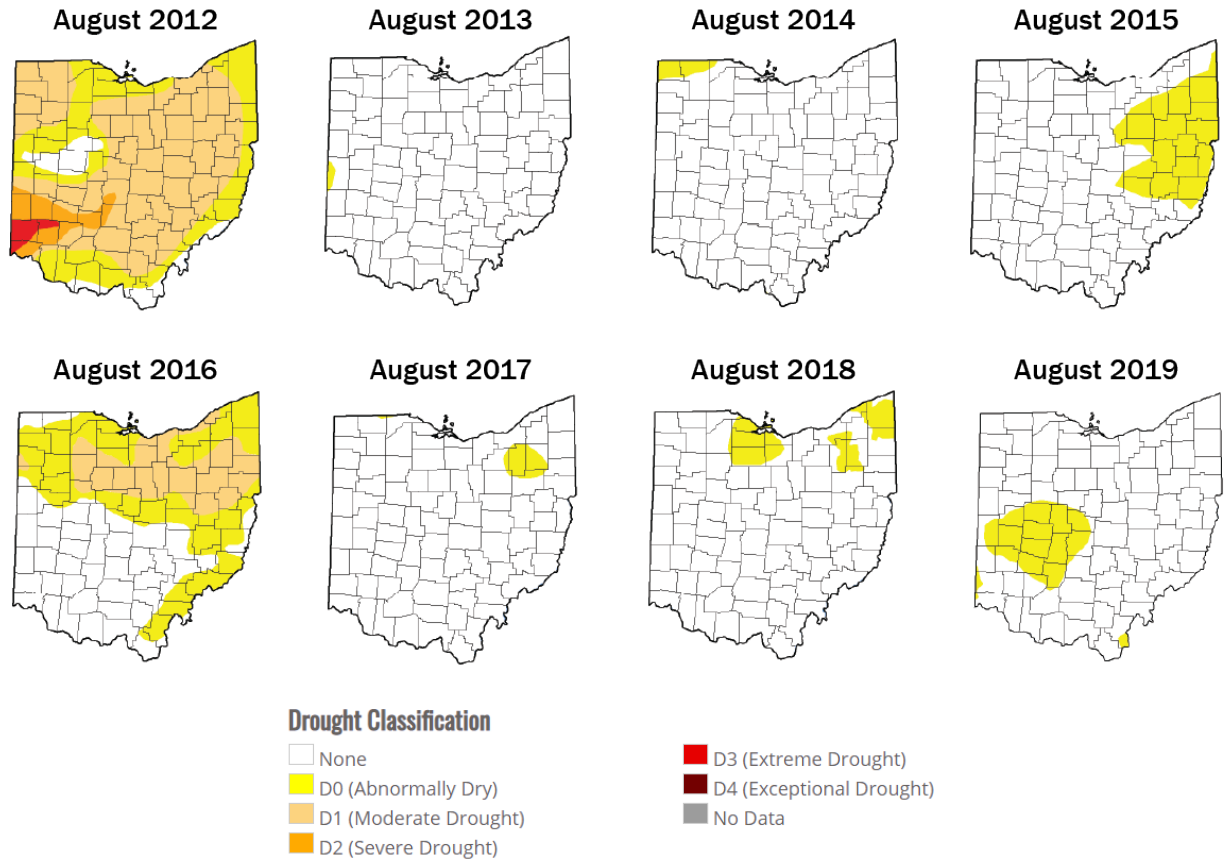
Figure 4.2.2: Palmer Drought Severity Index for the United States in June of 2012



Source: NOAA

Figure 4.2.3 depicts the Drought Monitor for the State of Ohio for the month of August from 2012 through 2019. The image indicates the widespread nature of the Summer 2012 Drought, which was one of the worst on record for the State of Ohio.

Figure 4.2.3: Drought Monitor for the State of Ohio, 2012-2019



**The Statistics Comparison above is calculated as a percent area in those drought conditions. Source: U.S. Drought Monitor.*

Drought, Summer 1999

The local newspaper provided the following description of the drought events in July and August of 1999, as referenced in the NCEI:

July: Dry conditions that began in the spring and early summer continued into July. Excessive heat contributed to substantial crop loss across much of the Buckeye state. Rainfall was widely scattered and did little to help farmers. Crop damage amounts were not available at the time of this writing.

August: Drought conditions continued across the Ohio Valley through August with most areas receiving well below normal rainfall for the month. In some areas around 50 percent of crops were considered total losses. Most counties in southwest Ohio were declared Federal Disaster Areas by the US Department of Agriculture. At the time of this writing, no monetary estimates were available concerning the crop loss.

4.2.5 Probability

Clinton County has experienced droughts and excessive heat in the past, and the potential exists for the County to experience droughts in the future. Seasons of drought have the potential to occur during any particular year when necessary conditions are met, and they are most likely to occur from

spring through autumn. More specifically, the County has record of 21 drought events from the U.S. Drought Monitor from January 2000 through July 2020, averaging just over one drought each year with an average duration of 10.2 weeks per drought event. The longest drought recorded for Clinton County was 33 weeks long. While no crop or property losses were recorded through the NCEI, a more detailed commodity loss analysis is provided in the Vulnerability Assessment below.

Based on current climate reports:

- Drought projections suggest that some regions of the U.S. will become drier and that most will have more extreme variations in precipitation.
- Even if current drought patterns remained unchanged, warmer temperatures will amplify drought effects.
- Drought and warmer temperatures may increase risks of large-scale insect outbreaks and wildfires.
- Drought and warmer temperature may accelerate tree and shrub death, changing habitats and ecosystems in favor of drought-tolerant species.
- Forest-based products and values, such as timber, water, habitat and recreation opportunities, may be negatively impacted.
- Forest and rangeland managers can mitigate some of these impacts and build resiliency in forests through appropriate management actions.

4.2.6 Vulnerability Assessment

Drought does have the potential for significant impacts to structures, businesses, and people, as well as critical infrastructure. Additionally, the greatest impacts of drought tend to be on agricultural interests, as crops may fail and livestock may not have sufficient water resources. Economic losses are the greatest threat from droughts to Clinton County. According to the 2012 Census of Agriculture developed by the USDA, top crop items based on acreage for Clinton County include soybeans for beans, corn for grain, forage land used for all hay and haylage, grass silage, greenchop, wheat for grain, and winter wheat. Commodity Loss Statistics for crops with available data provided by the United States Department of Agriculture (USDA) are included in **Table 4.2.3** and compare a non-drought year (2011) with the production and harvest of crops in a drought year (2012).

Based on data from the USDA, Clinton County's soybean yields remained constant between 2011 and 2012; however, the yield of soybeans decreased by 3.6 bushels per acre harvested. Additionally, the yield of corn harvested compared to corn planed increased by 0.14 percent, but the County's corn production decreased by 22 bushels per acre harvested between 2011 and 2012. The County's winter wheat yield increased by 6.8 bushels per acre harvested; however, the raw yield of acres harvested decreased by 0.54 percent.

Table 4.2.3: Commodity Loss Statistics between 2011 and 2012

Commodity	Units	Non-Drought Year 2011	Drought Year 2012	Change	Change Amount
Soybeans, Planted	Acres	97,500	100,500	Up	9,300
Soybeans, Harvested	Acres	97,400	100,400	Down	-1,268
Yield	%	99.90%	99.90%	No Change	0.00%

Commodity	Units	Non-Drought Year 2011	Drought Year 2012	Change	Change Amount
Soybeans, production	Bushels	4,989,000	4,778,000	Down	-211,000
Yield	Bushels/Acre Harvested	51.2	47.6	Down	-3.6
Corn for grain, planted	Acres	71,400	76,900	Up	5,500
Corn for grain, harvested	Acres	70,000	75,500	Up	5,500
Yield	%	98.04%	98.18%	Up	0.14%
Corn, production	Bushels	11,700,000	10,958,000	Down	-742,000
Yield	Bushels/Acre Harvested	167.1	145.1	Down	-22.0
Winter Wheat, planted	Acres	5,900	3,600	Down	-2,300
Winter Wheat, harvested	Acres	5,850	3,550	Down	-2,300
Yield	%	99.15%	98.61%	Down	-0.54%
Winter Wheat, production	Bushels	315,000	215,000	Down	-100,000
Yield	Bushels/Acre Harvested	53.8	60.6	Up	6.8

Source: USDA

4.2.7 Land Use and Development Trends

Drought is most likely to impact agriculture land uses; however, it can also have an economic impact that might result in changes to development plans.

4.3 Drug Misuse and Addiction

The prevalence of drug misuse and addiction throughout Clinton County was raised at the first Core Planning Committee meeting on June 18, 2020. This section will detail the issue, along with how it impacts the County. Stakeholders in Clinton County opted to include this section in the report to stimulate conversation regarding the negative impacts associated with drug misuse and addiction on the County and its communities. While there is often widespread awareness and concern among policymakers and the public about substance use, there may not be an awareness of the evidence-based prevention and treatment strategies currently available. To effectively aid in the prevention of drug misuse, policymakers should remain up to date on the evidence-based prevention and treatment strategies that are available in the County and nearby.

Furthermore, it is important to note the personal nature of drug misuse and addiction. As such, government experts and civil society must recognize strategies and develop policies incorporating the most effective ways to support and deliver evidence-based substance use prevention and treatment services. (Source: INCB, 2019).

4.3.1 Description

A drug is a substance that affects the way the body functions. If a drug is classified as "illegal," this means that it is forbidden by law. Different drugs have different effects on people and these effects are influenced by many factors. This makes illegal use of drugs unpredictable and dangerous. The following circumstances can impact the effect of a drug:

- The type of drug;
- How much of the drug is consumed;
- Where the person is when the drug is being used;
- What the person is doing while using the drug;
- Individual characteristics such as body size and health vulnerabilities; and,
- How many different drugs are taken at one time.

The World Health Organization (WHO) defines drug misuse as "the use of a substance for a purpose not consistent with legal or medical guidelines." While many misused substances are illegal, some substances, such as many common opioids, are legally prescribed. **Table 4.3.1** describes commonly misused drugs, including those that are outright illegal and those whose improper use makes them illegal. Drug misuse can have a negative impact on health or functioning and may take the form of drug dependence or may be part of a wider spectrum of problematic or harmful behavior (Source: UK Department of Health, 2006).

Table 4.3.1: Commonly Misused Drugs

Drug Name	Description
Cocaine	A powerfully addictive stimulant drug made from the leaves of the coca plant native to South America.
Heroin	An opioid drug made from morphine; a natural substance extracted from the seed pod of the various opium poppy plant.
Benzodiazepines	A type of prescription sedative commonly prescribed for anxiety or to help with insomnia. These types of drugs work to calm to sedate a person by raising the level of inhibitory neurotransmitter GABA in the brain.

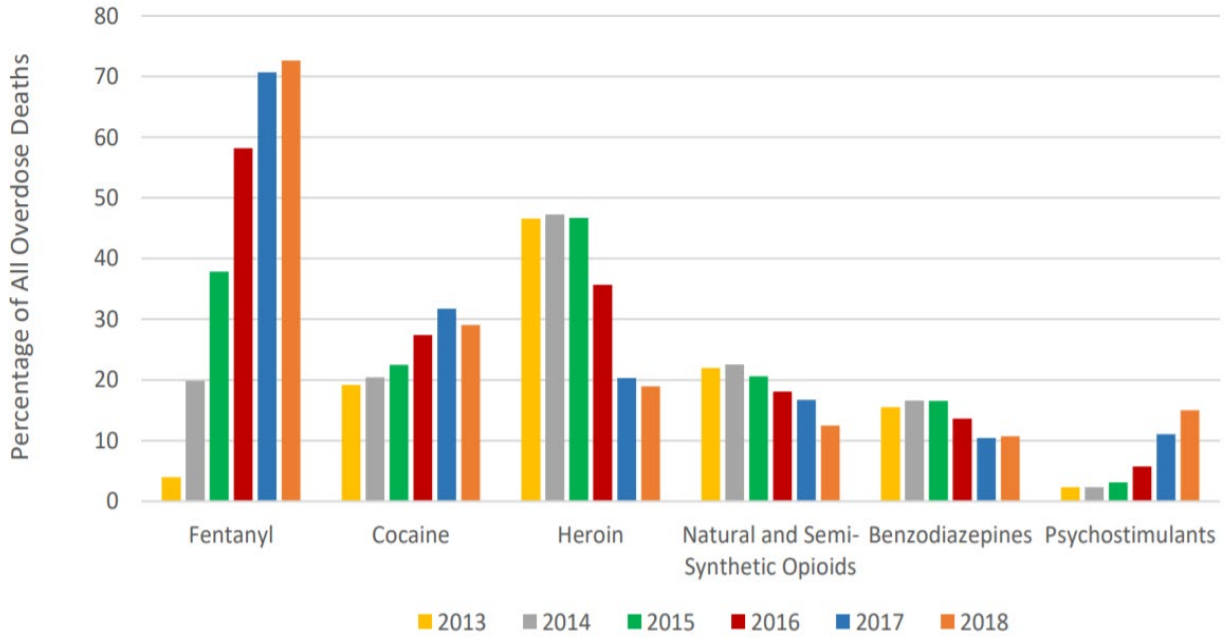
Drug Name	Description
Prescription Opioids	Pain relievers with an origin similar to that of heroin. Opioids can cause euphoria and are often used nonmedically, leading to overdose deaths. Pain relievers with an origin similar to that of heroin. Opioids can cause euphoria and are often used nonmedically, leading to overdose deaths. Examples of prescription opioids include hydrocodone, oxycodone, morphine, codeine, and fentanyl.
Prescription Stimulants	Medications that increase alertness, attention, energy, blood pressure, heart rate, and breathing rate. (Amphetamine and Methylphenidate)
Inhalants	Solvents, aerosols, and gases found in household products such as spray paints, markers, glues, and cleaning fluids; also, nitrites (e.g., amyl nitrite), which are prescription medications for chest pain
LSD	A hallucinogen manufactured from lysergic acid, which is found in ergot, a fungus that grows on rye and other grains. LSD is an abbreviation of the scientific name lysergic acid diethylamide
GHB	Gamma-hydroxybutyrate (GHB) is a depressant approved for use in the treatment of narcolepsy, a disorder that causes daytime "sleep attacks".
MDMA (Ecstasy/Molly)	A synthetic, psychoactive drug that has similarities to both the stimulant amphetamine and the hallucinogen mescaline. MDMA is an abbreviation of the scientific name 3,4-methylenedioxymethamphetamine.
Methamphetamine	An extremely addictive stimulant amphetamine drug.
PCP	A dissociative drug developed as an intravenous anesthetic that has been discontinued due to serious adverse effects. Dissociative drugs are hallucinogens that cause the user to feel detached from reality. PCP is an abbreviation of the scientific name, phencyclidine.
Synthetic Cannabinoids	A wide variety of herbal mixtures containing man-made cannabinoid chemicals related to THC in marijuana but often much stronger and more dangerous. Sometimes misleadingly called “synthetic marijuana” and marketed as a “natural,” “safe,” legal alternative to marijuana.
Synthetic Cathinones (“Bath Salts”)	An emerging family of drugs containing one or more synthetic chemicals related to cathinone, a stimulant found naturally in the khat plant. Examples of such chemicals include mephedrone, methylone, and 3,4-methylenedioxypyrovalerone (MDPV).
Ketamine	A dissociative drug used as an anesthetic in veterinary practice. Dissociative drugs are hallucinogens that cause the user to feel detached from reality.

Source: National Institute on Drug Abuse

Drug addiction, as described by the American Psychiatric Association (APA), is a complex condition “that is manifested by compulsive substance use despite harmful consequence.” Drug addiction can also be called substance use disorder. The Substance Abuse and Mental Health Services Administration (SAMHSA) defines substance use disorder as occurring “when the recurrent use of alcohol and/or drugs causes clinically significant impairment, including health problems, disability, and failure to meet major responsibilities at work, school, or home.” A person with substance use disorder may also experience mental and physical health issues.

Figure 4.3.1 shows the percentage of unintentional drug overdose deaths involving certain drugs from 2013-2018 in Ohio. The image shows that the percentage of all overdose deaths from fentanyl, a type of prescription opioid, has increased from 2013 to 2018. Fentanyl is also responsible for the greatest percentage of all overdose deaths in Ohio.

Figure 4.3.1: Percentage of Unintentional Drug Overdose Deaths in Ohio by Drug, 2013-2018



Source: ODH

4.3.2 Location

Drug misuse and addiction has a countywide impact on Clinton County. The extent of these impacts is discussed in the next section. The Ohio Substance Abuse Monitoring Network (OSAM) released a "Surveillance of Drug Abuse Trends in the State of Ohio" report in January of 2017. For the purposes of this report, Clinton County was identified as part of the Cincinnati Region, which was assessed as a whole.

4.3.3 Extent

According to the National Drug Intelligence Center (NDIC), drug misuse can impact individuals as well as communities. At the individual level, users can experience overdoses, adverse reactions, psychotic episodes, and symptoms of infectious disease that can be transmitted through sharing of needles, including diseases such as hepatitis B and C, HIV/AIDS, and tuberculosis.

At a community scale, drug misuse and addiction can have a significant impact on the environment, as well as the economy. Environmental impacts include significant environmental contamination from precursor chemicals required for the manufacturing of drugs and pharmaceuticals. Disposal of these chemicals results in the introduction of those substances into the environment in sewage, from where they can enter sediment, surface and ground water, and the tissues of vegetation and aquatic organisms (Source: INCB, 2013).

Furthermore, illicit drug cultivation and manufacturing in residential areas has the potential to reduce quality of life for residents, as well as contribute to neighborhood decay and property damage.

In 2011, the National Drug Intelligence Center (NDIC) completed a National Drug Threat Assessment, which detailed the impact of drugs on society in the United States. The report stated that, in 2007,

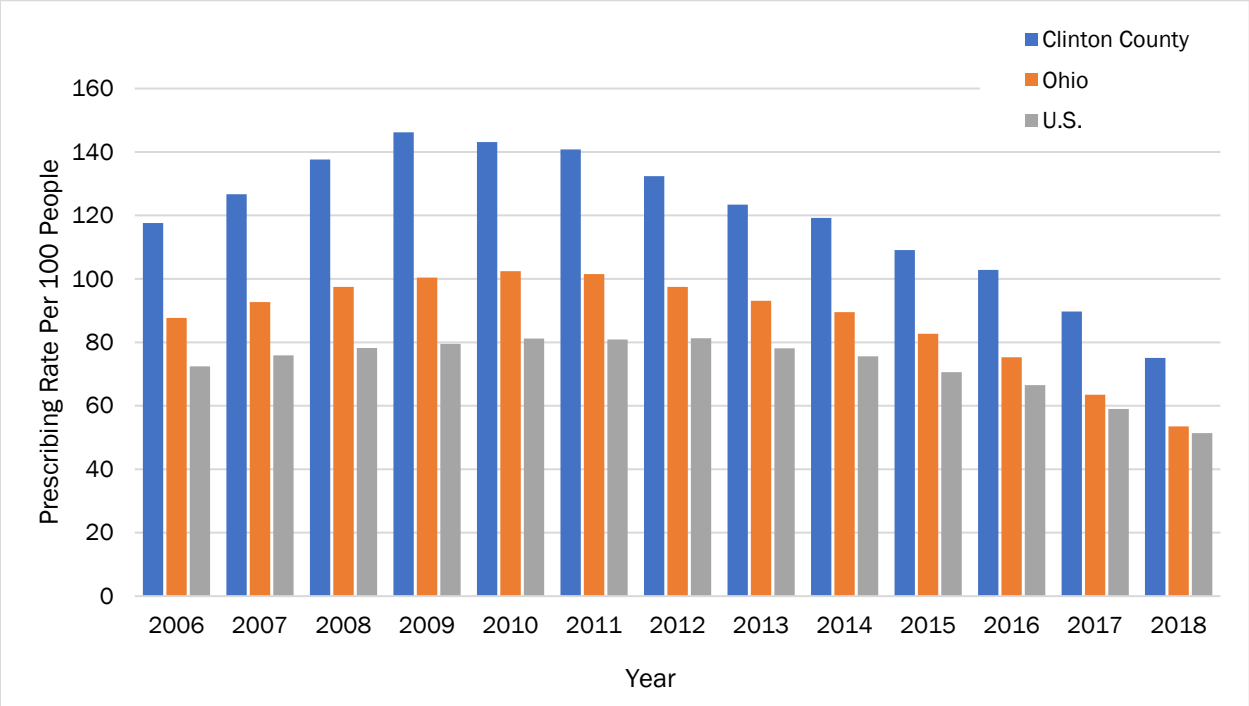
the estimated cost of illicit drug use to society was $193 billion, including direct and indirect public costs related to crime, health, and productivity. The largest portion of these costs were attributed to a loss of productivity, which amounted to $120 billion per year. Additionally, the NDIC estimated that yearly drug-related healthcare costs were more than $11 billion in 2007, including both direct and indirect costs related to medical intervention such as emergency services, in-patient drug treatment and drug use prevention, and treatment research.

While numbers like this are available at the national scale, it is more difficult to calculate these numbers at a local scale.

4.3.4 History

Figure 4.3.2 displays the prescribing rate of opioids, per 100 people, from 2006 through 2018 at the county, state, and national levels. Clinton County's prescribing rate remained consistently higher than the average rate for Ohio and the United States. Between 2006 and 2016, Clinton County's prescribing rate was greater than 100, meaning enough opioids were dispensed for every person in the County to have one.

Figure 4.3.2: Opioid Prescribing Rates, Per 100 People, 2006-2018

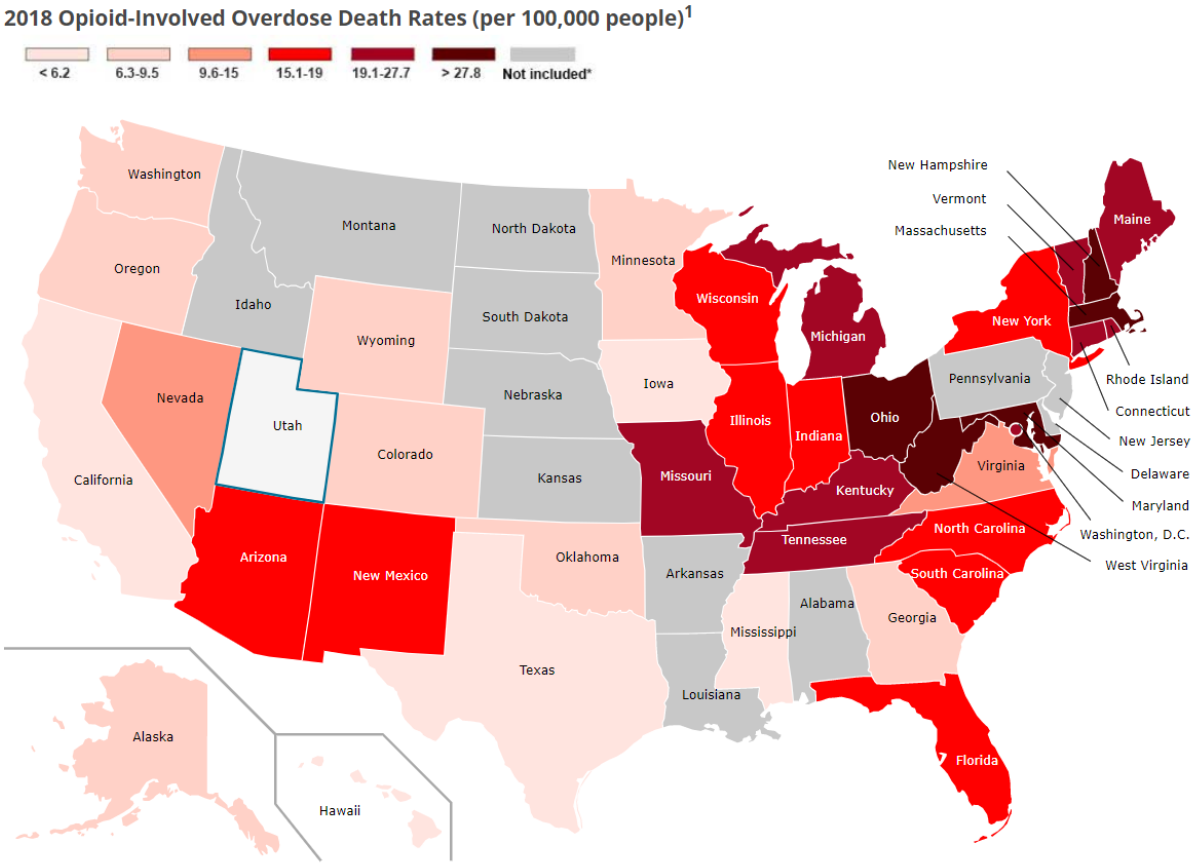


Source: ODH

In the United States, more than 67,300 Americans died from drug-involved overdose in 2018, including illicit drugs and prescription opioids.

In 2018, the State of Ohio had the fourth highest opioid-involved overdose death rate in the U.S., with 29.6 opioid-involved overdose deaths per 100,000 people (Source: CDC, 2018; **Figure 4.3.3**). Additionally, in the same year, Ohio medical providers wrote 53.5 opioid prescriptions for every 100 persons compared to the national average of 51.4 prescriptions.

Figure 4.3.3: Opioid-Involved Overdose Death Rates, 2018



Source: CDC

To combat misuse of prescription opioids and associated deaths, Ohio has made some changes to prescribing rules – with the support of physicians and other prescribers, such as dentists. The Governor's Cabinet Opiate Action Team (GCOAT) developed opioid prescribing guidelines for emergency departments (EDs) in 2012 and for the management of chronic pain in 2013. These prescribing guidelines are intended to supplement—not replace—clinical judgment (Source: OAFP). Additionally, regulations are in place to limit the quantity of opioids that can be prescribed at one time.

4.3.5 Probability

Drug misuse and addiction is a hazard that is already impacting Clinton County. In fact, the impacts of this hazard are prevalent enough that community leaders decided on including this hazard in this Plan Update.

In 2018, the prescribing rate for opioids in Clinton County was 75.1, meaning there were enough opioids dispensed in 2018 for approximately 75 out of 100 people to have one.

Globally, the International Narcotics Control Board (INCB) estimates that drug-related deaths account for between 0.5 and 1.3 percent of all-cause mortality for people ages 15-64.

Table 4.3.2 displays the unintentional drug poisoning (overdose) death rates per 100,000 people along with the age-adjusted overdose death rate per 100,000 people for Clinton County compared to

the State of Ohio (Source: ODH). According to the Ohio Department of Health (ODH), Unintentional Drug Poisoning Deaths include deaths where the injury leading to death was not intended and the mechanism of harm was "Drug Poisoning". This includes opioid overdoses. The age-adjusted death rate is a death rate that controls for the effects of differences in population age distributions.

The data indicates that, since 2012, Clinton County has maintained a higher death rate from overdose deaths compared to the rest of Ohio. For both the County and the State, overdose deaths peaked in 2017, where they experienced overdose death rates of 71.4 and 41.6 deaths per 100,000 residents, respectively.

Table 4.3.2: Opioid-Involved Overdoes Deaths in Clinton County

Death Year	Clinton County			State of Ohio		
	Deaths	Death Rate	Age Adjusted Death Rate	Deaths	Death Rate	Age Adjusted Death Rate
2010	3	7.2	N/A	1,544	13.4	13.7
2011	6	14.3	N/A	1,772	15.3	15.4
2012	13	31.1	32.6	1,914	16.6	17.0
2013	16	38.2	40.4	2,110	18.2	18.7
2014	13	31.1	33.7	2,531	21.8	22.7
2015	20	47.8	51.9	3,050	26.3	27.7
2016	12	28.6	31.2	4,050	34.8	36.8
2017	30	71.4	79.7	4,854	41.6	44.1
2018	13	30.9	30.0	3,764	32.2	34.2
Total	**126**	**33.4**	**35.8**	**25,589**	**24.5**	**25.6**

Source: ODH

4.3.6 Vulnerability Assessment

Infrastructure Impact

There is likely to be little-to-no direct impact to infrastructure from drug misuse and addiction; however, it should be noted that main thoroughfares through Clinton County, such as I-71, can serve as trafficking routes for illicit drugs.

Population Impact

The population of Clinton County is likely to be significantly impacted, both at an individual level and at a larger community scale. Individuals can experience ill health, sickness, and possibly death (see Loss of Life, below). Individuals who inject drugs have the potential to contract hepatitis, HIV/AIDS, or tuberculosis through needle use. Communities can also be impacted by the rampant misuse of drugs, such as experiencing discarded needles throughout their public space.

Property Damage

Property damage is possible due to drug misuse and addiction. Operation of motor vehicles while under the influence can lead to accidents resulting in damaged cars and property. Furthermore, property can experience damage in the form of neglect over time, becoming dilapidated and run down.

While many people suffering from drug addiction will not turn to crime to search for drugs, the unpredictable nature of addiction may influence some people to commit acts of theft or break and enter to find more drugs. This can result in property damage to homes or businesses.

Loss of Life
Loss of life is likely from drug misuse and addiction. Those who misuse drugs may overdose, while others may contract diseases from needles that will ultimately lead to their death.

Economic Losses
The economic impact of drug misuse can be significant, especially for businesses whose employees misuse drugs. This can be observed through absenteeism, lost productivity, and increased use of medical and insurance benefits by employees who misuse drugs. Locally, several businesses have experienced theft and damage related to drug misuse and addiction.

Economic losses can also be observed at the local, state, and federal government levels. As noted above, the ONDCP estimated that the economic cost of drug abuse to the United States in 2002 was $193 billion.

4.3.7 Land Use and Development Trends
Land use and development trends can be impacted by drug misuse and addiction. When properties become dilapidated because of neglect over time, property values in the surrounding area may suffer as a result. This is likely to stall or halt development in those areas. Neighborhoods with multiple dilapidated properties can also experience a lack of investment.

4.4 Earthquakes

4.4.1 Description

Earthquakes are a result of a sudden movement of the Earth's crust and are caused by the abrupt rupture and rebound of accumulated stress along geologic faults. These movements vary in length and may last from a few seconds to several minutes.

The seismicity, or seismic activity, of an area refers to the frequency, type, and size of earthquakes experienced over a period of time. Earthquakes are measured using observations from seismometers. The Moment Magnitude Scale (MMS), which was developed in the 1970s, is the most common scale on which earthquakes larger than approximately 5.0 in magnitude are reported for the entire world. Earthquakes smaller than magnitude 5.0, which are more numerous, are reported by national seismological observatories and measured most commonly on the local magnitude scale – also referred to as the Richter Scale. These two scales are numerically similar over their range of validity. Earthquakes of magnitude 3.0 or lower are often almost imperceptible or weak, while earthquakes of magnitude 7.0 or greater can potentially cause serious damage over larger areas.

Damage from an earthquake also depends on the earthquake's depth in the Earth's crust. The shallower an earthquake's epicenter, the more damage to structures it will cause. Alternatively, an earthquake can also be measured by its intensity. The Modified Mercalli Intensity Scale (MMI) ranges in value I to XII, in roman numerals (**Table 4.4.1**).

Major earthquakes are low-probability, high-consequence events. Most major earthquakes in the U.S. have occurred in California and other western states. There have been recorded earthquakes throughout the U.S., and the Ohio River Valley has experienced earthquakes exceeding the 3.0 magnitude within the last 25 years.

4.4.2 Location

Earthquakes are countywide hazards and can affect all areas and jurisdictions within Clinton County. According to the Ohio Department of Natural Resources, Ohio is located on the periphery of the New Madrid Seismic Zone, an area in and around Missouri that was the site of the largest earthquake sequence to occur in the country. Additionally, West Central Ohio is the area of Ohio with the highest risk for earthquakes in the State.

4.4.3 Extent

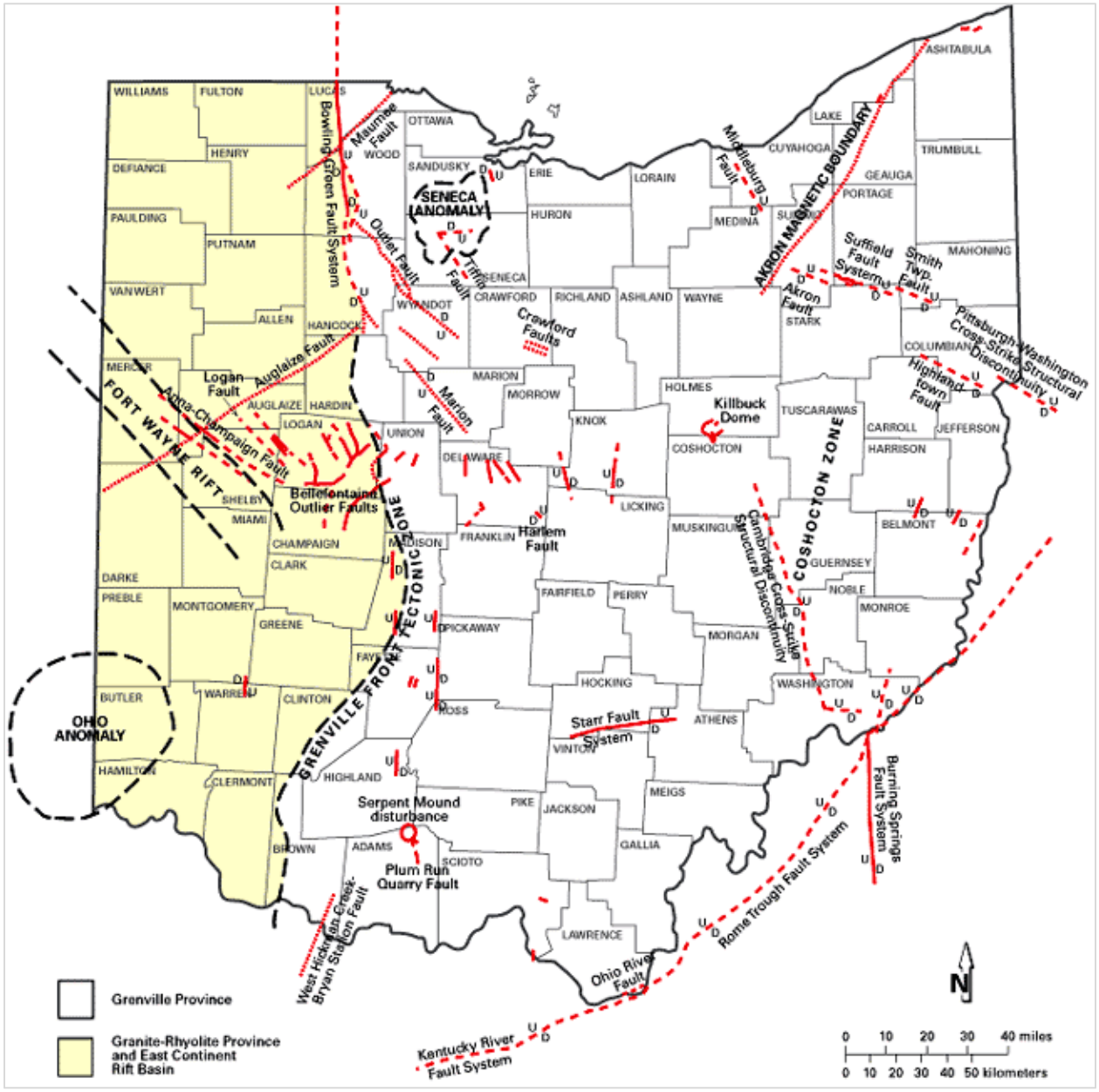
Earthquakes post a risk to life and property depending on the severity. To monitor earthquakes, the State of Ohio has deployed several seismometers to record ground-shaking activity (**Figure 4.4.2**). The Stonelick State Park Station (SLSO) seismometer is located in the closest proximity to Clinton County and is situated in Stonelick State Park in Clermont County.

Table 4.4.1: Modified Mercalli Intensity Scale

Modified Mercalli Intensity Scale		Magnitude
I	Detected only by sensitive instruments.	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing.	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibrations like passing truck.	2.5
IV	Felt indoors by many, outdoors by few, at night some awaken; dishes, windows, doors disturbed; standing autos rock noticeably.	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects.	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small.	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos.	4.5
VIII	Panel walls thrown out of frames; walls, monuments, chimneys fall; sand and mud ejected; drivers of autos disturbed.	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken.	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides.	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent.	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up into air.	7 7.5 8

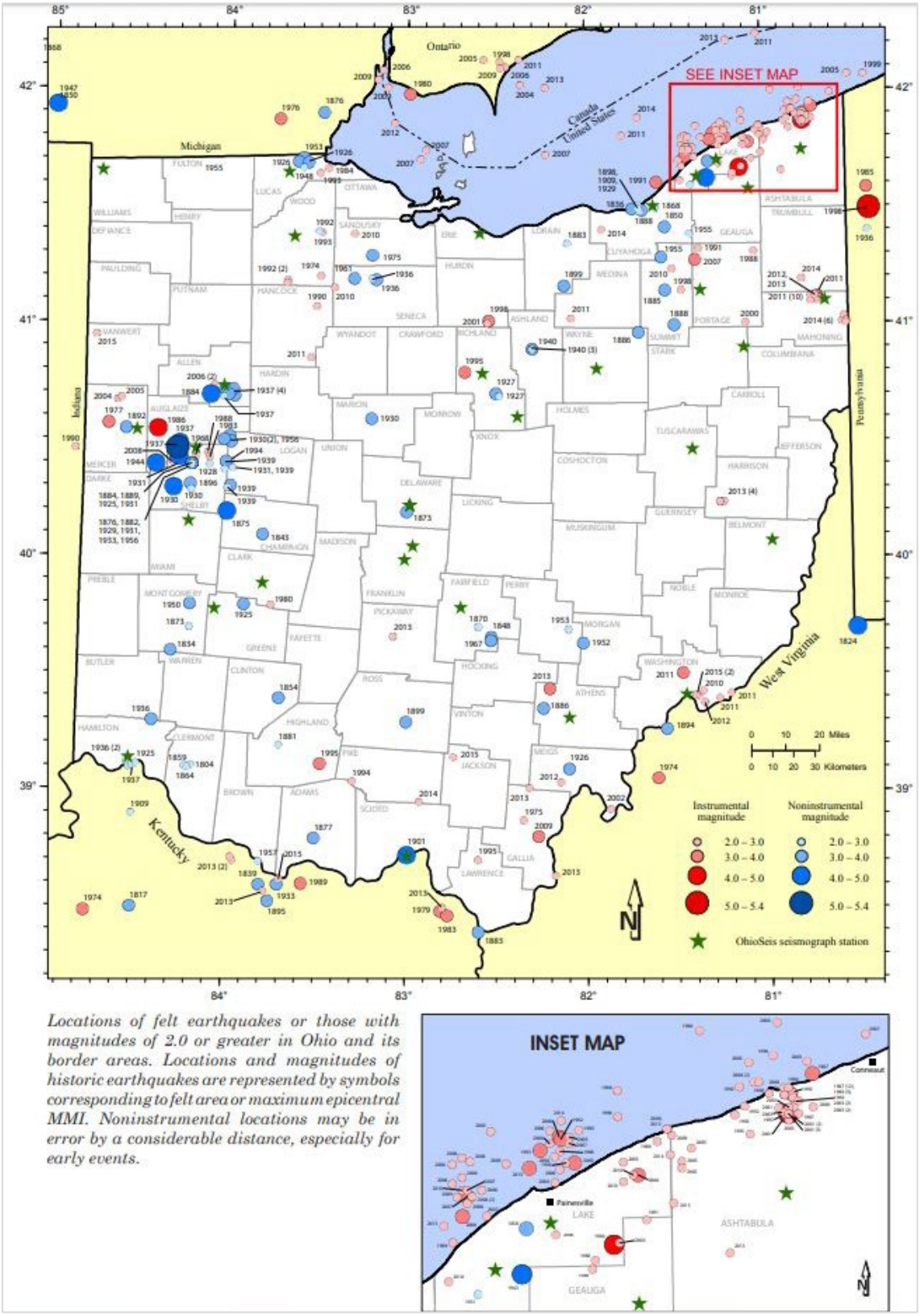
Source: ODNR

Figure 4.4.1 Map of Deep Structures in Ohio



Source: ODNR

Figure 4.4.2: Earthquake Epicenters and Seismometers in Ohio



Locations of felt earthquakes or those with magnitudes of 2.0 or greater in Ohio and its border areas. Locations and magnitudes of historic earthquakes are represented by symbols corresponding to felt area or maximum epicentral MMI. Noninstrumental locations may be in error by a considerable distance, especially for early events.

Source: ODNR

Earthquakes can yield a variety of different outcomes. With the ground shaking associated with earthquake events, buildings have the potential to be impacted. If soil liquefaction, or the mixing of sand and soil with groundwater occurs, buildings can sink into the ground. Earthquakes also have the potential to rupture dams or levees along a river, resulting in flooding (see Dam Failure section). Earthquakes can cause landslides in high-risk areas and can cause mines to subside. Furthermore, earthquakes that break gas and power lines can result in fires.

4.4.4 History

The State of Ohio has experienced more than 120 earthquakes between 1776 and 2019. Fourteen of these earthquakes have caused minor-to-moderate damage. The largest historic earthquake in Ohio was centered in Shelby County in 1937. This event was estimated to have had a magnitude of 5.4 on the Richter scale. **Figure 4.4.2**, above, displays epicenters of all historical earthquakes with a magnitude greater than 2.0, as well as the location of seismometers in the State of Ohio. This image, provided by ODNR, shows that there was a magnitude 3.0 to 4.0 earthquake in Clinton County in 1854. No descriptions of damages associated with this 1854 event are available at this time.

ODNR maintains a record of all earthquake events in the State of Ohio. On February 19, 1995, a 3.6 magnitude earthquake occurred near Hillsboro, Ohio, which is in the neighboring Highland County. More recently, on March 3, 2019, a 2.5 magnitude earthquake occurred near Georgetown, Ohio, which is located in the neighboring Brown County, Ohio. It is possible that residents of Clinton County felt minor ground shaking as a result of these earthquakes.

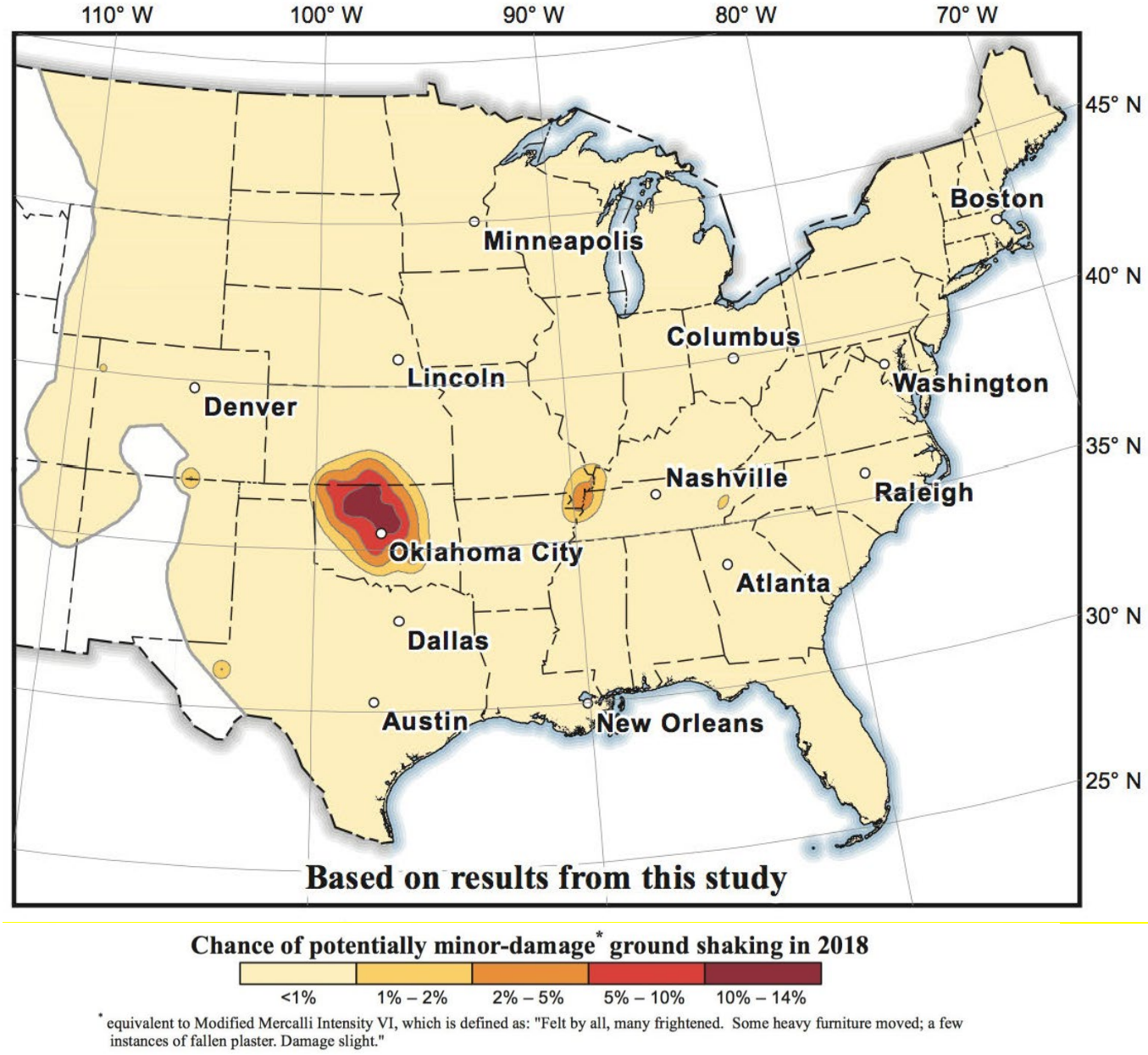
4.4.5 Probability

The USGS has both long-term and short-term probabilistic seismic hazard forecasts. In the 2018 one-year probabilistic seismic hazard forecast, the United States Geological Survey estimates that there is a less than one percent chance of potentially minor-damage ground shaking in 2018 for Clinton County (**Figure 4.4.3**).

The USGS also determined the long-term hazard of earthquakes for the United States (**Figure 4.4.4**). The measurement used in this estimation is based on the chance of ground shaking – peak ground acceleration – as a percentage of the natural force of gravity over time. This map identifies that most of Clinton County and surrounding areas in Ohio have the second to lowest hazard ranking for the nation.

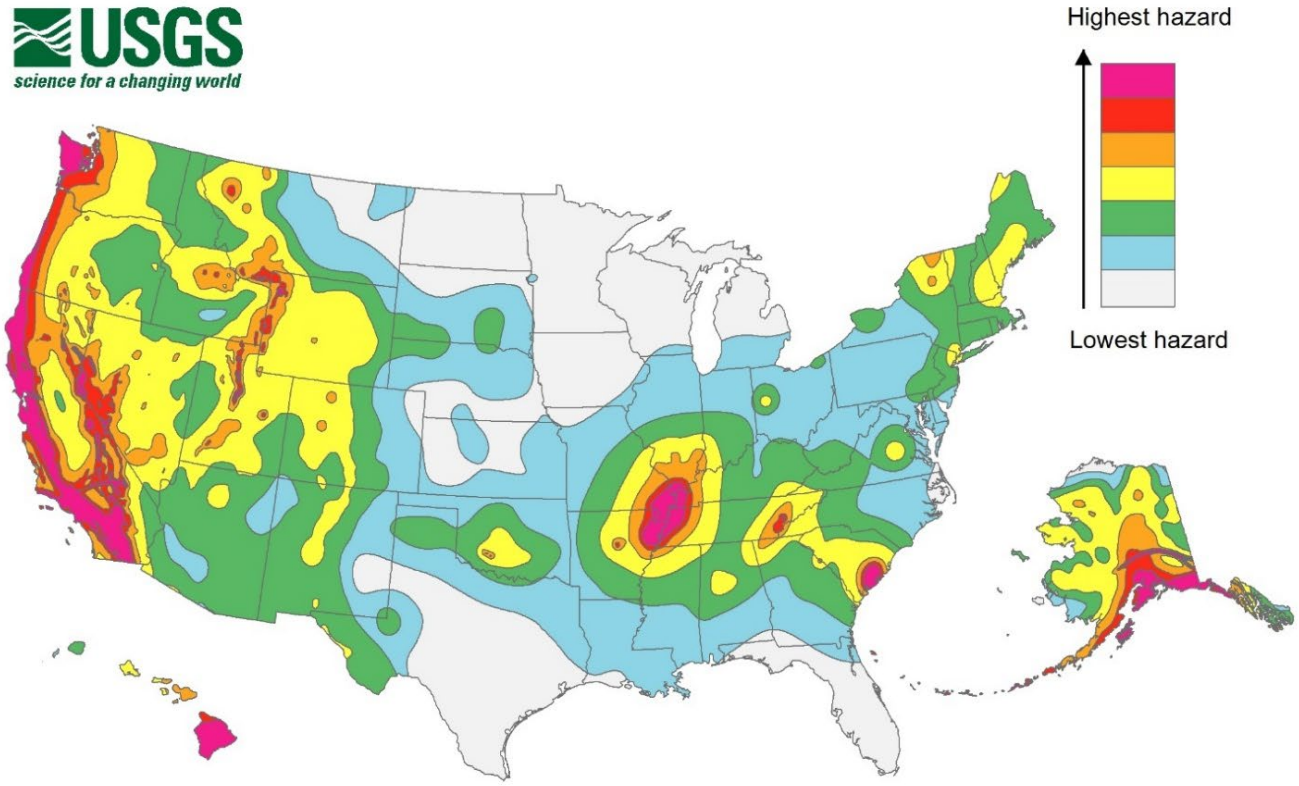
Furthermore, the ODNR indicates that the brief historic record of Ohio earthquakes suggests a risk of moderately damaging earthquakes in the western, northeastern, and southeastern parts of the State.

Figure 4.4.3: Chance of Potentially Minor-Damage Ground Shaking in 2018



Source: USGS

Figure 4.4.4: Probability of Earthquakes in the United States



Source: USGS

4.4.6 Vulnerability Assessment

Infrastructure Impact

Since there are no recent earthquake events with recorded damages, exact damages to infrastructure are unknown. Buildings, roadways, and gas and power lines have the potential to be affected. Since the probability of an earthquake occurring in Clinton County is less than one percent, there is a low risk of impact to infrastructure as a result.

Population Impact

There is a low risk of earthquakes occurring in Clinton County. Accordingly, there is low risk of impact to the population. If an earthquake would occur within the County, the population could be impacted by loss of homes, as well as potential loss of utilities.

Property Damage

With any earthquake event, there is potential for property damage to occur, as ground shaking can lead to damaged buildings. Due to the non-site-specific nature of this hazard, **Table 4.4.2** lists all structures within Clinton County as having potential impacts from earthquakes. It also provides values for two worst-case scenarios valued at one percent damage and five percent damage.

Loss of Life

Clinton County has no recorded earthquake events that have resulted in loss of life; however, in the event that an earthquake occurs, there is potential for loss of life. Loss of life can be mitigated by

educating the public on proper protection in the event of an earthquake. For example, the Ready Campaign (Ready.gov) is a national public service campaign designed to educate and empower the American people to prepare for, respond to, and mitigate disasters. The Ready Campaign provides materials for how to educate the public on earthquake preparedness.

Economic Losses

Earthquakes have the potential to damage infrastructure, resulting in economic burden of clean up and repairs. Potential economic losses and damages associated with Clinton County structures and potential worst-case scenarios are recorded in **Table 4.4.2**, below. Compared with other hazards, earthquakes are relatively unlikely to occur, meaning there is low risk of economic loss as a result of an earthquake.

Table 4.4.2: Structure Vulnerability from Earthquakes

Structure Type	Number of Properties Exposed	Total Value of Structures	Damage for 1% Scenario	Damage for 5% Scenario
Residential	17,871	$516,675,550	$5,166,756	$25,833,778
Non-Residential	8,935	$887,711,440	$8,877,114	$44,385,572
Critical Facilities	102	$63,454,190	$634,542	$3,172,710
Total	**26,806**	**$1,404,386,990**	**$14,043,870**	**$70,219,350**

**Note: Critical Facilities are non-residential structures and their value is incorporated into the non-residential totals as well. Calculated totals are determined by summing the residential and non-residential values.*

4.4.7 Land Use and Development Trends

While incidence and likelihood of earthquakes is low in Clinton County, all communities are at risk. As such, all new developments should be built up to code to reduce risk.

4.5 Epidemic/Pandemic

4.5.1 Description

The Centers for Disease Control and Prevention (CDC) defines an epidemic as "an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area." Moreover, the World Health Organization (WHO) defines a pandemic as "an epidemic occurring worldwide, or over a very wide area, crossing international boundaries and usually affecting a large number of people."

Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. More specifically, an epidemic may result from any of the following:

- A recent increase in amount or virulence of the agent;
- The recent introduction of the agent into a setting where it has not been before;
- An enhanced mode of transmission so that more susceptible persons are exposed;
- A change in the susceptibility of the host response to the agent; and/or
- Factors that increase host exposure or involve introduction through new portals of entry.

While epidemics usually refer to infectious agents, the Centers for Disease Control and Prevention notes that non-infectious diseases such as diabetes and obesity exist in epidemic proportion in the United States. For the purposes of this report, only epidemics referring to infectious agents will be discussed. These types of infectious agents can include bacteria, viruses, fungi, and parasites.

Disease and epidemic can also impact animals. In particular, Clinton County is concerned with potential outbreaks of a virus that can impact swine and other livestock. In particular, swine are commonly infected with Influenza A Viruses.

4.5.2 Location

Epidemics can develop with little or no warning and quickly erode the capacity of local medical care providers. A fast-developing epidemic can last several days and extend into weeks or even months in extreme cases. Epidemics can occur at any time of the year, but the warm summer months, when bacteria and microorganism growth are at their highest, present the greatest risk for epidemics to occur. An epidemic has the potential to affect the entire County but is more probable to occur in densely populated areas, especially at facilities with large numbers of occupants.

4.5.3 Extent

According to the WHO, 70 percent of emerging human pathogens come from animals. As such, some of the most likely epidemics that could affect Clinton County include animal-sourced pathogens such as influenza and West Nile Virus. Such an event has the potential to cause serious injury or death to large numbers of people but would cause no damage to private property or structural damage to public facilities. The impact on individuals could also be economic at the individual level due to the inability of an infected person to go to work. In a worst-case scenario, cascading effects could lead to civil unrest, food and fuel shortages, or utility failure due to inability for people to provide services.

Animal Disease and Epidemic

It is important for the County to monitor Influenza A Viruses, as well as other swine-related disease, because of the potential for human interaction. Additionally, a widespread swine epidemic could have catastrophic economic impacts on the swine industry.

4.5.4 History

The Coronavirus (COVID-19) impacted the County, along with the rest of the United States, beginning in March of 2020. The pandemic is an ongoing national emergency, and a National Emergency Declaration went into effect on March 13, 2020. Governor Mike DeWine and Ohio Department of Health Director, Dr. Amy Acton, issued a stay-at-home order on March 23, 2020 with an expiration date of April 6, 2020. On April 2, 2020, Governor DeWine and Dr. Acton extended the stay-at-home order until May 1, 2020.

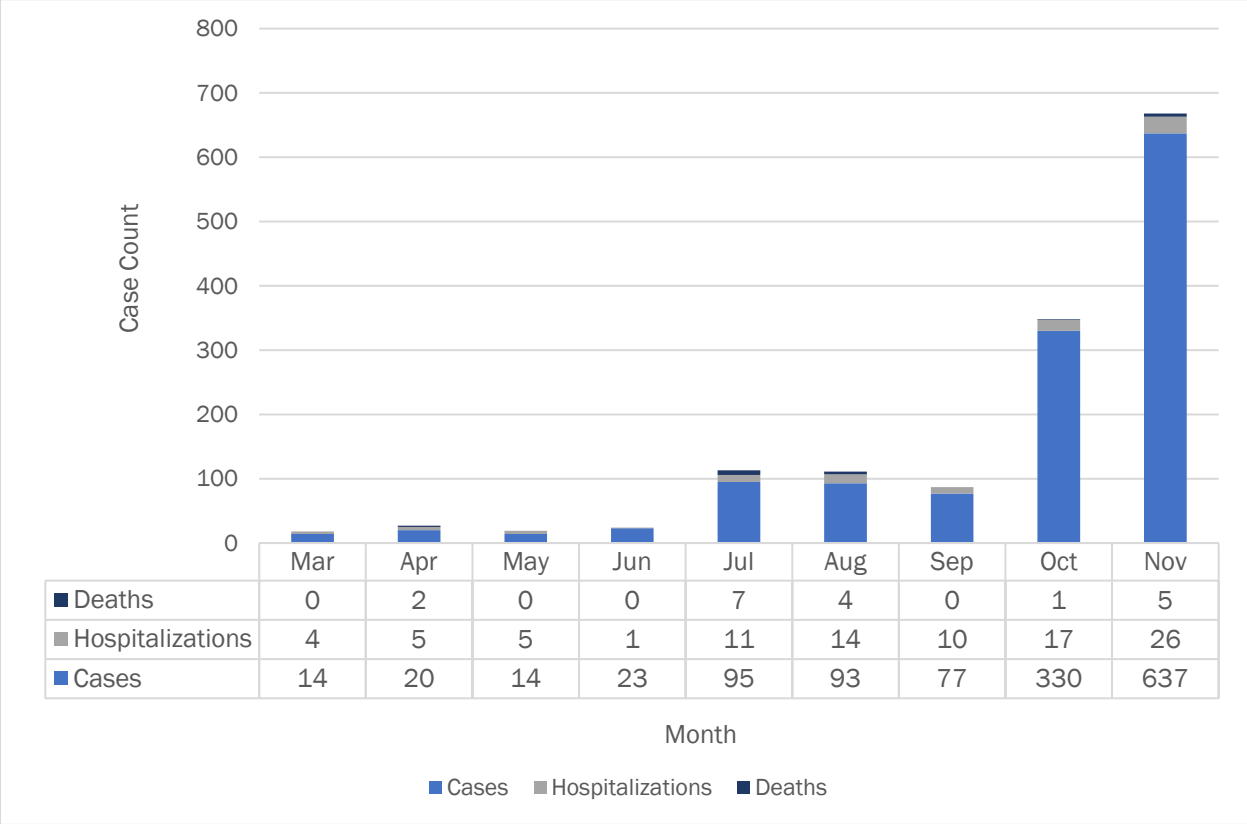
The stay-at-home order has the following components:

- Any person entering Ohio from out of state is asked to self-quarantine for 14 days.
- The number of people allowed to be inside essential establishments is restricted.
- A board has been established to assist local health departments identify essential businesses.
- Weddings are permitted, although receptions are expected to follow social distancing guidelines (at least six feet apart).
- Campgrounds are closed, except when a camper or recreational vehicle serves as a permanent residence.
- Ohio State Parks remain open, but the Parks Director can take action to enforce the orders that have been issued.

In early May 2020, businesses and other organizations in Ohio started the process of reopening; however, by mid-to-late June hospitals begin to see an uptick in the number of COVID-19 hospitalizations. In fall of 2020, as the school year began, local schools utilized a combination of in-person and virtual education. Additionally, by November 2020, communities across Ohio began to see a significant increase in COVID-19 cases.

As of December 7, 2020, Clinton County has 1,369 total confirmed cases, 94 hospitalizations, and 19 deaths attributed to COVID-19. Only three cases were confirmed within local school districts (Source: ODH). **Figure 4.5.1** displays total COVID-19 case count, as well as hospitalizations and deaths, in Clinton County by month. Please note that October only includes October 1-15, 2020.

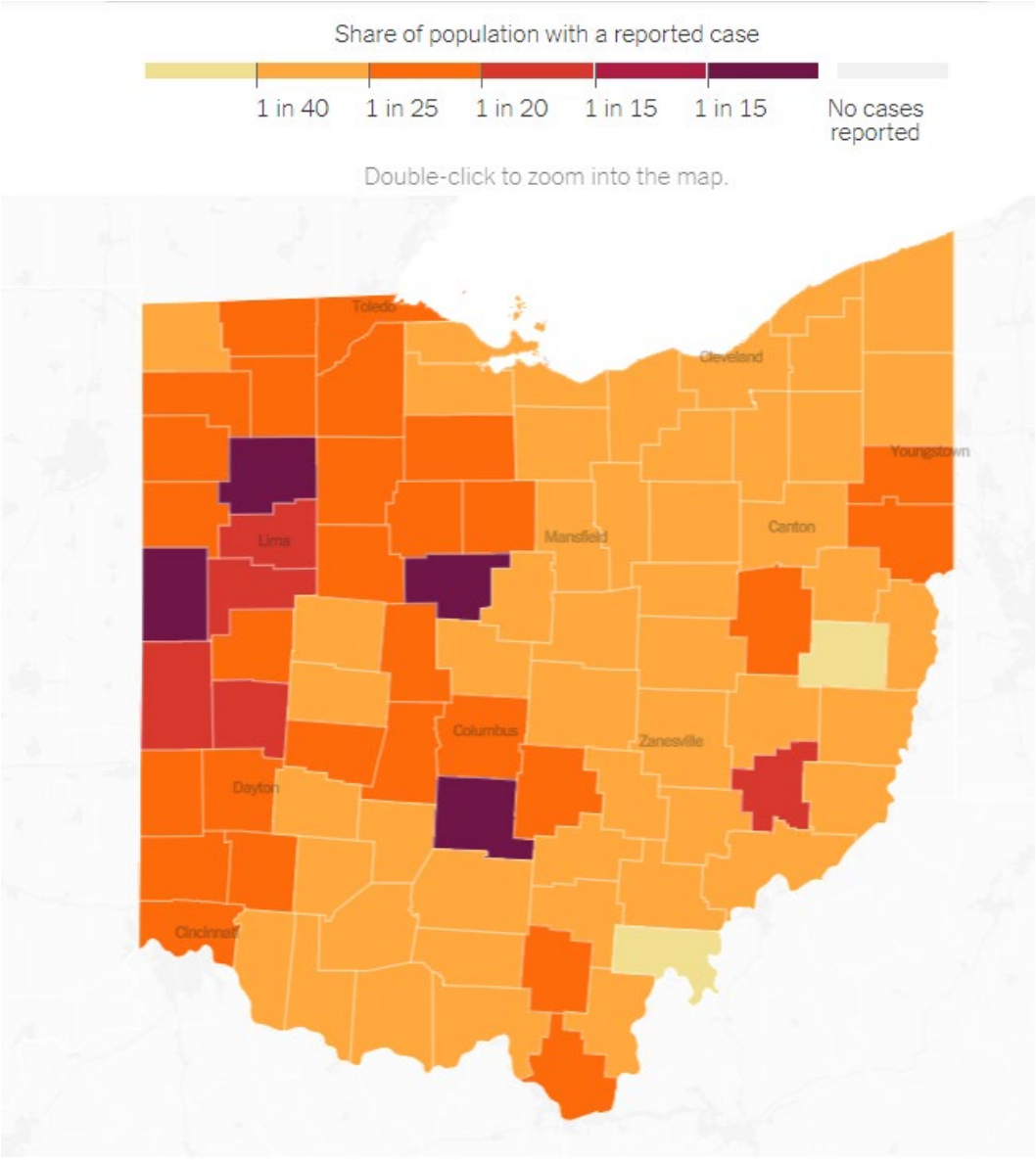
Figure 4.5.1: Clinton County COVID-19 Cases by Month



Source: ODH

Figure 4.5.2 compares COVID-19 rates per capita in Ohio's counties as of December 7, 2020. This figure, which was provided by The New York Times, was developed using data from state and local health agencies. According to this figure, Clinton County has a per capita COVID-19 rate of less than 1 in 40 residents. Counties in red on the figure have per capita COVID-19 rate of between 1 in 15 and 1 and 20 and counties in purple have the highest per capita rate of more than 1 in 15 residents.

Figure 4.5.2: COVID-19 Cases Per Capita by County as of December 7, 2020



Sources: State and local health agencies. Population and demographic data from Census Bureau.

The Ohio Department of Health (ODH) maintains a Public Health Advisory Alert System. This is "a color-coded system designed to supplement existing statewide orders through a data-driven framework to assess the degree of the virus' spread and to engage and empower individuals, businesses, communities, local governments, and others in their response and actions" (Source: ODH). The system consists of four levels that provide Ohioans with guidance as to the severity of the problem in the counties in which they live. The levels are determined by seven data indicators that identify the risk level for each county and a corresponding color code to represent that risk level. These colors and risks are described in **Table 4.5.1**.

Table 4.5.1: Public Health Advisory Alert System

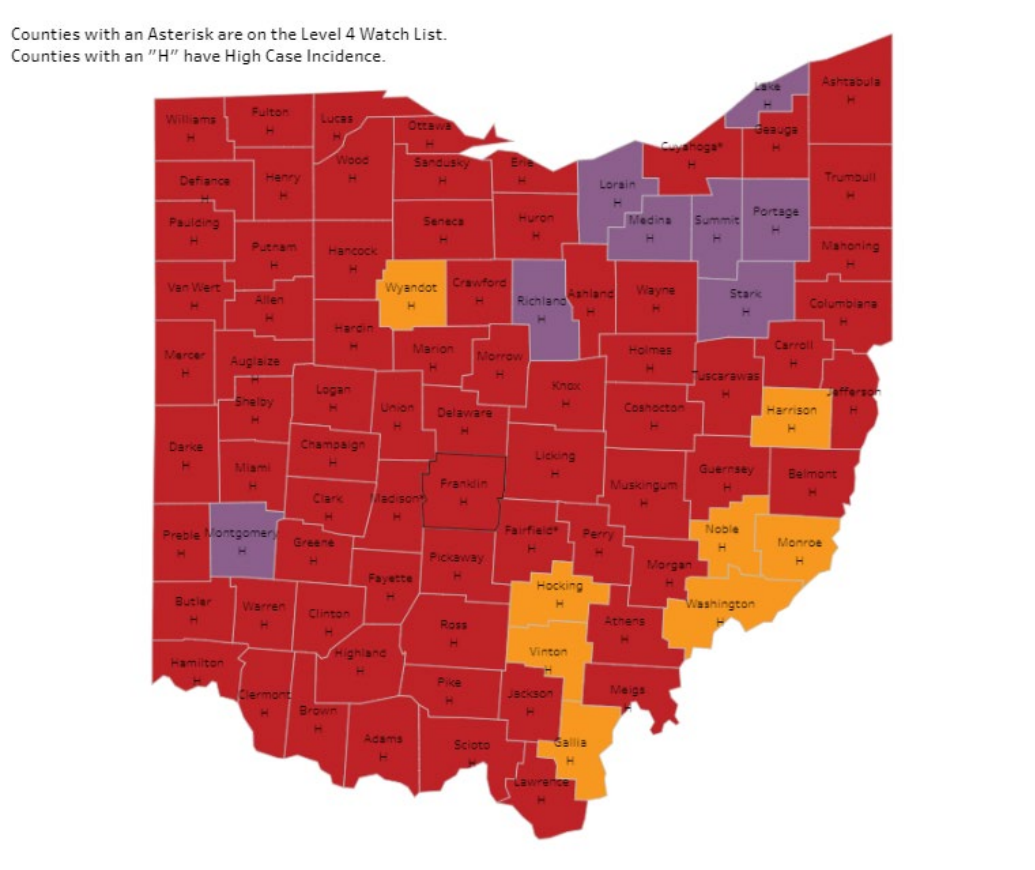
Color	Public Emergency Level	Risk Information
Yellow	Level 1 Public Emergency	Active exposure and spread.
Orange	Level 2 Public Emergency	Increased exposure and spread. Exercise high degree of caution.
Red	Level 3 Public Emergency	Very high exposure and spread. Limit activities as much as possible.
Purple	Level 4 Public Emergency	Severe exposure and spread. Only leave home for supplies and services.

Source: ODH

Figure 4.5.3 shows the Public Health Advisory System as of December 7, 2020. This image shows that Clinton County had a Level 3 Public Emergency (red) as of December 7, 2020.

The exact long-term impacts from COVID-19 are unknown at this point.

Figure 4.5.3: Public Health Advisory System as of December 7, 2020



Source: ODH

It is important to note that the situation with COVID-19 is constantly changing. At the time this report was written and submitted, the State of Ohio was experiencing a second wave of the virus. As of November 30, 2020, all Ohio counties were listed as High Incidence Spread.

Livestock Disease & Epidemic Occurrence
To monitor large-scale outbreaks of Influenza A Viruses (IAV) among swine in Clinton County, pigs at the County Fair are randomly checked each year. **Table 4.5.2** provides the incident rate for positive swine at the fair over the past five years.

Table 4.5.2: Clinton County Ohio Fair Data Summary

Year	IAV Positive	Samples Collected	% IAV Pos	Subtypes Identified
2016	2	20	10%	H3N2
2017	14	20	70%	H1N1, H3N2, Mixed
2018	4	20	20%	H1N2
2019	0	20	0%	NA
2020	12	20	60%	TBD

Source: OSU Extension

4.5.5 Probability
Epidemics do not occur at regular intervals and can begin without warning. The WHO indicates that most epidemic-prone diseases are rare, and outbreaks are generally contained quickly. Early detection of infected individuals can prevent a widespread epidemic.

As global weather patterns shift and permafrost in areas of the world melts, there will be more opportunity for diseases that have been frozen within layers of permafrost to be released, exposing humans to new diseases. As such, there will be more potential for epidemics to arise from these diseases.

4.5.6 Vulnerability Assessment
Given the lack of historic epidemic events in the County, it is difficult to estimate potential damages. Additionally, the long-term impacts of a widespread virus like COVID-19 are unknown. The following assessment was developed to provide a general vulnerability assessment for epidemics in Clinton County.

Infrastructure Impact
There is likely to be little-to-no impact to infrastructure in the event of an epidemic.

Population Impact
The population of Clinton County is likely to be significantly impacted should an epidemic occur. Day-to-day life can be significantly interrupted, and people may lose their jobs or need to work from home.

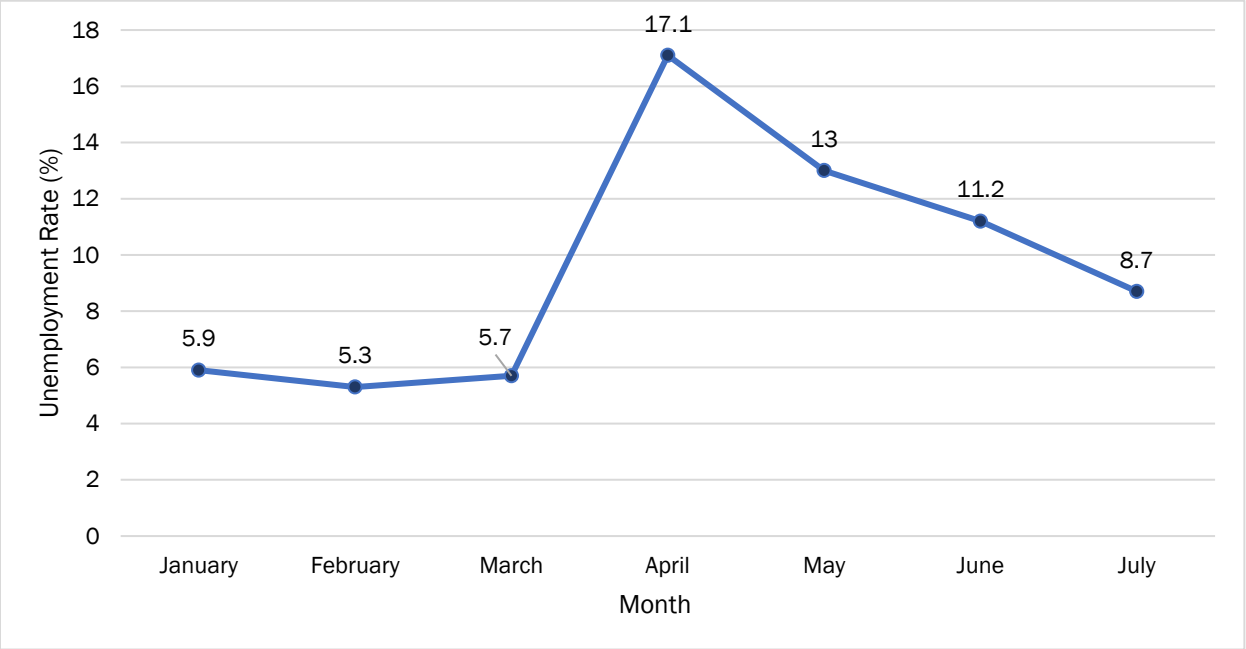
Property Damage
Property damage is not likely to occur as a direct result of an epidemic event.

Loss of Life
Loss of life is a potential outcome from any epidemic event. As of July 2020, COVID-19 has caused 6 deaths in Clinton County.

Economic Losses
Economic losses would likely be observed through the inability for individuals to work. Large-scale epidemics then can have a significant impact on production and the supply chain. As such, these events can disrupt the flow of the economy. In the long run, the threat of epidemics is low, and there is little risk that economic losses will occur in the County due to an epidemic. With that being said, the COVID-19 pandemic has proven to be a multiple-month event resulting in ongoing losses. The full extent of this pandemic is still to be determined.

Figure 4.5.4 displays the unemployment rate for Clinton County from January 2020 through July 2020. This shows the significant increase in unemployment associated with COVID-19 and accompanying business closures mandated by the State of Ohio.

Figure 4.5.4: Unemployment Rates in Clinton County in 2020 by Month

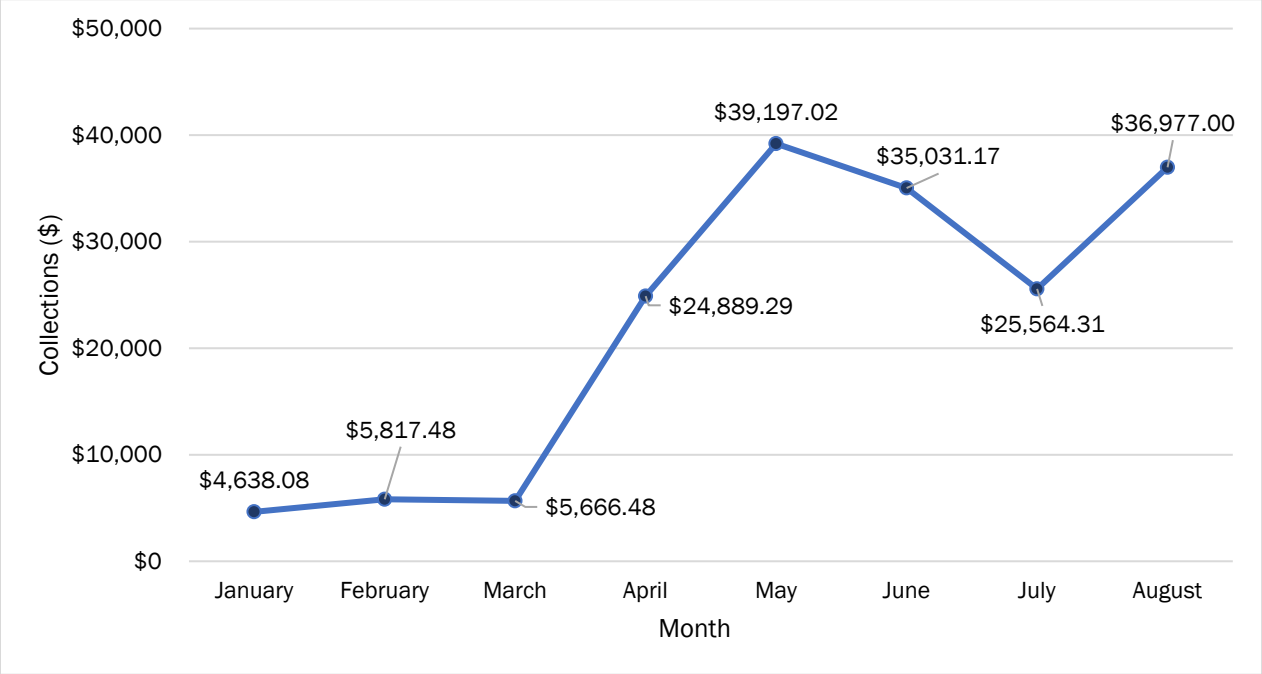


Source: Clinton County Job and Family Services

Clinton County also observed a surge in the number of SNAP, TANF, Medicaid, and PRC applications between March and April 2020 with 328 applications total in March to 700 in April. Between 200 and 300 applications were received each month from May through August. In addition to these observations, Clinton County also experienced a rise in the value of collections from Unemployment Claims for the payment of child support (**Figure 4.5.5**).

It is important to note that these figures are brief snapshots suggesting some of the impacts of COVID-19. A much more detailed economic analysis of the impacts of COVID-19 should be completed once more data has been collected. After 2020, more comprehensive statistical comparisons can be made related to taxes and other economic indicators.

Figure 4.5.5: Collections from Unemployment Claims for the Payment of Child Support



Source: Clinton County Job and Family Services

Economic impacts can also be observed should a swine influenza outbreak occur. Swine influenza costs pork produces approximately $3.23 - $10.31 per pig produced (national average).

4.5.7 Land Use and Development Trends

Land use and development are not likely to be impacted by epidemics. Adequate health care facilities should be maintained in the event of an epidemic.

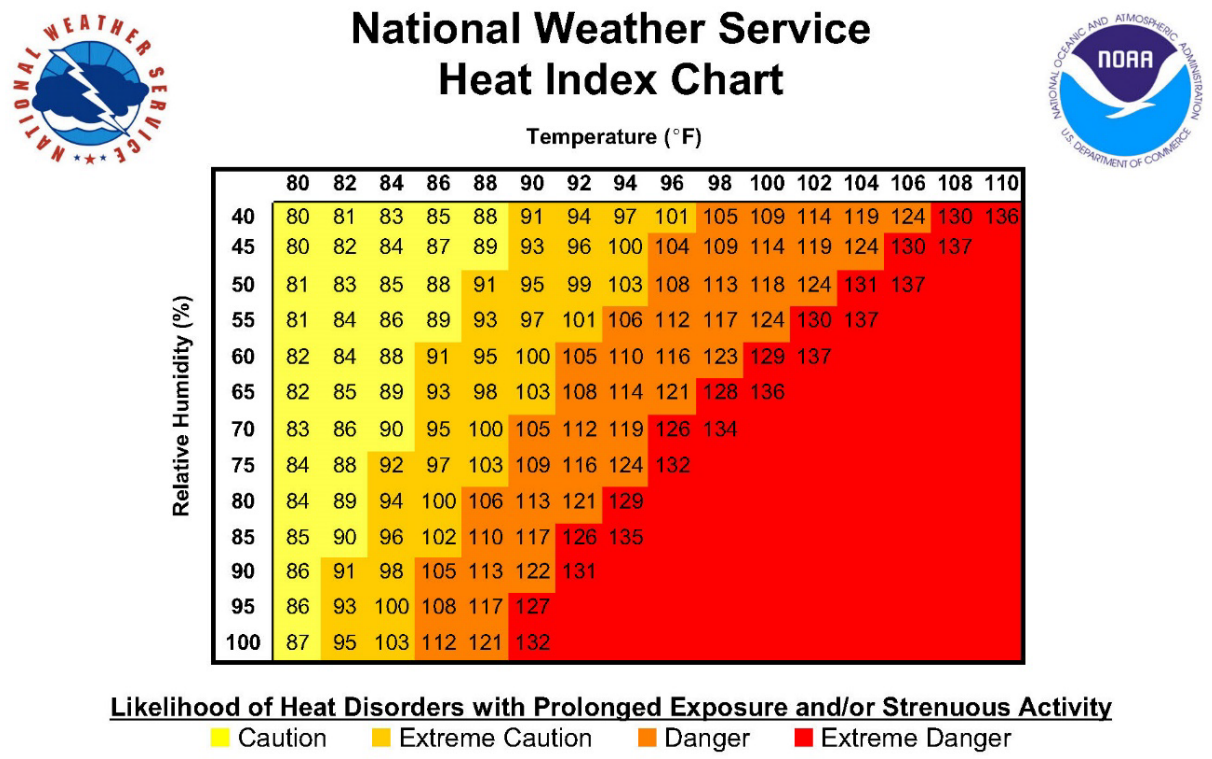
4.6 Extreme Temperatures (Heat & Cold)

4.6.1 Description

Extreme Heat

According to the states of New York, Washington, and California, temperatures that hover over ten degrees or more above the average high temperature for the region and last for several days are considered extreme heat. Humid conditions, which add to the discomfort of high temperatures, occur when a high-pressure weather system traps hazy, moist air near the ground. Extreme heat may also contribute to the formation of a drought if moisture and precipitation are lacking. The National Weather Service's Heat Index Chart is provided in **Figure 4.6.1**.

Figure 4.6.1: Heat Index Chart



Source: NWS

Each National Weather Service Forecast Office issues some or all of the following heat-related products as conditions warrant:

- An **Excessive Heat Warning** is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105 degrees or higher for at least 2 days and nighttime air temperatures will not drop below 75 degrees; however, these criteria vary across the country, especially for areas not used to extreme heat conditions.
- **Excessive Heat Watches** are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain.
- A **Heat Advisory** is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100 degrees or higher for at least 2 days, and night time air

temperatures will not drop below 75 degrees; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions.

- **Excessive Heat Outlooks** are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead time to prepare for the event.

Extreme Cold and Wind Chill

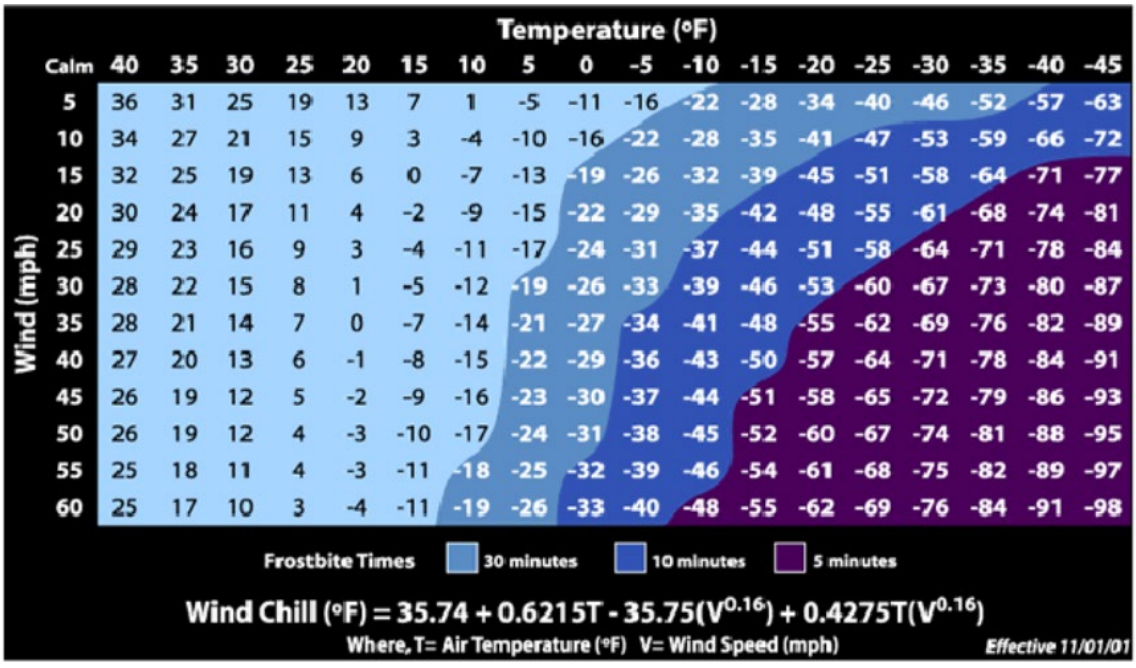
Wind chill is the term used to describe the rate of heat loss on the human body resulting from the combined effect of low temperature and wind. As winds increase, heat is carried away from the body at a faster rate, driving down both the skin temperature and eventually the internal body temperature. Animals are also affected by wind chill.

The National Weather Service offers the following definitions for wind chill and can issue the following related warnings:

- **Wind Chill:** Wind Chill refers to the Wind Chill Factor. Increased wind speeds accelerate heat loss from exposed skin, and the wind chill is a measure of this effect. No specific rules exist for determining when wind chill becomes dangerous. Generally, the threshold for potentially dangerous wind chill conditions is about -20°F.
- **Wind Chill Advisory**: A Wind Chill Advisory is issued when the wind chill temperatures with the combination of the wind and cold air will be between -10° F to -24° F.
- **Wind Chill Factor**: Increased wind speeds accelerate heat loss from exposed skin. No specific rules exist for determining when wind chill becomes dangerous. Generally, the threshold for potentially dangerous wind chill conditions is about -20°F.
- **Wind Chill Warning**: A Wind Chill Warning is issued when the wind chill or feel-like temperature with the combination of the wind and cold air will be -25° F or colder.

The wind chill chart displayed in **Figure 4.6.2** shows the wind chill based on the wind and temperature. The shaded areas show how long it will take for exposed skin to become frostbitten.

Figure 4.6.2: NWS Windchill Chart



Source: NWS

4.6.2 Location

Extreme heat is a countywide hazard that can affect all locations and jurisdictions in Clinton County. Like drought (Section 4.2), this hazard typically occurs at a regional scale. The season for extreme heat is typically from June through August.

Extreme cold events are countywide and can affect all areas and jurisdictions. The cold season typically lasts from November to March with average temperatures ranging from approximately 25 degrees to 30 degrees Fahrenheit. Typically, these events will occur at a regional or even national scale.

4.6.3 Extent

Extreme Heat

Due to the widespread nature of extreme heat events, all structures, croplands, and infrastructure may experience impacts. More specifically, severe lack of moisture can cause soil – especially expansive soil - to recede from foundations of buildings leading to structural instability. All residents of the County may also be impacted, especially at-risk populations that are more susceptible. The elderly and infants are the most vulnerable populations for extreme heat.

The most common symptoms caused by extreme heat, according to the Centers for Disease Control (CDC) include:

- **Heat Cramps** are muscle spasms, often in the abdomen, arms, or calves, caused by a large loss of salt and water in the body. Heat cramps can occur from prolonged exposure to extreme heat combined with dehydration, and they commonly happen while participating in strenuous outdoor activities such as physical labor or sports.
- **Heat Exhaustion** is a severe illness requiring emergency medical treatment. It can occur from exposure to extreme heat over an extended period of time (usually several days), especially when combined with dehydration.
- **Heat Stroke** is the most serious medical condition caused by extreme heat requiring emergency treatment. Heat stroke (or hyperthermia) occurs when the body can no longer regulate its temperature and its temperature rises rapidly—up to 106°F or higher. It usually occurs as a progression from other heat-related illnesses such as heat cramps or heat exhaustion; however, it can also strike suddenly without prior symptoms, and it can result in death without immediate medical attention.

Extreme heat is especially dangerous because people might not recognize their symptoms as signs of a more serious condition. For example, symptoms like sweating or fatigue may just appear to be normal reactions to a hot day. People may be in more danger if they experience symptoms that alter their decision making, limit their ability to care for themselves, or make them more prone to accidents. If untreated, heat-related illnesses can worsen and eventually lead to death. Heat can also contribute to premature death from health impacts other than those listed above. This is because extreme heat can worsen chronic conditions such as cardiovascular disease, respiratory disease, and diabetes.

Extreme Cold and Wind Chill

According to the National Weather Service, frostbite is an injury to the body caused by freezing body tissue. Fingers, toes, ears, and tip of the nose are most vulnerable. Symptoms include white or pale appearance to the affected area. The area affected should be slowly re-warmed. Immediate medical attention is needed. **Figure 4.6.3** shows the onset time for frostbite at certain temperatures and wind speeds.

Figure 4.6.3: Minutes to Frostbite

Wind speed at 10 meters (MPH) ↕	Air Temperature in °F												
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	-50
5	>2 h	>2 h	>2 h	>2 h	31	22	17	14	12	11	9	8	7
10	>2 h	>2 h	>2 h	28	19	15	12	10	9	7	7	6	5
15	>2 h	>2 h	33	20	15	12	9	8	7	6	5	4	4
20	>2 h	>2 h	23	16	12	9	8	8	6	5	4	4	3
25	>2 h	42	19	13	10	8	7	6	5	4	4	3	3
30	>2 h	28	16	12	9	7	6	5	4	4	3	3	2
35	>2 h	23	14	10	8	6	5	4	4	3	3	2	2
40	>2 h	20	13	9	7	6	5	4	3	3	2	2	2
45	>2 h	18	12	8	7	5	4	4	3	3	2	2	2
50	>2 h	16	11	8	6	5	4	3	3	2	2	2	2

Source: NWS

4.6.4 History

According to the National Centers for Environmental Information (NCEI), there have been a total of five extreme temperature events in Clinton County since February of 1996, including two extreme cold/wind chill events and three excessive heat events. These events resulted in $20,000 in property damage and no crop damage. These events were not responsible for any deaths or injuries. The description of these events, which is provided by the NCEI, is supplied below.

Extreme Heat: July 20, 2019

With a combination of high temperatures in the 90-degree range and added humidity, heat index values across the region reached into the triple digits for a second day in a row.

Extreme Heat: July 19, 2019

With a combination of high temperatures in the 90-degree range and added humidity, heat index values across the region reached into the triple digits.

Extreme Cold/Wind Chill: January 30, 2019

An arctic airmass was pushed into the Ohio Valley behind a cold front. Sub-zero temperatures reached the lower teens in some areas and combined with wind gusts of 30 to 45 MPH creating wind chills from 20 to 40 degrees below zero.

Extreme Heat: August 7, 2007

Oppressively hot and humid conditions with heat indices near 105 degrees impacted southern Ohio August 7-10, 2007.

Extreme Cold/Wind Chill: February 1, 1996

Arctic high pressure brought the coldest air of the season to the Ohio Valley. Cincinnati broke its record low on February 4, 1996 with a temperature of -11 degrees. Cincinnati also experienced its record low maximum temperatures of 7 and 6 degrees on February 3rd and 4th respectively. The extreme cold was entrenched for 5 days freezing and bursting numerous water pipes. There were at least 2 house fires indirectly related to the cold weather as space heaters, which were thawing

frozen water lines, caught on fire. On February 6, 1996, six thousand customers were without power near Portsmouth as over-usage caused outages. AAA Motor Club had an extremely high number of calls during this cold wave when cars would not start. This event resulted in $20,000 in property damage.

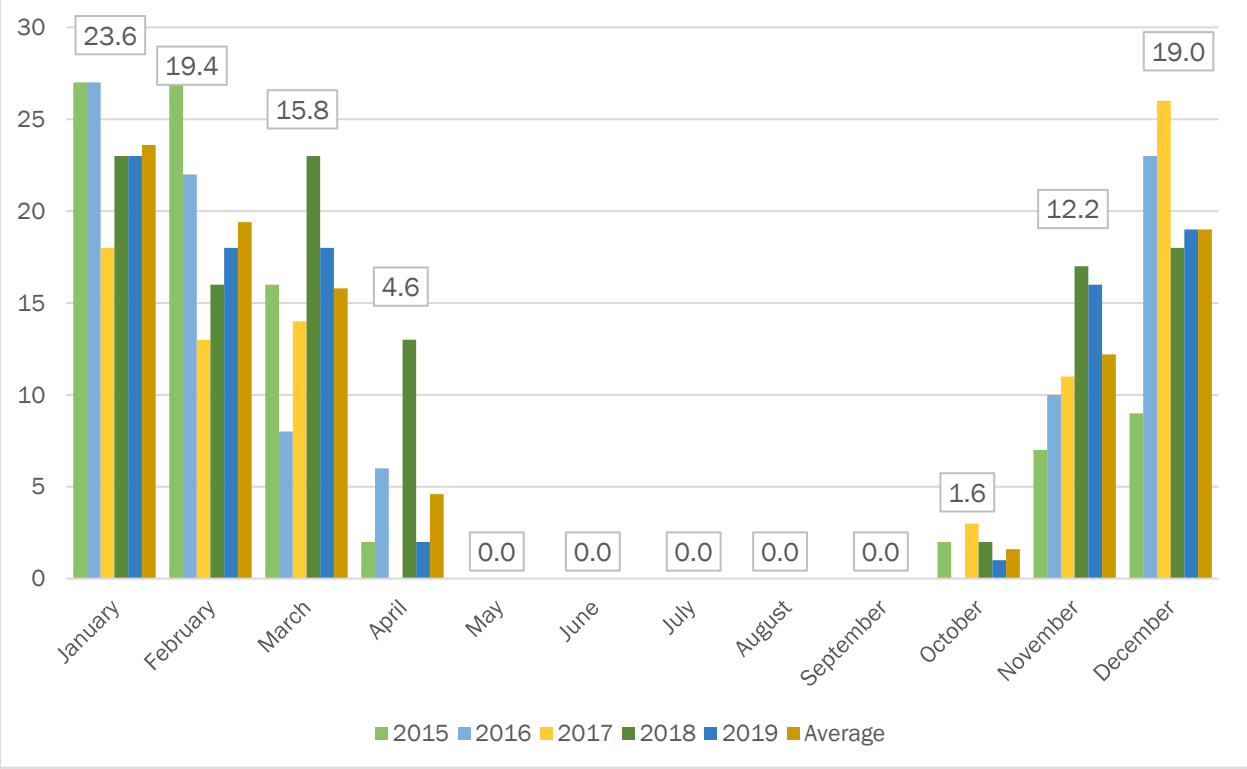
4.6.5 Probability

Clinton County has experienced extreme temperature events in the past, and the potential exists for the County to experience more of these events in the future. Seasons of extreme heat and seasons of extreme cold have the potential to occur during any particular year when necessary conditions are met.

More specifically, the County has record of five extreme temperature events from February 1996 to June 2020 resulting in $20,000 in property damage, which amounts to a 20.8 percent chance of an extreme temperature event occurring any given year. Annualized damages for this time frame amount to $833.33 in property damages each year from extreme temperature events (specifically, extreme cold events).

Even when official wind chill advisories are not issued, temperatures can still drop below safe levels. **Figure 4.6.4** displays the days below freezing by month for 2015-2019. The average number of days below zero each month is displayed above each month. Over the last five years, January is the month with the greatest number of days below zero, on average, followed by February and December. The annual average over the last five years is 96.2 days below freezing with all of those days occurring between October and April.

Figure 4.6.4: Days with Minimum Temperatures Below Freezing, 2015-2019



Source: NWS

4.6.6 Vulnerability Assessment

Infrastructure Impact

Extreme heat is not likely to have impacts on infrastructure; however, it is possible that extreme heat could lead to a power outage if the electric grid is overtaxed due to heavy air conditioning use. Extreme cold can have secondary impacts on infrastructure due to the accumulation of snow and ice. The primary impact of extreme cold on infrastructure is typically the freezing of exposed water pipes and systems.

Population Impact

Although there is no history of population impact, extreme heat can have an impact on the population of the entire County. Groups that are particularly vulnerable to extreme heat include young children, older adults, and people with chronic health conditions, such as obesity, hypertension, and cardiopulmonary or vascular disease. Residents should be aware of the dangers of extreme heat and how to recognize the symptoms of such conditions as heat cramps, heat exhaustion, and heat stroke.

Both people and livestock can be impacted by extreme cold. People should stay indoors during extreme cold events. If someone is outside during an extreme cold event, they should wear loose-fitting and warm clothing and cover all exposed skin. Efforts should be made to protect livestock, pets, and other animals during extreme cold events.

Property Damage

Property damage is a possibility due to extreme heat. Vehicles are at risk of breaking down from excessive heat, as heat can reduce battery life and reduce the efficiency of the cooling system resulting in overheated engines. Extreme heat can also cause a home to dry out and prematurely age. Excessive heat in combination with lack of rainfall (drought) can cause soil to shrink and crack, which puts stress on a home's foundation that can be costly to fix. Extreme cold events are also likely to cause property damage in the form of frozen pipes that burst.

Loss of Life

Loss of life is a potential outcome from any extreme temperature event, especially for at-risk populations such as the elderly. Extreme heat can lead to heat exhaustion or heat stroke which has the possibility to lead to death. According to the National Safety Council, 372 people died in the U.S. in 2013 from exposure to excessive heat. Additionally, extreme cold events can cause severe hypothermia in the event of loss of heat or prolonged exposure.

Economic Losses

Extreme heat can have an economic impact by compromising crops and livestock, which are both vulnerable to extended extreme heat events. Human productivity can also be adversely affected when working conditions become too hot.

While there are no recorded economic losses in Clinton County due to extreme cold, the potential certainly exists. Businesses have the potential to close temporarily if pipes freeze and services are temporarily suspended. Additionally, agricultural crops can also be put at risk by extreme cold, especially if an extreme cold event occurs outside the traditionally coldest months of the year.

4.6.7 Land Use and Development Trends

Extreme temperatures do not have a significant influence on land use or where development should take place.

4.7 Flooding

4.7.1 Description

FEMA describes a flood as "a general and temporary condition of partial or complete inundation of normally dry land areas from the overflow of inland or tidal waters [and] the unusual and rapid accumulation or runoff of surface waters from any source." Floods are typically riverine, coastal, or shallow. Flash floods are floods that occur quickly, even occurring without visible signs of precipitation.

Urban flooding is a type of flood that can occur in areas of development that have a high level of impervious surfaces such as concrete. The level of development and the level of stormwater management practices impact the severity of urban flooding.

Common flood-related terms include:

- **100-Year Flood:** A flood that has a one percent chance to occur each year. The 100-year floodplain can be seen in **Figure 4.7.1: Flood Hazard Map**. The elevation of the water from the 100-year flood is called the Base Flood. Mitigation strategies should be based on the base flood elevation.
- **Floodplain:** An area that has the potential to flood from any source.
- **Floodway:** Sometimes referred to as a regulatory floodway. FEMA defines a floodway as "the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the Base Flood without cumulatively increasing the water surface elevation more than a designated height."
- **Flash flood:** Flash floods are typically caused by heavy rainfall over a short period of time. These floods are particularly dangerous because they can occur in minutes and can sometimes occur even without rainfall such as when an ice jam breaks or dissolves. Areas impacted by wildfires are particularly susceptible to flash floods. Flash floods can occur just about anywhere with enough rainfall, and are not restricted to the 100-year floodplain. Development/restriction to drainage or increased impervious surfaces can contribute to flash flood frequency.

4.7.2 Location

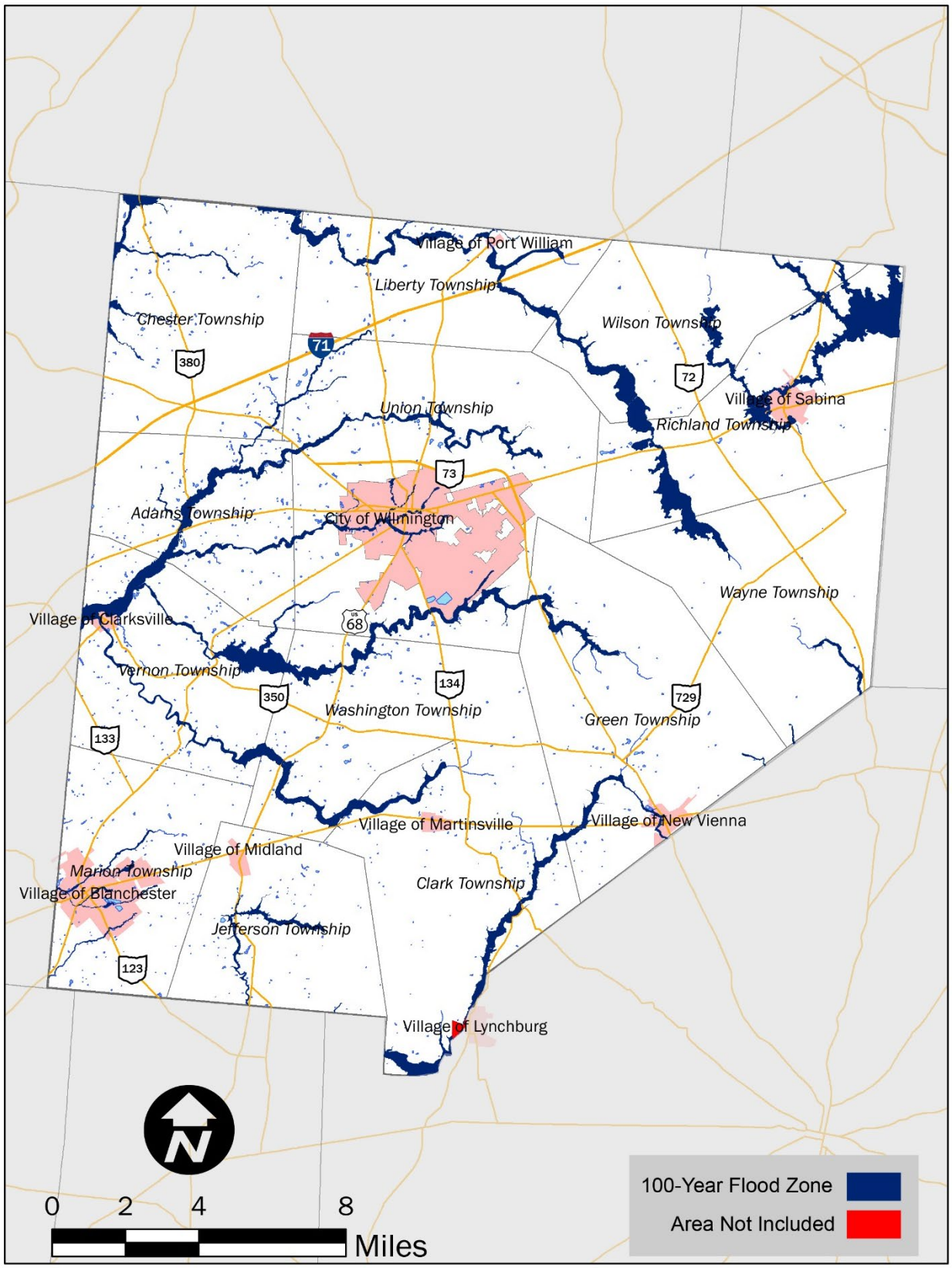
Flooding can occur throughout Clinton County. Flash flooding is more likely to occur in developed areas. **Figure 4.7.1** shows the location of the 100-year floodplain. Floods can and do occur outside the FEMA defined one percent flood zone. Sometimes very small watersheds are not included in the FEMA analyses, but there can be a risk in smaller watersheds, as well.

4.7.3 Extent

Clinton County currently has 36 flood insurance maps (see **Appendix F**). The most recent update is from April 2010.

Clinton County and five communities within the County participate in the NFIP. These communities include the City of Wilmington and the Villages of Blanchester, Clarksville, New Vienna, and Sabina. The Villages of Martinsville, Midland, and Port William do not participate in the NFIP. Both the Village of Martinsville and the Village of Midland are located in Areas of Minimal Flood Hazard according to the insurance maps. The Village of Lynchburg participates as part of Highland County, Ohio. A mitigation action has been included in this Plan to coordinate with Port William to participating in the NFIP.

Figure 4.7.1: 100-Year Flood Zone in Clinton County, Ohio



There are no repetitive loss properties in Clinton County, Ohio. FEMA defines a repetitive loss property as an insurable building for which two or more claims of more than $1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period since 1978. FEMA defines a severe repetitive loss property as a single family property that is covered under flood insurance by the NFIP and has incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage, with the amount of each claim payment exceeding $5,000 and with cumulative amount of such claims payments exceeding $20,000; or for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property. The County has no severe repetitive loss properties.

4.7.4 History

There have been 55 floods or flashfloods in Clinton County between April 1996 and December 2019. These events have caused $110,000 in property damages and $1,000 in crop losses. Average annual damage from floods and flashfloods amounts to $4,500. There are no reported injuries and one reported death from 2008. Described below are the three most damaging events by property damage over the past two decades, including the event that caused a death in 2008. All events are listed individually in **Appendix A**. Additionally, **Figure 4.7.2** shows some flooding in fields associated with flooding in May 2020.

Flooding in the Village of Blanchester on March 19, 2008

Seven homes were evacuated due to high water in the Village of Clarksville. A 54-year-old woman attempting to cross a swollen stream was swept away and drowned. Numerous roads were flooded throughout the county. This event caused $10,000 in property damage.

Flooding in Clinton County on January 5, 2005

A stationary frontal boundary that draped across the Ohio Valley was the focusing mechanism for an extended period of heavy rain across much of central and southern Ohio, including Clinton County. Many locations received two to four inches of rain in a 24-hour period, which increased flooding problems as the ground was already saturated from recent snowmelt. Widespread flooding of roads and low-lying areas occurred across the region with numerous creeks and streams rising out of their banks. This event caused $20,000 in property damage in Clinton County.

Flooding in Clinton County on May 18, 2001

Heavy rain from thunderstorms flooded roads across Clinton County. Roads in the northeastern section of the County were especially impacted. Standing water was reported on portions of the first floor of Sabina Elementary School in the Village of Sabina. This event caused $10,000 in property damage.

Figure 4.7.2: Flooding along Hackney Road in Clinton County, May 2020

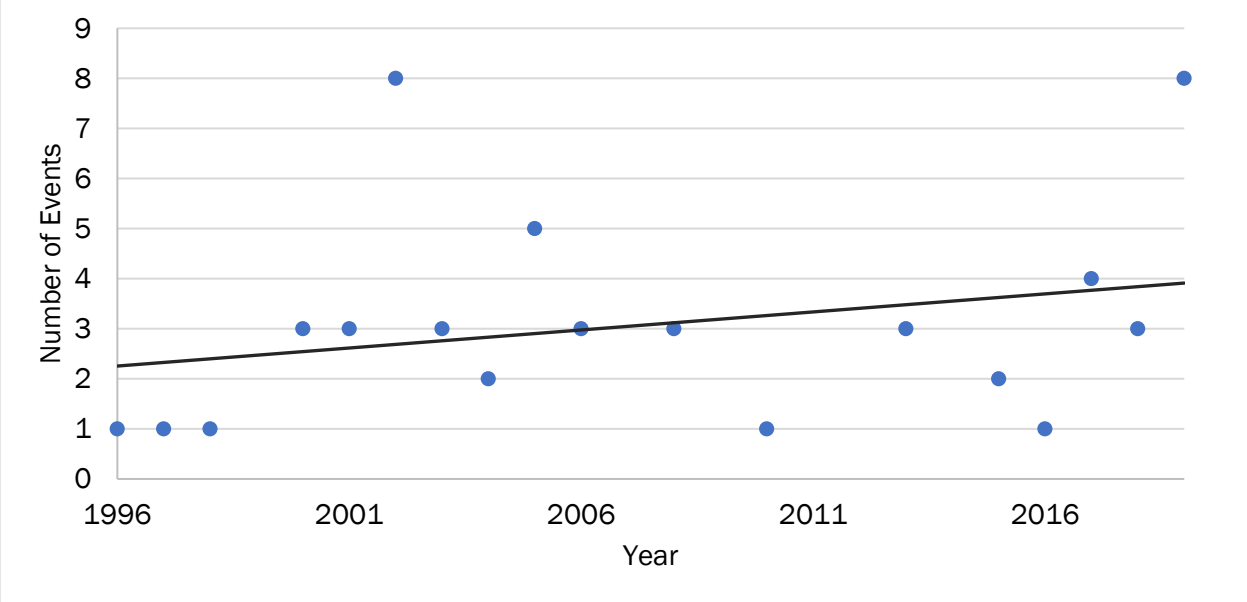
Source: Wilmington News Journal

4.7.5 Probability

Figure 4.7.3 shows the trend of flood events over time since January 1996, as this is the earliest year with complete data from the NCEI. The trend of flood occurrences per year increases slightly over time, which means Clinton County can expect to have more annual flood events than have occurred in the recent past.

Between 1996 and 2019, Clinton County has experienced 55 flooding events, including both floods and flash floods. These events have resulted in one death and no additional injuries, as well as $110,000 in property damage and $1,000 in crop damage (Source: NCEI). Annually, this amounts to approximately 2.4 floods or flash floods and $4,826 in property and crop damages.

Figure 4.7.3 Probability of Flooding



4.7.6 Vulnerability Assessment

Infrastructure Impact

Floods can impact roadways, including interstates and state routes, by blocking them due to high water or by filling them with debris.

Population Impact

Floods and flash floods have caused damages to occupied homes in the past. During flood events, shelter may need to be provided to those impacted by flooding.

Property Damage

Property damage is likely during floods to both residential and non-residential properties. **Table 4.7.1** lists the value of all the properties that are exposed to 100-year floods.

Table 4.7.1 Structure Vulnerability from Flooding

Structure Type	Number of Properties Exposed	Value (Exposed)	Percent of Total
Residential	19,622	$3,469,316	73.2%
Commercial	3,967	$700,934	14.8%
Industrial	1,662	$292,455	6.2%
Agriculture	375	$66,990	1.4%
Religious	536	$94,007	2.0%
Government	241	$42,717	0.9%
Education	402	$73,208	1.5%

Loss of Life

There is one reported death from a flood event on March 19, 2008. Loss of life is possible in future floods or flashfloods.

Economic Losses

Floods can halt economic activity, block roadways, and destroy agricultural crops. Building contents up to $25,000 are expected to be exposed during a 100-year flood event. Crop losses are also expected during floods or flashfloods.

4.7.7 Land Use and Development Trends

Any development that occurs in flood zones will be at risk. Development in these areas should be limited. Flash flooding is more likely to occur in areas with a high percentage of impervious surfaces. Future land use practices should limit the percentage of impervious surfaces. **Chapter 5** contains mitigation actions that address these issues.

4.8 Hazardous Materials

4.8.1 Description

According to the Ohio Environmental Protection Agency, hazardous materials can be defined in different ways depending on 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 Environmental Protection Agency's definition includes the Occupational Safety and Health Administration definition. It also adds any item or chemical which can cause harm to people, plants, or animals when released into the environment.
- The Department of Transportation 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.

The Ohio Environmental Protection Agency (Ohio EPA) indicates that there are five categories in which materials can be hazardous including acute, chronic, fire, reactive, or sudden release of pressure.

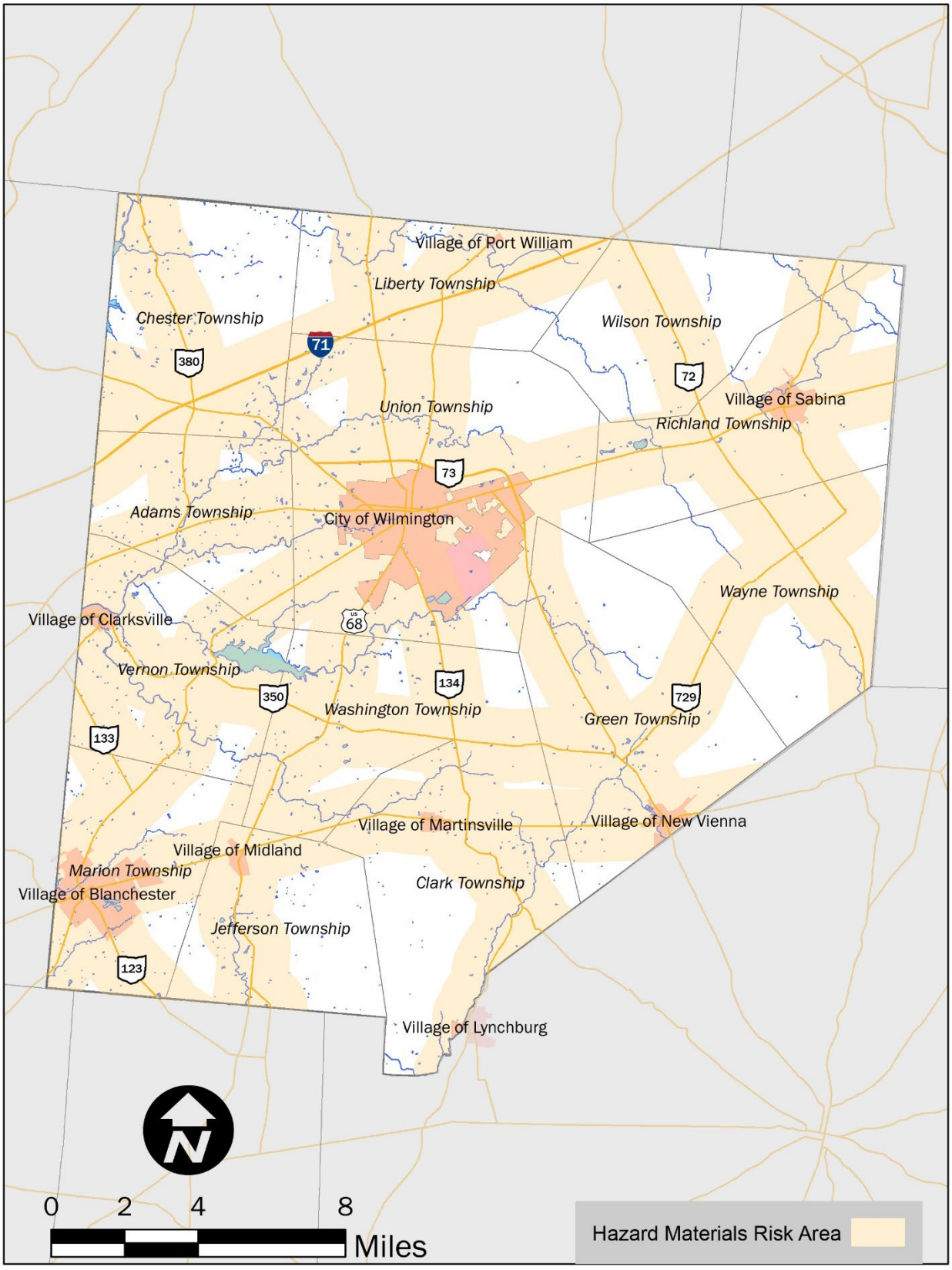
The U.S. Nuclear Regulatory Committee regulates materials that produce ionizing radiation, which includes by-product material and radioactive substances.

The Emergency Planning and Right-to-Know Act, or EPCRA, was passed as Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires a facility that processes, uses, or stores extremely hazardous substances or hazardous substances as classified by the Occupational Safety and Health Administration Hazard Communication Standard. This is also codified in the Ohio Revised Code (ORC) Chapter 3750 and the Ohio Administrative Code Chapter 3750.

4.8.2 Location

Hazardous material spills can occur wherever hazardous materials are stored and during shipment to these facilities. **Figure 4.8.1** shows the areas which are at the highest risk of being impacted by hazardous materials spills. These areas were calculated by identifying normal shipping routes and placing a one mile buffer around these routes.

Figure 4.8.1: Hazardous Materials Risk Area



4.8.3 Extent

The EPA keeps records for Extremely Hazardous Substance facilities because these facilities have a higher probability of spills due to the higher amounts of hazardous materials at their sites. Each potential hazardous material has varying levels of toxicity. The concentration of these materials should be measured in parts-per-million to determine whether they present a threat. Many chemicals are safe at low amounts and low concentrations but can become dangerous and even toxic at high amounts and concentrations. Additionally, some chemicals can be flammable and can become more volatile when exposed to oxygen. In ground spills, untreated chemical and waste spills can contaminate the soil and drinking water creating toxic environmental conditions. Corrosive, flammable, or explosive chemicals can create infrastructure damage depending on the location, amount spilled, and the circumstances of the incident. In worst-case scenarios, large spills can trigger evacuations of residents and close transportation routes used for hazardous materials transportation, which can also affect local residents.

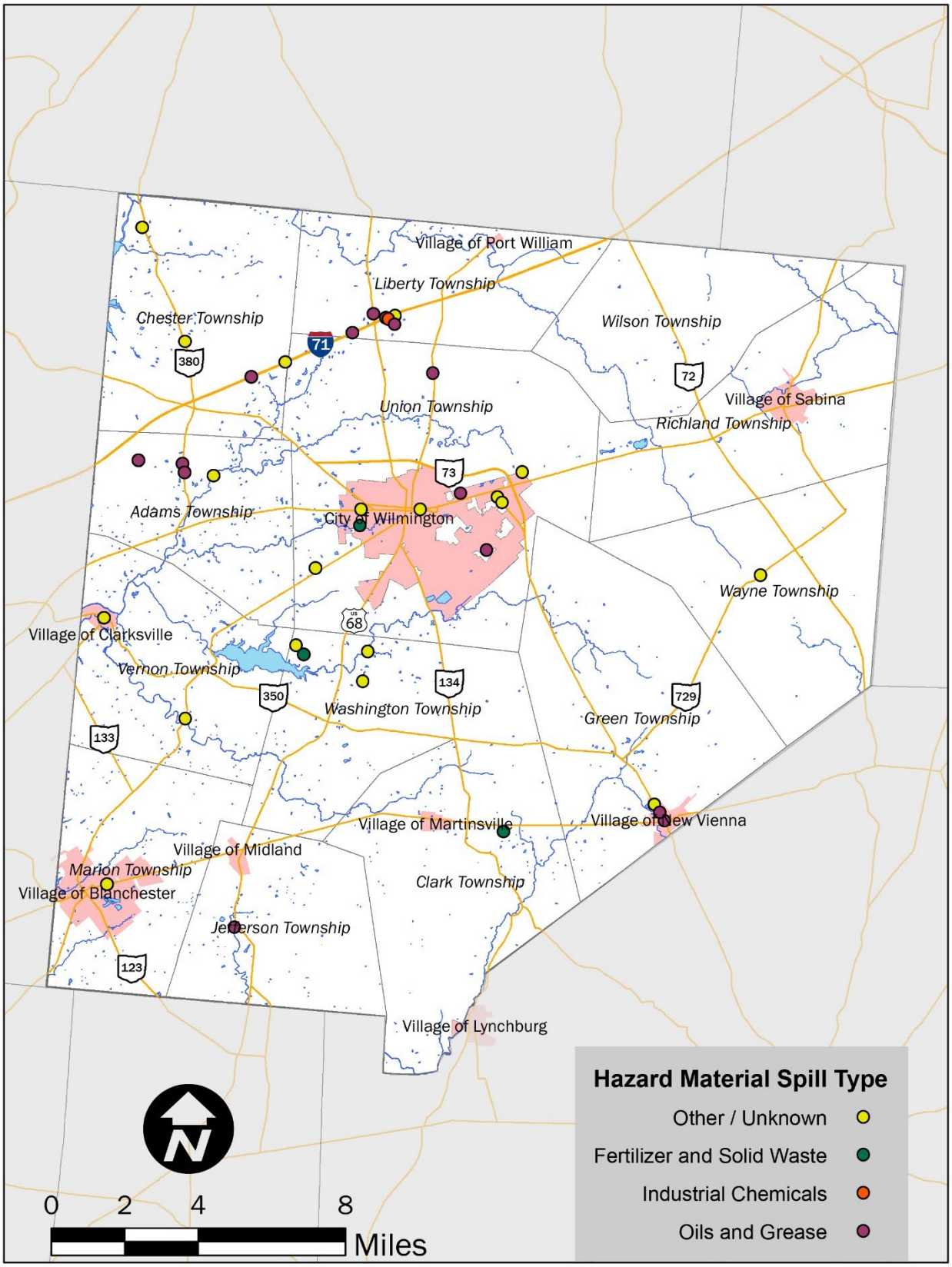
4.8.4 History

There have been 49 recorded hazardous material spills and releases in Clinton County from May 2017 through March 2020. Estimated property and crop damages have not been recorded. **Figure 4.8.2** shows the locations and types of hazardous materials spills in Clinton County as recorded by the Ohio Environmental Protection Agency (OEPA). A table containing all recorded hazardous materials spills can be found in **Appendix A**.

4.8.5 Probability

Due to their unpredictable nature and the influence of human error, the probability of hazardous materials spills is difficult to quantify. Since hazardous material spills can occur at any time, they should be considered likely events.

Figure 4.8.2: Hazardous Materials Spills



4.8.6 Vulnerability Assessment

Infrastructure Impact

Roadways, waterways, and groundwater may be impacted by hazardous materials spills. Road closures may occur as a direct or indirect result of hazardous materials spills.

Population Impact

The local population may be directly exposed to hazardous materials. If a large spill occurs, some residents may need to be evacuated and given shelter elsewhere.

Property Damage

Depending on the chemical, property damage is likely. Properties near Extremely Hazardous Substance facilities are likely to be damaged during a spill.

Loss of Life

While some hazardous materials can be toxic, loss of life from hazardous materials spills is unlikely. It is possible, however, and extreme precaution should be taken in the event of a spill.

Economic Losses

Economic losses can occur from the loss of hazardous materials that may be needed in manufacturing or for other processes. Road closures may lead to slowed commerce, and businesses impacted by hazardous materials spills may suffer property damage, damage to goods, or be required to close.

Table 4.8.2: Vulnerability of Land and Structures within Hazardous Materials Risk Area

Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	16,833	$101,852,780	$377,246,550	$479,099,330
Non-Residential	7,782	$457,765,350	$312,092,240	$769,857,590
Critical Facilities	102	$7,359,920	$56,094,270	$63,454,190
Total	**24,615**	**$559,618,130**	**$689,338,790**	**$1,248,956,920**

**Note: Critical Facilities are non-residential structures and their value is incorporated into the non-residential totals as well. Calculated totals are determined by summing the residential and non-residential values.*

4.8.7 Land Use and Development Trends

Development that has occurred since the previous plan and any future development near hazardous materials storage facilities may be impacted by hazardous materials spills. All land uses are equally impacted by potential hazardous materials spills.

4.9 Invasive Species

4.9.1 Description

Harmful species are species that have potential negative impacts on the environment and economy of Clinton County. Harmful species are both native and invasive. 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." Harmful species are species that are native to a region, but that also cause significant ecological, public health, or economic harm. Their growth is often encouraged through human activity.

Invasive species can be terrestrial (land dwelling) or aquatic (water dwelling). Terrestrial species include plants, trees, shrubs, animals, birds, and insects, as well as fungi, bacteria, molds, and viruses. Aquatic species include aquatic plants and algae, fish, mollusks, amphibians, and insects, as well as fungi, bacteria, molds, and viruses.

4.9.2 Location

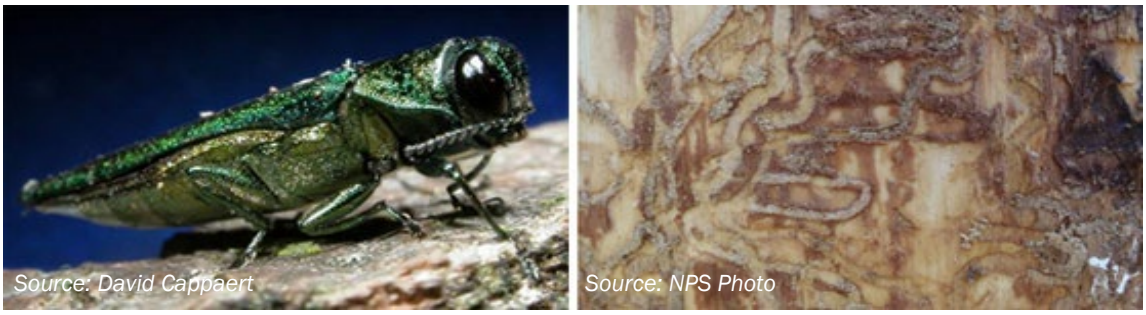
Invasive species have the potential to impact any location within the County. The most invasive of terrestrial species degrade the State's woodlands, wetlands, and prairies. Aquatic Invasive Species use rivers to spread. Ohio has over 66,000 miles of streams, 262 miles of Great Lakes shoreline, nearly 2,000 inland lakes and reservoirs, and shares major watersheds with other states and Canada. Clinton County lies in the Mississippi River basin, which is an ecologically diverse river system, and is susceptible to invasions through the Ohio River and its tributaries.

4.9.3 Extent

Once invasive species become widely established, controlling their spread is both technically difficult and expensive, making eradication nearly impossible. Invasive species can usually overtake native species and alter the natural wildlife habitat.

The most common invasive species in Clinton County is the **Emerald Ash Borer (EAB) (Figure 4.9.1).** It is an exotic beetle that feeds on ash trees inhibiting its ability to transport water and nutrients. This insect was first found in Ohio in 2002 and has since been found in every county in the State. Since the EAB has been found in every county, there are no quarantines in effect with Ohio's borders. Ohio is still listed in the Federal quarantine boundary.

Figure 4.9.1: Emerald Ash Borer and Feeding Tunnels



Approximately 2,300 plant species occur in the wild in Ohio. Of these, about 78 percent are native, that is, they were found in the region before the times of European settlement. Of the remaining 22 percent, fewer than 100 have been identified to be problems in natural areas. According to the Ohio Invasive Plants Council, there are 38 banned invasive plant species in Ohio and more under consideration (**Table 4.9.1**). These plants cannot be sold, distributed, or imported.

Studies conducted by Ohio Department of Natural Resources, Ohio Sea Grant, and the Ohio State University have identified over 70 invasive aquatic species in Ohio (**Table 4.9.2**). With the exception of White Perch, it is unlawful to possess, import, or sell these species live.

Table 4.9.1: Plant Invasive Species in Ohio as of January 7, 2018

Scientific Name	Common Name
Ailanthus altissima	Tree-of-heaven
Alliaria petiolate	Garlic mustard
Berberis vulgaris	Common barberry
Butomus umbellatus	Flowering rush
Celastrus orbiculatus	Oriental bittersweet
Centaurea stoebe ssp. Micranthos	Spotted knapweed
Dipsacus fullonum	Common teasel
Dipsacus laciniatus	Cutleaf teasel
Egeria densa	Brazilian elodea
Elaegnus angustifolia	Russian olive
Elaegnus umbellate	Autumn olive
Epilobium hirsutum	Hairy willow herb
Frangula alnus	Glossy buckthorn
Heracleum mantegazzianum	Giant hogweed
Hesperis matronlis	Dame's rocket
Hydrilla verticillata	Hydrilla
Hydrocharis morsus-ranae	European frog-bit
Lonicera japonica	Japanese honeysuckle
Lonicera maackii	Amur honeysuckle
Lonicera morrowii	Morrow's honeysuckle
Lonicera tatarica	Tatarian honeysuckle
Lythrum salicaria	Purple loosestrife
Lythrum virgatum (effective January 7, 2019)	European wand loosestrife
Microstegium vimineum	Japanese stiltgrass
Myriophyllum aquaticum	Parrotfeather
Myriophyllum spicatum	Eurasian water-milfoil
Nymphoides peltata	Yellow floating heart
Phragmites australis	Common reed
Potamogeton crispus	Curley-leaved pondweed
Pueraria montana var. lobate	Kudzu

Scientific Name	Common Name
Pyrus calleryana (effective January 7, 2023)	Callery pear
Ranunculus ficaria	Fig buttercup, lesser celandine
Rhamnus cathartica	Common Buckthorn
Rosa multiflora	Multiflora rose
Trapa natans	Water chestnut
Typha angustifolia	Narrow-leaved cattail
Typha x glauca	Hybrid cattail
Vincetoxicum nigrum	Black Swallow-Wort

Table 4.9.2: Aquatic Invasive Species in Ohio

Type	Scientific Name	Common Name
Fish	*Alosa pseudoharengus*	Alewife
Fish	*Carassius auratus*	Goldfish
Fish	*Carassius carassius*	Crucian Carp
Fish	*Carassius gibelio*	Prussian Carp
Fish	*Channa app. and Parachanna app.*	Snakeheads
Fish	*Claris batrachus*	Walking Catfish
Fish	*Ctenopharyngodon idella*	Diploid Grass Carp - White Amur
Fish	*Ctenopharyngodon Idella* #	Grass Carp
Fish	*Cyprinus carpio* #	Common Carp
Fish	*Fundulus catenatus*	Northern Studfish
Fish	*Fundulus diaphanus*	Eastern Banded Killifish
Fish	*Gambusia holbrooki and Gambusia affinis* #	Eastern & Western Mosquitofish
Fish	*Gasterosteus aculeatus*	Three Spine Stickleback
Fish	*Gymnocephalus cernuus*	Ruffe
Fish	*Hypophthalmichthys harmandi*	Large-scale Silver Carp
Fish	*Hypophthalmichthys molitrix*	Silver Carp
Fish	*Hypophthalmichthys nobilis*	Bighead Carp
Fish	*Lates niloticus*	Nile Perch
Fish	*Leuciscus idus*	Ide
Fish	*Morone americana*	White Perch
Fish	*Mylopharyngodon piceus*	Black Carp
Fish	*Neogobius melanostomus*	Round Goby
Fish	*Osmerus mordax*	Rainbow Smelt

Type	Scientific Name	Common Name
Fish	*Perca fluviatilis*	European Perch
Fish	*Perccottus glenii*	Amur Sleeper
Fish	*Petromyzon marinus*	Sea Lamprey
Fish	*Phoxinus phoxinus*	Eurasian Minnow
Fish	*Proterorhinus marmoratus*	Tubenose Goby
Fish	*Pseudorasbora parva*	Stone Moroko
Fish	*Rhodeus sericeus*	Bitterling
Fish	*Rutilus rutilus*	Roach
Fish	*Sander lucioperca*	Zander
Fish	*Scardinius erythrophthalmus*	European Rudd
Fish	*Scardinius erythrophthalmus*	Rudd
Fish	*Silurus glanis*	Wels Catfish
Fish	*Tinca tinca*	Tench
Mollusks	*Bellamya (Cipangopaludina)*	Mystery Snails
Mollusks	*Bithynia tentaculata*	Faucet Snail
Mollusks	*Corbicula fluminea* #	Asian Clam
Mollusks	*Dreissena bugensis*	Quagga Mussel
Mollusks	*Dreissena polymorpha*	Zebra Mussel
Mollusks	*Limnoperna fortune*	Golden Mussel
Mollusks	*Potamopyrgus antipodarum*	New Zealand Mudsnail
Crustaceans	*Bythotrephes longimanus*	Spiny Waterflea
Crustaceans	*Cercopagis pengoi*	Fishhook Waterflea
Crustaceans	*Cherax destructor*	Yabby
Crustaceans	*Cherax tenuimanus*	Marron
Crustaceans	*Dikerogammarus villosus*	Killer Shrimp
Crustaceans	*Eriocheir sinensis*	Chinese Mitten Crab
Crustaceans	*Eriocheir sinensis*	Chinese Mitten Crab
Crustaceans	*Faxonius virilis*	Virile Crayfish
Crustaceans	*Hemimysis anomala*	Bloody-red Shrimp
Crustaceans	*Procambarus clarki*	Red Swamp Crayfish
Plant	*Butomus umbellatus*	Flowering-rush
Plant	*Egeria densa*	Brazilian Waterweed
Plant	*Hydrilla verticillata*	Hydrilla
Plant	*Hydrocharis morsus-ranae*	European Frog-bit

Type	Scientific Name	Common Name
Plant	*Iris pseudacorus*	Yellow Iris
Plant	*Ludwigia peploides* #	Creeping Water-primrose
Plant	*Lysimachia nummularia* #	Moneywort
Plant	*Lythrum salicaria*	Purple Loosestrife
Plant	*Marsilea quadrifolia*	European Water Clover
Plant	*Myriophyllum aquaticum*	Parrotfeather
Plant	*Myriophyllum spicatum* #	Eurasian Watermilfoil
Plant	*Najas minor* #	Brittle Naiad
Plant	*Nelumbo nucifera*	Pink Lotus
Plant	*Nitellopsis obtusa*	Starry Stonewort
Plant	*Nymphoides peltata*	Yellow Floating Heart
Plant	*Phalaris arundinacea* #	Reed Canary Grass
Plant	*Phragmites australis*	Common Reed (Phragmites)
Plant	*Pistia stratiotes*	Water Lettuce
Plant	*Potamogeton crispus* #	Curly-Leaf Pondweed
Plant	*Trapa natans*	Water Chestnut
Plant	*Typha angustifolia, Typha x glauca* #	Narrowleaf and Hybrid Cattails

#*Species most likely found in Clinton County*

Other invasive species that have the potential to impact Ohio and Clinton County include:

The **Gypsy Moth** has been migrating into Ohio from Pennsylvania and Michigan. In the caterpillar stage, the Gypsy Moth targets over 300 different trees and shrubs. A healthy tree will typically die within two years of a Gypsy Moth infestation. Gypsy Moth eggs are laid during July and over winter until late April to mid-May. An egg mass can contain up to 600 eggs. Before feeding, the larvae are dispersed by the wind to other trees or areas. The Gypsy Moth can lead to heavy defoliation and can make trees more susceptible to other invasive or harmful species. Preferred host plants include alder, aspen, gray birch, white birch, hawthorn, larch, linden, mountain ash, oaks, Lombardy poplar, willows, and witch hazel. Trees that are susceptible to older larvae only include beech, red cedar, chestnut, hemlock, plum, pine, and Colorado blue spruce.

The **Walnut Twig Beetle** transmits the thousand cankers disease, a fungus that attacks black walnut trees. Butler County is currently under quarantine to limit the spread of the Walnut Twig Beetle throughout Ohio.

Hemlock Wooly Adelgid are small invasive pests that can be found on the underside of hemlock needles. They feed on the sap causing the tree to dry up and die. It was first found in North America in the 1950s. Today, they are a huge problem in northeast Ohio.

Mute Swans are non-native invasive species found on public lakes across Ohio. During the breeding season, March through May, adult mute swans become highly territorial and will fight to push native birds out of their nesting area. Mute swans have attacked humans and pets during this time as well.

Mute swans can consume submerged aquatic vegetation and usually uproot the whole plant leaving nothing behind. This takes away natural habitat from fish and leaves little food source for native waterfowl. The removal of aquatic vegetation can also cause water quality issues and erosion problems.

White Nose Syndrome is a fungal disease infecting and killing bats. Bats provide several ecological benefits such as plant pollination, seed dispersal, pest control, and contributions to the medical field. In Ohio, there are 11 species of bats that consume tons of nocturnal insects each year including moths, beetles, flies, true bugs, and hoppers. A White Nose Syndrome case was confirmed in Ohio in 2011.

4.9.4 History

There are no known impacts of invasive species particular to Clinton County except the Emerald Ash Borer, which has spread to all 88 counties in Ohio. Additionally, it is possible that any of the species listed above have at one point affected the County and its residents.

4.9.5 Probability

Since there are many invasive species throughout Ohio, it is probable that Clinton County will experience some of the invasive species listed above.

4.9.6 Vulnerability Assessment

Infrastructure Impact

There are no likely impacts to public roadways or utilities. Public trees may be destroyed or impacted by various invasive species. Aquatic invasive species could destroy water quality, make poor habitat for fish, and clog water intake pipes. Some species also increase fire potential and can be problematic to levees, dams, and irrigation systems.

Population Impact

There are no likely impacts on the local population. Recreational activities such as boating and fishing may be mildly impacted

Property Damage

Property damage, in the form of reduced values from impacts on landscaping, is likely.

Loss of Life

Loss of life due to the effects of invasive species is unlikely. Some of these species consumed as food could lead to diseases and other health impact in humans.

Economic Losses

Economic impacts can vary greatly depending on the target and of the invasive species and their impacts on those targets. If a large number of trees are severely damaged or killed by various invasive species, there may be indirect economic losses. Examples include increased heating and cooling costs, reduced property value, and reduction in viable lumber for construction.

4.9.7 Land Use and Development Trends

There could be slight impacts on development and land use due to invasive species. Some invasive species can be particularly damaging to crops, agricultural land, and wetlands.

4.10 Landslides, Erosion, and Subsidence

4.10.1 Description

The Ohio Department of Natural Resources (ODNR) defines a landslide as "a variety of downslope movements of earth materials. Some slides are rapid, occurring in seconds, whereas others may take hours, weeks, or even longer to develop." Landslides are commonly triggered by human-induced vibrations, over-steepened slopes, increased weight on a slope, and removal of vegetation on areas with landslide-prone slopes.

Erosion is the geological process in which earthen materials are worn away and transported by natural forces such as wind or water. The movement of earthen materials by wind or water will be considered a landslide for the purposes of this Plan.

Subsidence is the motion of the earth's surface as it shifts downward relative to a benchmark (often sea level) of the surrounding terrain. In Ohio, the two primary causes are abandoned underground mines (AUMs) and karst.

According to the Ohio Administrative Code 3901-1-48, mine subsidence is loss caused by the collapse or lateral or vertical movement of structures resulting from the caving in of underground mines including coal mines, clay mines, limestone mines, and salt mines. Mine subsidence does not include loss caused by earthquakes, landslide, volcanic eruption, or collapse of strip mines, storm and sewer drains, or rapid transit tunnels. Several factors determine the potential for mines to collapse including depth, mining technique used, types of rock and/or soils, and the development on the ground surface. Additionally, abandoned underground coal mines in Ohio have the potential to discharge acidic water which, if discharged into creeks or streams, can alter the chemical composition of the water habitat and cause considerable harm to sensitive aquatic life. For the purposes of this report, there are no known active or abandoned underground mines in Clinton County. Mine subsidence will not be assessed further.

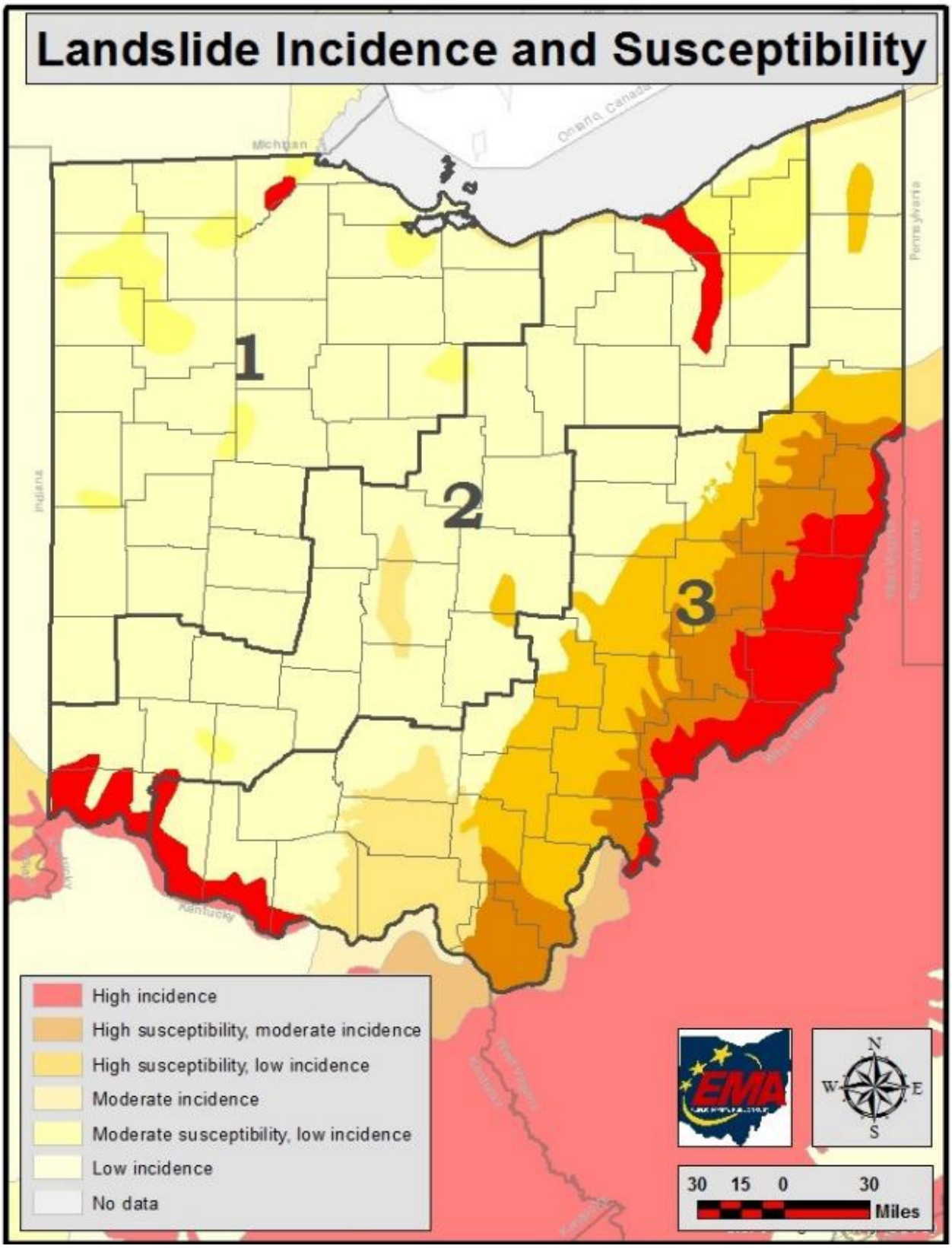
Karst is a topography formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes and caves.

4.10.2 Location

Figure 4.10.1 shows the location of areas under risk for slope failure (landslides). Clinton County is categorized as either low incidence of landslides or moderate susceptibility with low incidence of slope failure.

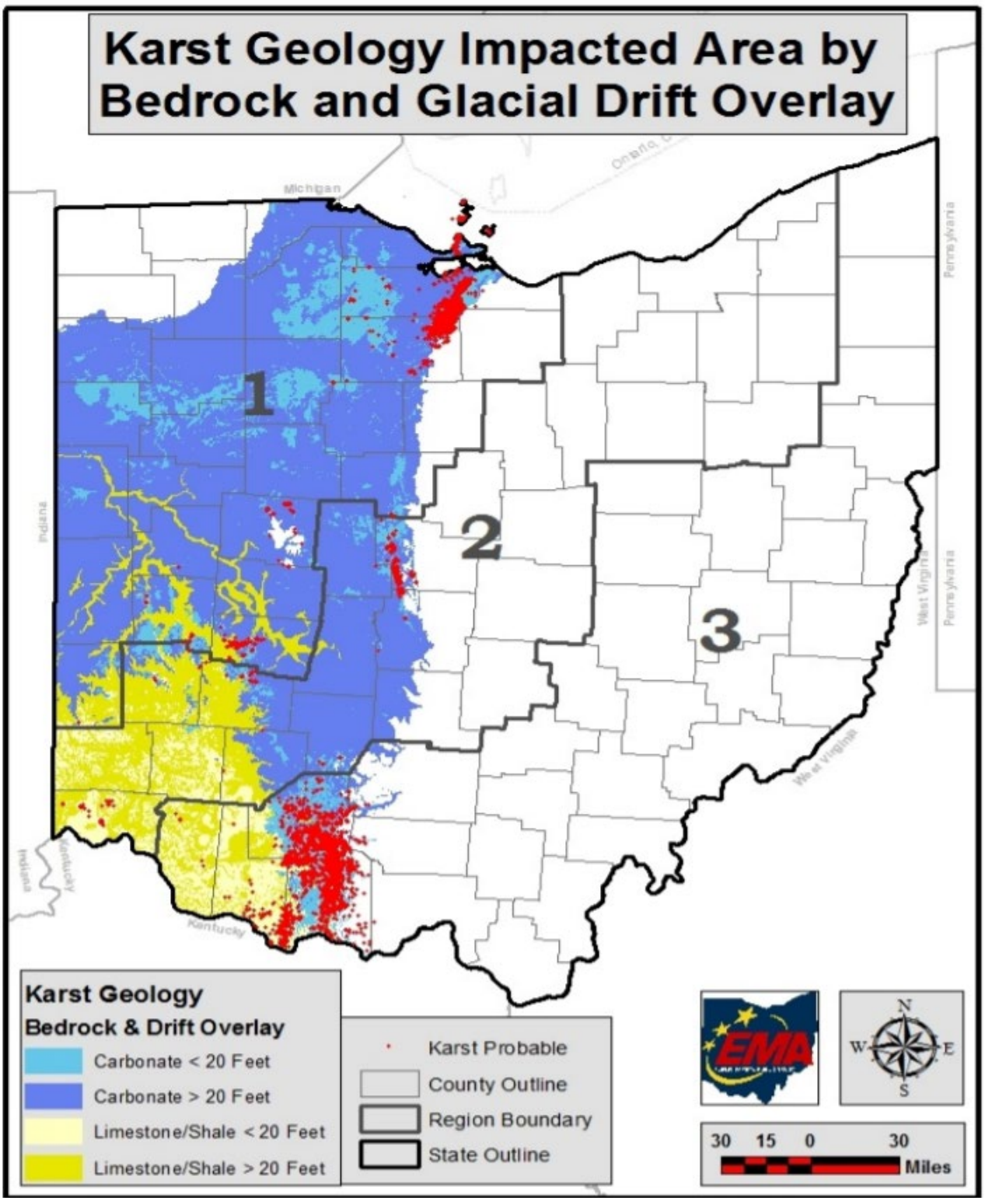
Figure 4.10.2 shows the karst geology for Ohio. According to the *2019 State of Ohio Hazard Mitigation Plan*, karst features are associated with the western third of Ohio, including Clinton County. The limestone, shale, and dolomite layers were deposited between 408 and 505 million years ago as the floor of an ancient sea. Later, the continental plate rose above the existing sea level creating dry land and vast salt deposits. These sedimentary rock layers are naturally porous and dissolve into the water which passes through them.

Figure 4.10.1: Landslide Incidence and Susceptibility Map



Source: Ohio EMA

Figure 4.10.2: State of Ohio Karst Geology



Source: Ohio EMA

4.10.3 Extent

There are three major types of landslides:

1. **Rotational slump**, caused by the movement of a mass of weak rock or sediment as a block unit along a slope. These are the largest types of landslides found in Ohio.
2. **Earthflow**, caused by a mass of rock or sediment-flowing downslope. These are the most common landslides in Ohio.
3. **Rockfall**, a rapid downslope movement of large blocks of bedrock. Most rockfalls in Ohio involve sandstone or limestone that has been weakened by surface water.

Related to karst, Clinton County contains carbonate at both less than and greater than 20 feet below the surface as well as limestone/shale at both less than and greater than 20 feet below the surface.

4.10.4 History

Figures 4.10.3 and 4.10.4 show that Clinton County has relatively low occurrences of landslides and rock falls as compared to other counties within Ohio with only 1 total landslide and no rockfall sites as of June 18, 2019. Additionally, County Engineer Jeff Linkous identifies two recent, partial landslides in Clinton County: one on Creek Road north of the Village of Clarksville and one on South US-68.

4.10.5 Probability

According to the ODNR, Clinton County falls within an area of low risk for slope failure. Landslides should be considered an unlikely event. There are two locations identified in red in **Figure 4.10.2** where karst is probable.

4.10.6 Vulnerability Assessment

Infrastructure Impact

Landslides can block or damage roadways and damage existing utility infrastructure. Mine subsidence can occur under existing roadways or utility infrastructure causing anything from minor damage to complete destruction.

Population Impact

Landslides can cause injury or death if a person is struck by or trapped under falling earthen material. Mine subsidence can cause sinkholes under occupied structures which could lead to injuries.

Property Damage

Properties caught in the path of a landslide can be completely destroyed or severely damaged. Properties, including structures, can be completely destroyed by mine subsidence.

Loss of Life

Loss of life is possible during mine subsidence or landslides. There are no known fatalities in Clinton County due to mine subsidence or landslides.

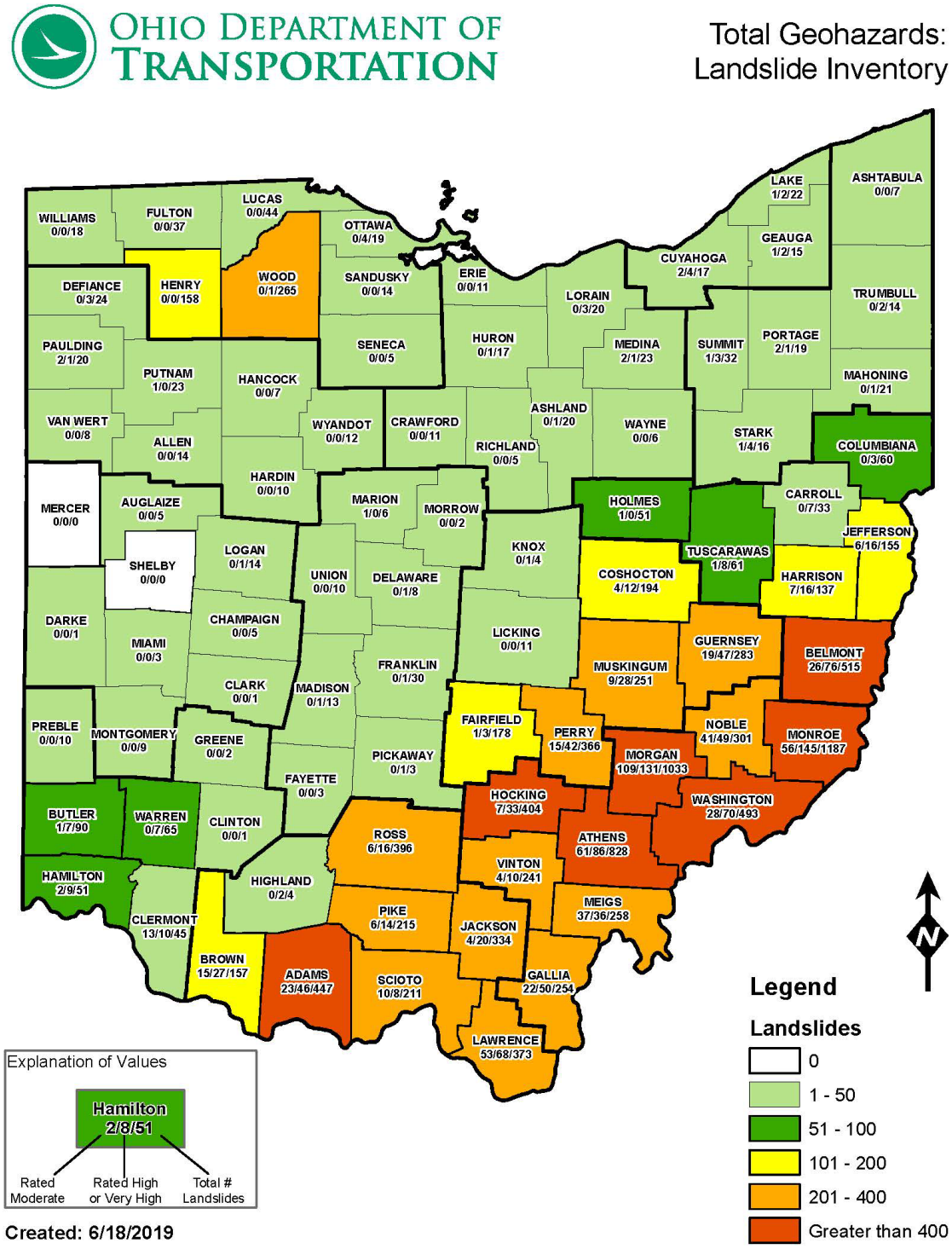
Economic Losses

Both landslides and mine subsidence can block or destroy sections of roadways vital to shipping. Stores, storage facilities, and other structures that are important to economic activity can also be severely damaged or destroyed.

4.10.7 Land Use and Development Trends

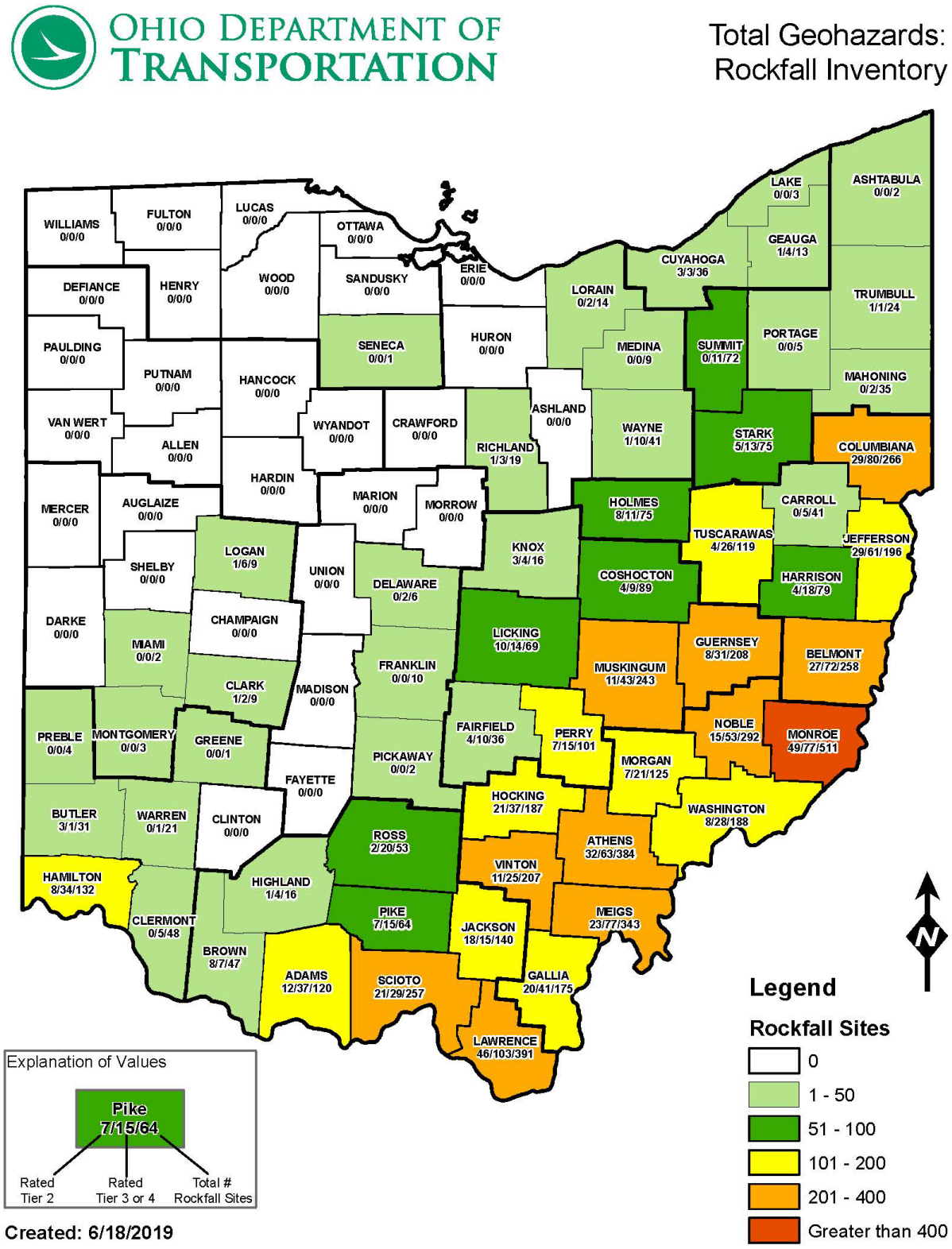
Uses that serve vulnerable populations, such as schools and hospitals, should not be placed in areas that are in high-risk zones for landslides or karst. Development should be limited to areas with minimal slope to reduce potential losses during landslides.

Figure 4.10.3: State of Ohio Total Geohazards Landslide Inventory



Source: Ohio EMA

Figure 4.10.4: State of Ohio Total Geohazards Rockfall Inventory



Source: Ohio EMA

4.11 Severe Summer Weather

4.11.1 Description

Severe summer weather events may include severe thunderstorms and thunderstorm winds, hail, and lightning. High winds, tornadoes, and flooding may also be related to severe summer storms and, due to the potential threat of these events, they are each discussed in separate risk assessments. While tropical storms and hurricanes are also forms of severe storms, Clinton County does not have any record of such events affecting the County; therefore, the County has not deemed tropical storms and hurricanes to be a threat and these specific types of weather will not be addressed further.

According to the National Weather Service (NWS), a severe thunderstorm is a thunderstorm that produces a tornado, winds of at least 58 MPH, and/or hail at least one inch in diameter. A Severe Thunderstorm Watch is issued by the NWS if conditions are favorable for the development of severe thunderstorms. A watch is usually in place for four to eight hours, during which time people should be prepared to move to a safe place if threatening weather approaches.

A Severe Thunderstorm Warning is issued if either the WSR-88D radar indicates a severe thunderstorm or if a spotter reports a storm producing hail or winds meeting the criteria outlined in the description above. The WSR-88D radar is an advanced Weather Surveillance Doppler Radar utilized by the NWS to generate a radar image. The NWS recommends that people in the affected area seek safe shelter immediately, as severe thunderstorms have the potential to produce tornadoes with little-to-no advance warning. Lightning frequency is not a criterion for issuing a severe thunderstorm warning. The warnings are usually issued for one hour and can be issued without a Severe Thunderstorm Watch already in effect. The National Weather Service Forecast Office in Wilmington is responsible for issuing Severe Thunderstorm Watches and Warnings for Clinton County.

Lightning is caused by a rapid discharge of electrical energy that has built up in the atmosphere between clouds, the air, or the ground. Lightning strikes can be either direct or indirect. A direct strike is when lightning strikes a building or a specific zone, which can result in fusion points melting holes of varying sizes at the point of impact of materials with high resistivity. An indirect lightning strike is when lightning causes power surges that disrupt electrical equipment.

Severe summer storms can also create strong winds – often called “straight-line” winds – to differentiate thunderstorm winds from tornadic winds. These winds, which have the potential to cause damage, are caused by an outflow generated by a thunderstorm downdraft. Severe wind events are discussed in more detail in **Section 4.12.**

Hail is a type of frozen precipitation that occurs when thunderstorm updrafts carry raindrops upward into extremely cold atmospheric zones where they freeze before falling to the ground. The resulting hailstones can fall at speeds greater than 100 MPH and range in size from smaller than 0.50 inches (the size of a pea) to 4.5 inches (the size of a softball) (Source: National Weather Service).

4.11.2 Location

Severe summer storms are a countywide hazard and all of Clinton County is susceptible to severe weather.

4.11.3 Extent

Severe summer storm events have the potential to create large-scale damage in Clinton County. Specifically, lightning is responsible for approximately 50 deaths annually across the United States, as well as hundreds of injuries (Source: NOAA). Winds associated with severe summer storms have the potential to cause damage by bringing down tree limbs and generating widespread power outages. Additionally, hail can result in property damage.

Severe summer storms can lead to flooding, downed trees and power lines, and other dangerous conditions.

4.11.4 History

According to the National Centers for Environmental Information (NCEI), there have been 152 thunderstorm wind events, 16 heavy rain events, 61 hail events, and two lightning events recorded in Clinton County from February 1956 to June 2020. These events resulted in $3.545 million in property damage and $0 in crop damage. These events were not responsible for any deaths or injuries. These events are summarized in **Table 4.11.1**, below:

Table 4.11.1: Thunderstorm-Related Events in Clinton County since 1956

Severe Storm Event Type	Number of Events	Injuries	Deaths	Property Damages	Crop Damages
Thunderstorm Wind	152	1	0	$3,114,000	$0
Heavy Rain	16	0	0	$0	$0
Hail	61	0	0	$281,000	$0
Lightning	2	0	0	$150,000	$0
Total	**231**	**1**	**0**	**$3,545,000**	**$0**

Clinton County has not been associated with any thunderstorm-related disaster declarations since the previous hazard mitigation plan. The events that resulted in the largest amounts of property damage, as well as the sole injury due to summer storms in the County's history, are described below.

March 14, 2019

Thunderstorms developed through the afternoon hours ahead of an approaching cold front. Some of the storms produced damaging winds and large hail. According to the Clinton County EMA, 92 poles were knocked down as a result. 35 of these poles were power transmission poles resulting in an eight-hour countywide power outage on March 16, 2020. All parts of the County were impacted except for Blanchester. This set of storms was responsible for $165,000 in property damage, no crop damage, and no injuries or deaths.

April 9, 1999

This line of storms was also responsible for tornadoes in other parts of the County. Three homes and a business were destroyed by the storm and 20 other properties were damaged. This storm was responsible for $1.0 million in property damages and no crop damage, injuries, or deaths.

June 19, 1994

This line of severe storms was responsible for the one injury reported due to this hazard type. A local resident was injured in a traffic accident during the storm from falling debris striking the car.

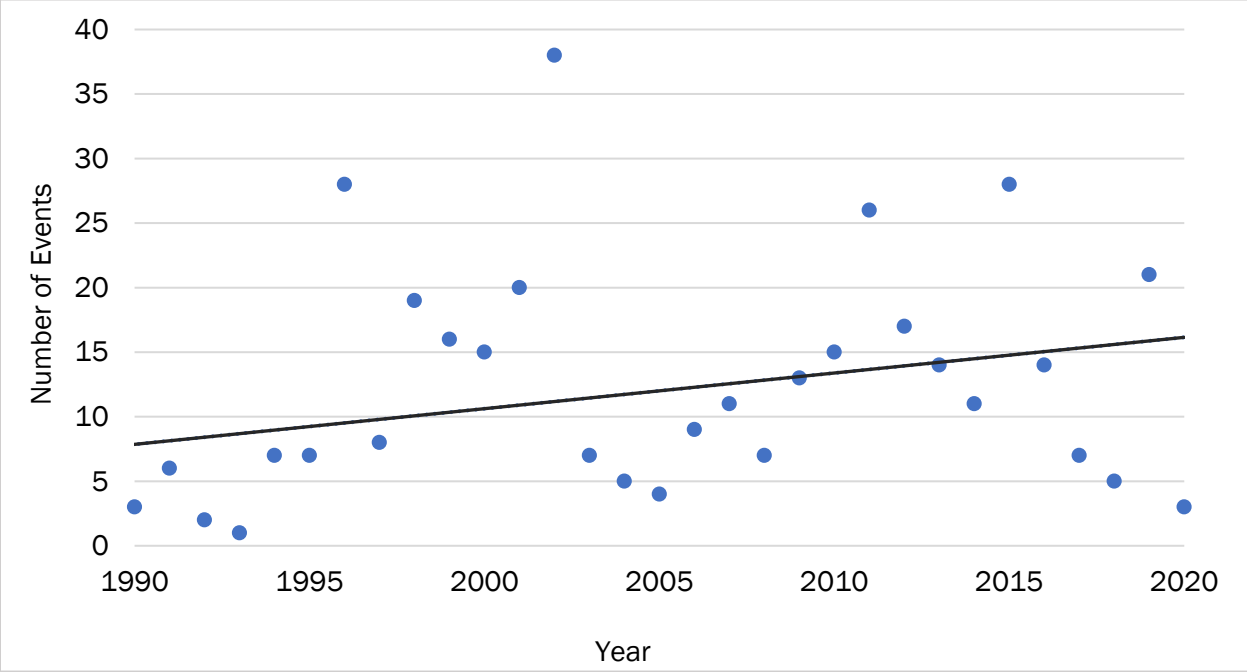
Numerous trees were downed, including some on homes and vehicles. A metal storage shed was blown from its foundation and found suspended in a tree. This storm was responsible for $50,000 in property damage and no crop damage.

April 14, 1994
This severe storm event was responsible for $500,000 in property damage, but no crop damage, injuries, or deaths. Reports indicate that trees were downed and there was minor roof and porch damage in several locations including the Village of Clarksville and City of Wilmington. A vacant mobile home was blown over in Vernon Township. A tractor-semitrailer was blown off US-68 just south of I-71 near the City of Wilmington.

4.11.5 Probability
According to the NCEI, there have been 231 severe summer storm events reported in Clinton County from February 1956 to June 2020 with total losses reaching more than $3.545 million in property damage and $0 in crop damage. This amounts to between three and four severe storm events annually with average annual damages of $55,390.

Furthermore, **Figure 4.11.2** below shows the trend in number of thunderstorm events per year since 1990. The trend line has a slightly positive slope, which indicates that the number of severe summer storms has increased over the last 30 years. Years prior to 1990 are excluded from the probability calculation due to missing and/or unreliable data reporting.

Figure 4.11.2: Severe Summer Storm Probability



4.11.6 Vulnerability Assessment
Infrastructure Impact
Above-ground infrastructure is at risk for storm damage by wind and falling debris. For infrastructure, high winds and hail are the most damaging part of a severe storm. Thunderstorm winds can strip

bark from trees and detach limbs. If large branches fall, they can damage buildings and supporting above-ground infrastructure. In the most severe storms with high winds, large trees can be uprooted and have the potential to fall on buildings including houses, which can cause harm or death.
Utilities are at risk for damage by severe summer storms as well. Electrical lines are spread throughout the County connecting homes, businesses, and other facilities. Severe storms are likely to down tree limbs and generate other debris that can affect above-ground electrical lines causing power outages. Downed power lines that are still live are extremely hazardous and can cause death by electrocution.

Population Impact
According to the American Community Survey's 2018 population estimates, the population of Clinton County is approximately 41,896. Summer storms are random in nature and affect the entire area of the County. Everyone within the County should be prepared during a storm event. Populations residing in mobile home parks are particularly vulnerable and should seek out shelters.

Property Damage
As described above, these events have caused an average of $55,390 in property damages annually. Due to the non-site-specific nature of this hazard, **Table 4.11.2** lists all structures within Clinton County as having potential impacts from severe storms.

Loss of Life
Although no loss of life was reported due to the 231 severe summer storm events on record with the NCEI, there is always potential for injuries and fatalities during severe weather.

Economic Losses
Severe storms usually cause minor damage to structures, such as blowing shingles off roofs and downed branches breaking windows or falling onto buildings and above-ground infrastructure. More severe damage may also result. Of the 231 severe summer storm events since 1956, 43 events resulted in property damage of $10,000 or more. The costliest storm in the County's history was a thunderstorm wind event on April 9, 1999 which caused $1.0 million in property damage.

Table 4.11.2: Structure Vulnerability from Severe Storms

Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	17,871	$110,107,680	$406,567,870	$516,675,550
Non-Residential	8,935	$561,925,770	$325,785,670	$887,711,440
Critical Facilities	102	$7,359,920	$56,094,270	$63,454,190
Total	26,806	$672,033,450	$732,353,540	$1,404,386,990

**Note: Critical Facilities are non-residential structures and their value is incorporated into the non-residential totals as well. Calculated totals are determined by summing the residential and non-residential values.*

4.11.7 Land Use and Development Trends
Severe storms can occur anywhere. Any development that has occurred since the previous plan and any future development has the potential to be impacted by severe storms.

4.12 Severe Wind and Tornadoes

4.12.1 Description

FEMA defines a tornado as "a violently rotating column of air extending from a thunderstorm to the ground." Tornadoes can generate wind speeds of greater than 250 MPH. Tornado paths can be as large as one mile wide and 50 miles long. Nationally, there is an average of 800 tornadoes reported annually across all 50 states.

In general, the midsection of the United States experiences a higher rate of tornadoes than other parts of the country because of the recurrent collision of moist, warm air moving north from the Gulf of Mexico with colder fronts moving east from the Rocky Mountains. Supercells, which form from rotating thunderstorms, are the most destructive variety of tornado.

Tornado Warnings are issued by the Wilmington NWS Forecast Office when a tornado is indicated by the WSR-88D radar or sighted in person by spotters. The WSR-88D radar is an advanced Weather Surveillance Doppler Radar utilized by the NWS to generate a radar image. Once a warning has been issued, people in the warning area should seek shelter immediately. Warnings will include the location of the tornado, as well as what communities will be in its path. A tornado warning can be issued without a tornado watch, and they are typically issued for 30 minutes at a time. If the thunderstorm responsible for the formation of the tornado is also producing large volumes of rain, the tornado warning may be combined with a Flash Flood Warning. The NWS Office will follow up any Tornado Warnings with Severe Weather Statements to provide up-to-date information on the tornado and inform the public when the warning is no longer in effect (Source: NWS).

This section also takes severe wind events, as they can be as destructive as some tornadoes. The NWS can issue various types of wind advisories and warnings. A **wind advisory** is issued when sustained winds of 31 to 39 MPH are reached for an hour or more and/or if there are wind gusts of 46 to 57 MPH for any duration. A **High Wind Watch** indicates that sustained, strong winds are possible and outdoor items should be secured. People should modify plans so they are not caught outside. Additionally, a **High Wind Warning** indicates that sustained, strong winds (40 MPH or greater) with even stronger gusts (greater than 58 MPH) are happening. People should seek shelter, and those driving should keep both hands on the wheel and slow down. An **extreme wind warning** is issued for surface winds of 115 MPH or greater associated with non-convective, downslope, derecho (not associated with a tornado), or sustained hurricane winds that are expected to occur within one hour.

4.12.2 Location

Tornadoes can occur anywhere in Clinton County. All areas and jurisdictions should be considered at risk for a tornado.

4.12.3 Extent

Tornadoes are measured by damage scale for their winds with greater damage equating greater wind speed. The original Fujita Tornado Damage Scale (F-scale) was developed in 1971 without much consideration to a structure's integrity or condition as it relates to the wind speed required to damage it. The Enhanced Fujita-scale (EF-Scale) took effect on February 1, 2007. This scale starts with the original F-scale's F0-F5 ratings and classifies tornado damage across 28 different types of damage indicators. These indicators mostly involve building/structure type and are assessed at eight damage levels from 1-8. Therefore, construction types and their relative strengths and weaknesses are incorporated into the EF classification given to a particular tornado. The most intense damage

within the tornado path will generally determine the EF scale given the tornado. **Table 4.12.1** lists the classifications under the EF- and F-scale. It should be noted that the wind speeds listed in this table are estimates based on damage rather than measurements.

There are no plans by the National Oceanic Atmospheric Administration (NOAA) or the National Weather Service to re-evaluate the historical tornado data using the enhanced scale. Therefore, this Plan and subsequent plans will reference both scales until a complete switchover is deemed necessary.

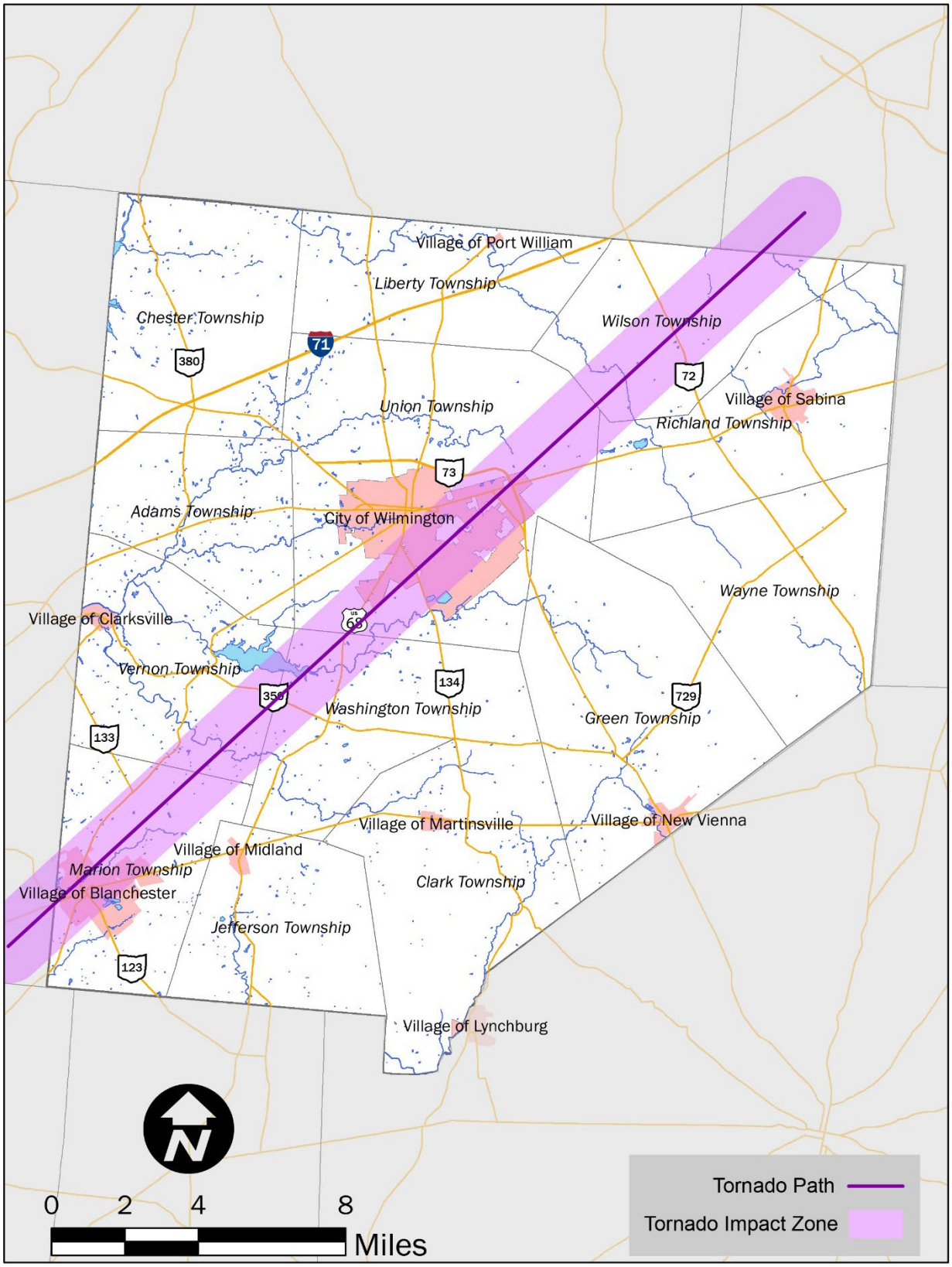
Figure 4.12.1, simulates an extremely destructive, worst-case scenario EF5 tornado and its impacts on Clinton County assets and infrastructure. The worst-case scenario is simulated by running the EF5 tornado on a straight path through the most populated areas of the County. This theoretical scenario is performed to determine maximum potential damage within the County. The damages associated with this theoretical scenario are used to identify the County's potential vulnerability to tornadoes (**Table 4.12.2**).

Table 4.12.1 Fujita and Enhanced Fujita Scale Classifications

Fujita Scale 3-Second Wind Gust (MPH)		Damage Levels	Enhanced Fujita Scale 3-Second Wind Gust (MPH)	
F0	45-78	**Light Damage**: Tree branches down.	**EF-0**	65-85
F1	79-117	**Moderate damage**: Roof damage.	**EF-1**	86-110
F2	118-161	**Considerable damage**: Houses damaged.	**EF-2**	111-135
F3	162-209	**Severe damage**: Buildings damaged.	**EF-3**	136-165
F4	210-261	**Devastating damage**: Structures leveled.	**EF-4**	166-200
F5	262-317	**Incredible damage**: Whole towns destroyed.	**EF-5**	Over 200

Source: SOHMP

Figure 4.12.1: Worst-Case Tornado Scenario



4.12.4 History

There have been 36 severe wind or tornado events in Clinton County between April 1961 and June 2020 resulting in a total of $13.417 million in property damage and $16,000 in crop damage. These events were responsible for two deaths and 19 injuries. Ten of these events occurred in the last ten years. Annualized damages average to approximately $227,407 in property damages and $271 in crop damages. Events with the highest recorded property damages, injuries, and fatalities are described below. Additionally, one event resulted in a Disaster Declaration. This is also described below.

Disaster Declaration FEMA-1805-DR on October 14, 2008 | Windstorms on September 14, 2008

On October 14, 2008, Governor Ted Strickland requested a major disaster declaration due to a severe windstorm associated with Tropical Depression Ike on September 14, 2008. The Governor requested a Declaration for public assistance for 33 counties and Hazard Mitigation for all counties. During the period of October 6-10, 2008, joint Federal, State, and local Preliminary Damage Assessments (PDAs) were conducted in the requested counties and are summarized below. PDAs estimate damage immediately after an event and are considered, along with several other factors, in determining whether a disaster is of such severity and magnitude that effective response is beyond the capabilities of the State and the affected local governments, and that Federal assistance is necessary.

On October 24, 2008, President Bush declared that a major disaster exists in the State of Ohio. This declaration made Public Assistance requested by the Governor available to State and eligible local governments and certain private nonprofit organizations on a cost-sharing basis for emergency work and the repair or replacement of facilities damaged by the severe windstorm associated with Tropical Depression Ike in Ashland, Brown, Butler, Carroll, Champaign, Clark, Clermont, Clinton, Coshocton, Delaware, Fairfield, Franklin, Greene, Guernsey, Hamilton, Harrison, Highland, Hocking, Holmes, Knox, Licking, Madison, Miami, Montgomery, Morrow, Perry, Pickaway, Preble, Shelby, Summit, Tuscarawas, Union, and Warren Counties. This declaration also made Hazard Mitigation Grant Program assistance requested by the Governor available for hazard mitigation measures statewide.

In total, the County reported $5.1 million in property damages associated with this event. Clinton County had a per capita impact of $10.76, which is more than twice the statewide per capita impact of $4.75. (Source: FEMA)

Tornado on September 14, 1990

An F2 tornado caused $2.5 million in property damage, as well as two injuries. The tornado was approximately 200 yards wide and tracked 22.5 miles. Two mobile homes were destroyed, as well as seven barns and outbuildings. (Source: NCEI)

Tornado on March 10, 1986

An F2 tornado caused ten injuries and $2.5 million in property damage on March 10, 1986. The tornado was measured to be 50 yards wide and tracked 8.8 miles across the County. The tornado touched down in western Wilmington and tracked northeast, traveling through the northern part of the City. Two permanent homes were destroyed, and six permanent homes were badly damaged. Five business buildings were also seriously damaged. In one trailer park, 30 mobile homes were overturned. The tornado was 73 yards wide and tracked for 6 miles.

Tornado on April 23, 1968

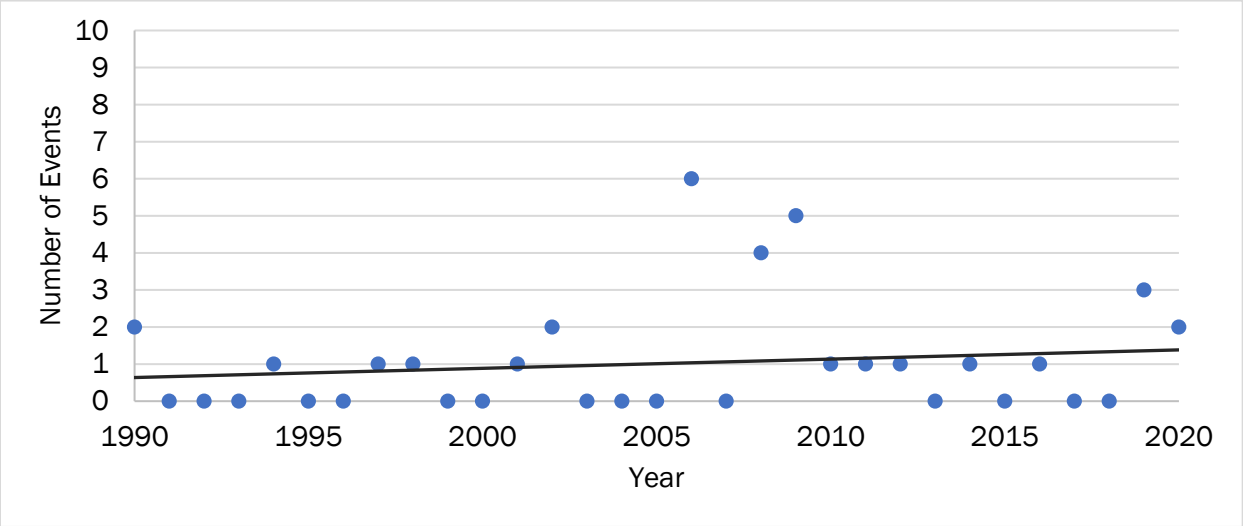
An F4 tornado caused two injuries and $2.5 million in property damage on April 23, 1968. The tornado was measured to be 33 yards wide and tracked 6.1 miles across the County.

Tornado on April 25, 1961
An F2 tornado caused two fatalities, four injuries, and $250,000 in property damage on April 25, 1961. The tornado was measured to be 50 yards wide and tracked 8.8 miles across the County.

4.12.5 Probability
There have been 36 severe wind or tornado events in Clinton County between April 1961 and June 2020 resulting in a total of $13.417 million in property damage and $16,000 in crop damage. As such, tornadoes are likely to occur within Clinton County and result in an average of $227,678 in property and crop damages annually. In the last ten years, there have been ten tornado or severe wind events.

The annual rate for tornadoes and severe wind events in Clinton County is 0.61 events per year, which amounts to approximately one event every one to two years. However, when conditions are right, there may be multiple tornadoes in one year. This rate is displayed in **Figure 4.12.2** below, which shows the number of tornado or severe wind events each year since 1990. The slope is slightly positive, which means the frequency of severe wind and tornado events has increased since 1990.

Figure 4.12.2: Probability of Severe Wind or Tornado Events in Clinton County



4.12.6 Vulnerability Assessment
Infrastructure Impact
Above-ground infrastructure can be damaged by severe winds and tornadoes. Debris caught in the high winds as well as fallen trees can also cause damage to buildings and infrastructure including road closure (**Figure 4.12.3**). Above ground utility infrastructure can be damaged or destroyed, which can cause service outages.

Population Impact
Tornadoes are random in nature and have the potential to occur anywhere in the County. Everyone within the County should be prepared for a tornado and severe wind events. Residents in mobile home parks are particularly vulnerable and should have a plan in place.

Property Damage

Tornadoes can cause significant damage to buildings and properties. There have been 36 tornadoes in Clinton County which have caused more than $13.4 million in property and crop damage. Annually, this amounts to $227,678 in damages. **Table 4.12.2** details the structural vulnerability from the worst-case scenario tornado for Clinton County, which is demonstrated in **Figure 4.12.1**.

Loss of Life

At least two lives have been lost as a result of a tornado in Clinton County. There is potential for loss of life during any tornado event.

Figure 4.12.3: A fallen tree blocks road outside Wilmington during a Tornado

Economic Losses

Tornadoes and severe winds can cause major damage to structures and roads. Higher severity tornadoes have the potential to destroy structures. Debris also has the potential to cause damage to structures by breaking windows, damaging walls, or falling directly onto buildings and above-ground infrastructure.

Damages to utilities and roadways may also cause economic damage due to business closures, destruction of goods that require electricity, and halting economic activity. The following table projects the vulnerability to structures in Clinton County based on the worst-case scenario tornado depicted in **Figure 4.12.1**. This modeling is completed only to demonstrate potential damages associated with a EF-5 tornado that tracks through the most populated areas of the County.

Table 4.12.2: Structure Vulnerability from Tornadoes

Structure Type	Number of Properties Exposed	Value of Vulnerable Structures		
		Land	Building	Total
Residential	3,183	$16,248,790	$58,535,050	$74,783,840
Non-Residential	1,683	$98,058,860	$121,132,340	$219,191,200
Critical Facilities	19	$4,534,400	$21,011,560	$25,545,960
Total	**4,866**	**$114,307,650**	**$179,667,390**	**$293,975,040**

**Note: Critical Facilities are non-residential structures and their value is incorporated into the non-residential totals as well. Calculated totals are determined by summing the residential and non-residential values.*

4.12.7 Land Use and Development Trends

Tornadoes can occur anywhere. Any development that has occurred since that previous plan and any future development has the potential to be impacted by tornadoes.

4.13 Severe Winter Weather

4.13.1 Description

Severe winter weather includes winter storms, heavy snow, and extreme cold. Winter storms are events that have snow, sleet, ice, or freezing rain as their primary type of precipitation. While the precipitation itself is typically not dangerous, frozen roads and exposure to cold can cause death and injury.

A winter storm forms under the right combination of three causes:

1. Below freezing temperatures in the clouds and near the ground, which are necessary to make snow and ice.
2. Lift, which raises the moist air from the clouds and causes precipitation. Warm air colliding with cold air and being forced to rise over the cold is an example of lift.
3. Moisture is needed to form clouds and precipitation. Air blowing across a body of water is a common source of moisture.

Winter storms are categorized by their type: blizzards, ice storms, lake effect storms, and snow squalls.

- Blizzards are winter storms that are a combination of blowing snow and wind which lead to very low visibility. Heavy snowfalls and severe cold often accompany blizzards, but this is not required. Ground blizzards occur when strong winds pick up snow that has already fallen.
- Ice Storms occur when at least a quarter inch of ice accumulates on exposed surfaces. Roads and sidewalks can become dangerously slick, and trees and powerlines can easily break under the weight of accumulated ice.
- Lake Effect Storms are cold, dry air masses that move over the Great Lakes regions and drop the moisture as snow in areas near the Great Lakes.
- Snow Squalls are brief, intense snow showers accompanied by strong winds. Impacts may be significant.

4.13.2 Location

Winter storms are typically large events that will impact the entire County and have the potential to impact multiple counties.

4.13.3 Extent

The State of Ohio Hazard Mitigation Plan 2019 lists winter storms as one of the three highest threat hazards in Ohio. The average annual snowfall in Clinton County is 19-20 inches. Snowfall typically occurs between November and April. January is the coldest month on average.

4.13.4 History

There have been at least 38 winter storm events and another 82 winter weather events including heavy snow, extreme cold, ice storm, and frost in Clinton County since December 1996. These events caused $505,000 in property damage, $540,000 worth of crop damage, and did not result in any injuries or deaths according to the National Centers for Environmental Information (NCEI).

There have been two emergency declarations related to winter storms covering Clinton County. The public assistance amount for each emergency declaration was divided between all jurisdictions impacted by the events including those outside of Clinton County,

Major Disaster Declaration on April 24, 2008 (EM-3386-OH)
A snow event impacted 17 counties including Clinton County on April 24, 2008. $7,122,145.99 in public assistance was distributed throughout all impacted counties.

Major Disaster Declaration on January 26, 1978 (DR-3055-OH)
A severe blizzard impacted all counties including Clinton County on January 26, 1978. $3,546,669 in public assistance was distributed throughout all impacted counties (**Figure 4.13.1**).

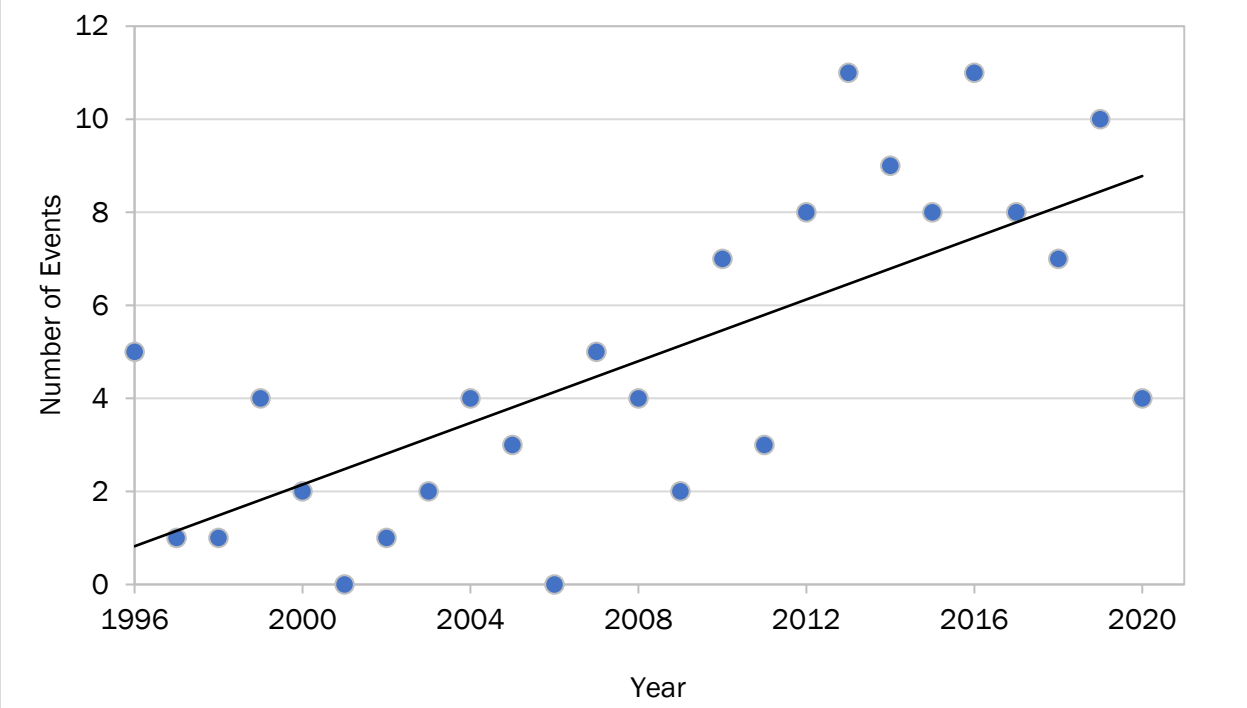
Figure 4.13.1: Blizzard in 1978

4.13.5 Probability

According to the NCEI, there have been a total of 120 winter storm and winter weather events reported in Clinton County from January of 1996 to March 2020, with total losses amounting to $1,045,000 in property damage and crop damage. This amounts to approximately five winter storm events annually with average annual damages of $43,092.78.

Figure 4.13.2 shows the trend of severe winter weather events over time between January 1996 and March 2020. The trend line increases over time showing that winter storm events are becoming more common each year.

Figure 4.13.2: Severe Winter Weather Probability



4.13.6 Vulnerability Assessment

Infrastructure Impact

Winter storms can cause damage to overhead utilities. Wires in particular can collapse under the weight of accumulated snow and ice. Debris can block roadways or damage property as tree limbs can also collapse under the weight of accumulated snow and ice. Water pipes can be frozen under extreme low temperatures that may accompany severe winter storms. Roads and sidewalks can be blocked by the accumulation of snow, as well as being iced over.

Population Impact

All residents of Clinton County are expected to be impacted by severe winter storms. The elderly and children may be more severely impacted by extreme cold.

Property Damage

Property can be damaged by accumulated snow and ice, debris, and falling wires. Extreme low temperatures can also freeze the water in pipes which could cause them to explode. All buildings are in the County are exposed and vulnerable to winter storms. The State of Ohio Hazard Mitigation Plan 2019 estimates annual potential losses due to damage caused by winter storms in Clinton County to be $54,884.65.

Loss of Life

There are no reported direct or indirect deaths from any severe weather event in Clinton County. Likely causes of death are from iced-over and dangerous roads which lead to vehicular accidents, hypothermia from prolonged exposure to cold, and heart attacks from heavy snow shoveling.

Economic Losses

Economic losses can occur from businesses shutting down for potentially long periods of time. Economic activity can be completely halted during winter storms including transportation of goods. Electricity outages may lead to spoiled goods. Since winter storms occur during the winter season, damages to crops are unlikely.

4.13.7 Land Use and Development Trends

Winter storms can occur anywhere. Any development that has occurred since that previous plan and any future development has the potential to be impacted by winter storms. All land uses are equally impacted by severe winter weather.

4.14 Terrorism

4.14.1 Description

The Terrorism hazard is assessed as a way to monitor different types of terrorism and acts of violence inflicted on a civilian population. Terrorism is defined as "the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR, Section 0.85). Tools used to conduct acts of terrorism include Weapons of Mass Destruction (WMD), biological, chemical, nuclear, and radiological weapons, arson, incendiary, explosives, armed attacks, industrial sabotage, intentional hazardous materials release, and cyberterrorism.

The Federal Bureau of Investigations (FBI) produces an annual terrorism report, which contains profiles and chronologies of terrorism incidents in the United States. Terrorism can be both International and Domestic, where International Terrorism is defined as acts "perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored)" (Source: FBI). The second is Domestic Terrorism, which is defined as acts "perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature" (Source: FBI).

Types of terrorism include cyberterrorism, agroterrorism, terrorism (biological), and terrorism (chemical). Stakeholders have also requested discussion on active aggressors as part of this hazard assessment. These types of terrorism and other complex/coordinated events are defined below:

- **Cyberterrorism:** Cyberterrorism is an electronic attack using one computer system against another, and attacks can be directed towards computers, networks, or entire systems. A cyber-attack may last minutes to days. Homeland Security, the FBI, and the Federal Communications Commission Department of Justice are often involved in developing countermeasures that focus on reducing the threat, vulnerability, and likelihood of attack.
- **Agroterrorism:** 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.
- **Biological Terrorism**: Biological terrorism includes use of bacteria, viruses, or toxins to incite terror. This mode of terrorism can last minutes to months.
- **Chemical Terrorism**: Chemical terrorism includes 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:** An 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.

4.14.2 Location

Terrorism 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.

4.14.3 Extent

The extent of each of these terrorism events includes:

- **Cyberterrorism**: Typically, the built environment is unaffected by a cyber-attack. Inadequate security can facilitate access to critical computer systems allowing them to be used to conduct attacks.
- **Agroterrorism**: Agro-terrorism is a viable primary aspiration for terrorists, as agriculture is the largest single sector in the US economy. It lacks the traditional shock factor of attacks, but its extent could be large and longer lasting. The extent of the effects varies by type of incident. Inadequate security can facilitate the adulteration of food and introduction of pests and disease agents to crops and livestock resulting in animal suffering, loss of valuable animals, cost of containment of outbreaks, and lost trade and other economic effects. With agriculture being the most common land use and top industry in Clinton County, farmers must be vigilant and prepared to respond to acts of terrorism.
- **Biological Terrorism**: A biological attack could cause illness and even kill hundreds of thousands of people, overwhelm public health capabilities, and create significant economic, societal, and political consequences. Public health infrastructure must be prepared to prevent illness and injury that would result from biological terrorism.
- **Chemical Terrorism**: Most chemical agents are capable of causing serious injuries or death, and their often rapid course of action means there is very little time to act when an act of chemical terrorism occurs. Public health infrastructure must be prepared to prevent illness and injury that would result from chemical terrorism. Terrorism events that are caused due to chemicals impact the environment as well. Impacts can be large and felt by the environment in several different ways such as altering the quality of air and water, affecting sewage and wastewater systems, and displacing aquatic ecosystems and soils that sustain wildlife.
- **Active Aggressor**: Active aggressor incidents often occur in areas where a number of people gather regularly. This may be a place of employment, a neighborhood gathering area (church, recreational center, school, etc.), or other location.

Terrorist threats may also occur among school districts within the County. Threats can last several hours or even days and cause multiple problems such as disturbing a school's order, causing traffic jams, and inducing civil panic. Individuals, groups, and institutions should be aware of and understand how to react to such potential threats immediately and appropriately.

4.14.4 History

There have been no reported terrorism events in Clinton County. Although events such as the World Trade Center Bombing (1993 & 2001) did not occur in Ohio, there is an implied threat in this state. In 1995, an Ohio resident was able to order samples of Plague bacilli. Although this attempt was thwarted, it indicates viability of bio-terrorist threats. Terrorist plots have been thwarted in Columbus, Dayton, Cincinnati, and Cleveland, among other locations. Mass shootings, such as a school shooting, are an example of an Active Aggressor situation.

While there are no recorded school shootings or terrorism incidents in Clinton County, local officials have determined that the risk of such an incident occurring in Clinton County exists. The Homeland Security Unit in the Clinton County Sheriff's Office serves as the primary division responsible for domestic and/or foreign security issues serving as a liaison to other state and local organizations.

4.14.5 Probability

Terrorism-related events have a low probability and are not predictable. As these events are man-made, they should be considered unlikely, but not impossible. Cyberattacks are becoming more likely with 42,068 incidents across all sectors occurring nationwide in 2016 according to the U.S. Council of Economic Affairs. Of this, 21,239 were public sector attacks and utility systems experienced 32 attacks nationwide in 2016.

4.14.6 Vulnerability Assessment

Infrastructure Impact

Above ground structures such as utility systems, government buildings, churches, libraries, and schools, as well as below-ground infrastructure such as natural gas pipelines, are at risk for terrorism damage. Acts of cyberterrorism have the potential to target systems that may influence or control infrastructure. The Homeland Security Unit conducts vulnerability assessments on critical infrastructure and other key resources in the County.

Population Impact

The population of Clinton County is likely to be impacted should an act of terror occur. It is important that public health organizations are prepared to prevent illness and injury that may result from acts of terror.

Property Damage

Since coordinated incidents can occur anywhere within the County, property damage is a possible outcome of such an event. Agroterrorism may result in damage to crops, and an active aggressor situation may result in minimal property damage.

Loss of Life

Acts of terror are likely to result in loss of life and cause long-term impact to health. It is important that public health and healthcare organizations are prepared to act quickly should an act of terror occur.

Economic Losses

Since the probability of a coordinated attack happening in Clinton County is very low and there is less than a one percent chance of this type of hazard occurring in any given year, local terrorism-related economic losses are estimated at zero. However, terror attacks occurring in other locations have the potential to have economic impacts in Clinton County. A 2016 nationwide estimate indicates that a cyber attack may cost the U.S. economy between $57 billion and $109 billion.

Transportation networks, such as air transportation, can be shut down as a result of terrorism impeding profits and resulting in economic losses to organizations within the County. Any nationwide complex/coordinated attack or act of terror that results in a temporary freeze of goods or services has the potential to limit or suspend economic activity in Clinton County as well.

4.14.7 Land Use and Development Trends

Terrorism-related events can occur anywhere. Non-residential land uses are more likely to be targeted for terror events or active shooters. Schools and government buildings should have active shooter plans in place. Farmers must be prepared for agroterrorism by locking certain areas of their farms or using cameras to monitor who is on their fields.

4.15 Utility Failure

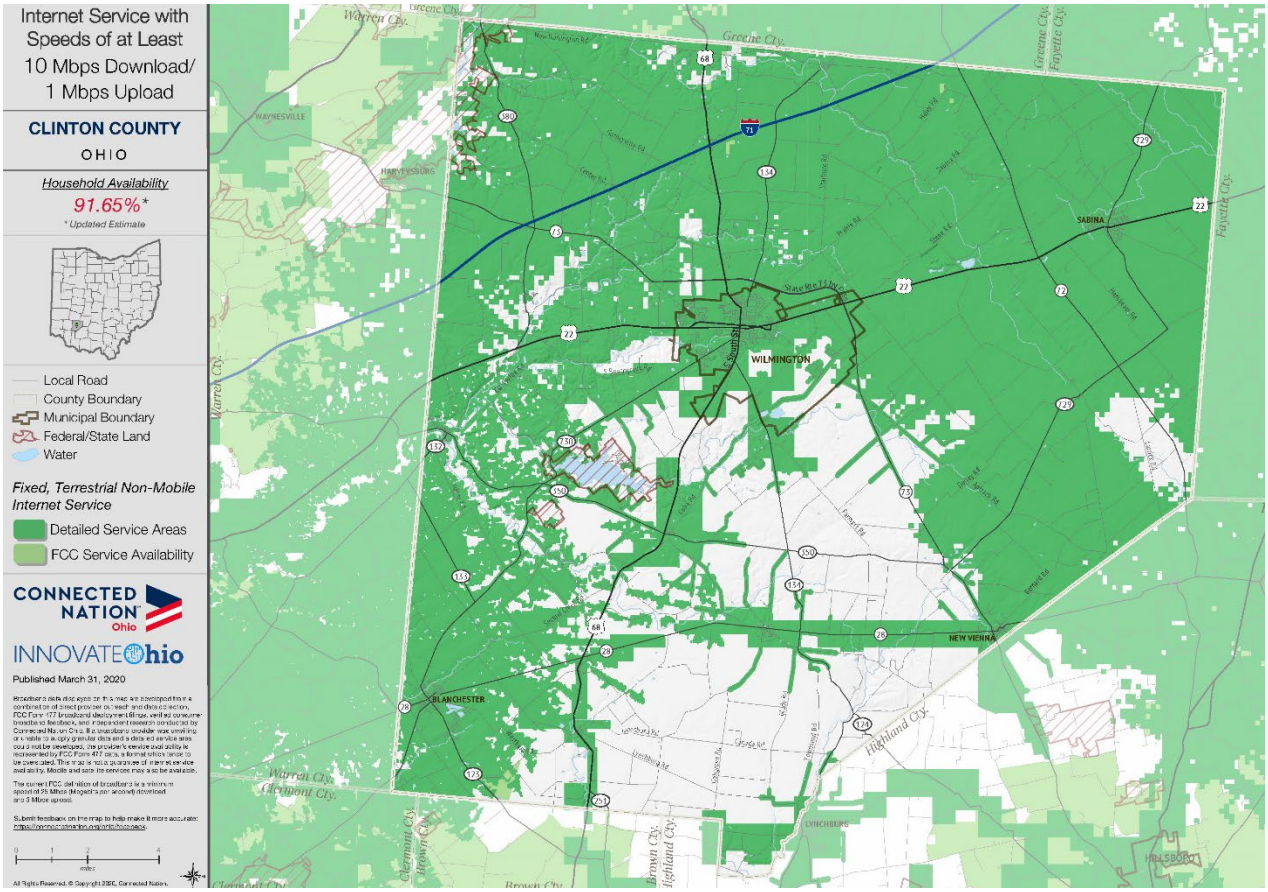
4.15.1 Description

Utility failure refers to the loss of electric power (blackouts), water, sewage, natural gas or other utilities. These are primarily caused by system overload or lack of updated infrastructure. Power failures are generally caused by natural events such as severe storms, ice storms, tornadoes, and high winds. These power failures are common and cannot easily be predicted due to the random nature of storms; however, updates to infrastructure can reduce the among and frequency of these power outages.

Clinton County residents receive electric services from Dayton Power and Light, American Electric Power (AEP), and Duke Energy. The Village of Blanchester then redistributes the power as a municipality under the Board of Public Affairs. Natural gas is provided by Vectren Energy Delivery and Volunteer Energy Services Incorporated (VESI). County residents have access to aggregation programs for both electric and natural gas through AEP and VESI.

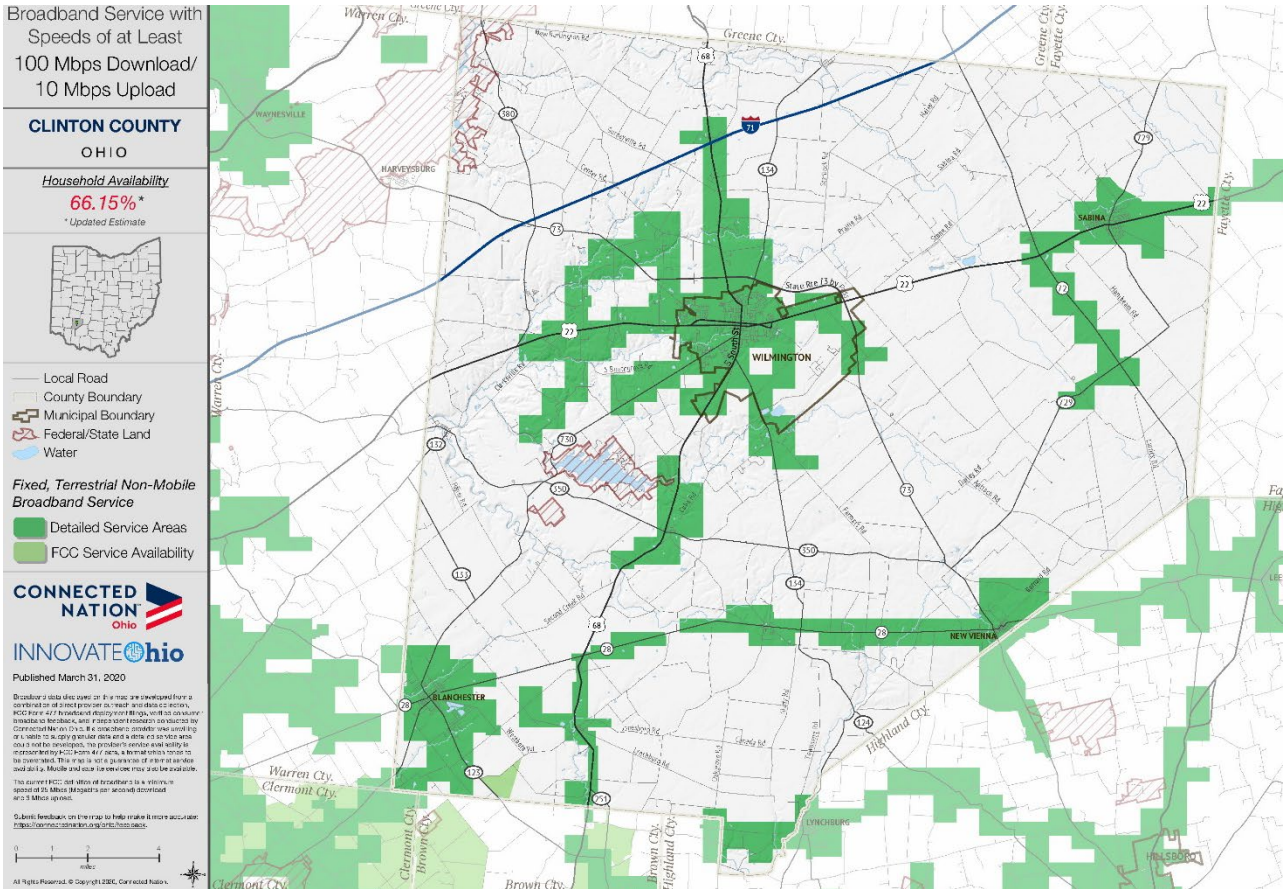
Residential internet providers include Spectrum and Frontier Communications. **Figures 4.15.1 and 4.15.2**, below, show the internet coverage in Clinton County. According to these images, which were provided by Connected Nation Ohio, 91.65 percent of Clinton County has access to internet service with speeds of at least 10 Mbps download and 1 Mbps upload. Additionally, only 66.15 percent of the County has broadband service with speeds of at least 100 Mbps download and 10 Mbps upload.

Figure 4.15.1: Internet Service with Speeds of at Least 10 Mbps Download/1 Mbps Upload



Source: Connected Nation Ohio

Figure 4.15.2: Internet Service with Speeds of at least 100 Mbps Download/10 Mbps Upload



Source: Connected Nation Ohio

Water services are provided by jurisdictional water departments, as well as the Western Water Company. Cowan Creek and Caesar Creek Lake are the two primary sources of water for Clinton County. The City of Wilmington also maintains an auxiliary connection with the Western Water Company to supply the City's outlying customers, as necessary, during main break repairs.

4.15.2 Location

Depending on the cause, blackouts can be isolated or countywide. Utility failures can occur in any area where the utility is provided.

4.15.3 Extent

Utility failures due to damaged infrastructure have the potential to impact large areas of the County through the loss of utilities that provide necessary services for the population. Loss of electric 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.

Furthermore, lack of utility access during a larger hazard event such as epidemic/pandemic, as seen with the COVID-19 pandemic, can result in an inability to perform work duties remotely, which has

the potential to have negative economic impacts at both the individual and family levels, as well as at a larger scale.

4.15.4 History

Numerous utility failures have occurred within Clinton County in the form of power outages due to severe storms, severe winter weather, or other natural hazards. Events resulting in power outages can be referenced in the Risk Assessment sections of the appropriate hazard. The following event is included due to the widespread nature of the outage and associated damages.

March 10, 2019 – March 17, 2019

The region experienced higher than normal precipitation prior to the week of March 10, 2019 which resulted in localized flooding and saturated soil throughout the County. On March 14, 2019, wind gusts greater than 60 MPH topped 93 DP&L poles supporting transmission and distribution lines. This resulted in localized outages, blocked rail line travel for 3-days, and reduced the operable transmission feeder lines to the County from three to one. On Saturday, March 16, 2019, a "jumper" line failure from a transmission line occurred. This resulted in a mass six-and-a-half-hour power outage. Power was restored to the majority of the County shortly after 5 PM that day and rail traffic resumed on March 17. The sole Clinton County governmental organization that reported a limiting factor/shortfall was Clinton County Health District in relation to critical cold-storage vaccines valued at over $180,000.

4.15.5 Probability

As there are no previous indications that a widespread utility failure has occurred in Clinton County, there is less than one percent chance of a widespread utility failure within the County. 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.

4.15.6 Vulnerability Assessment

Infrastructure Impact

In the event of a utility failure caused by downed power lines, roads may be closed. Utility infrastructure may also suffer long-term damage as a result of such an event.

Population Impact

Extensive utility failures can threaten the health and safety of the public. During extreme temperature events, the impacts on residents are heightened. Loss of utilities that provide air conditioning or heat can create a safety hazard, especially for children and older populations. The County and/or communities should have a plan in place for how to notify and assist residents in case of utility failure.

Property Damage

Direct damage to property may result directly from downed power lines. Fires may also occur because of downed power lines.

Loss of Life

Loss of life from the loss of electricity can occur. Those who depend on electricity for necessary medical treatment are at risk. Critical facilities such as hospitals and nursing homes should be

prepared in the event of a utility failure, as they manage sensitive populations that may be reliant on utilities. Downed power lines can also lead to unsafe environments with live electric lines that have the potential to lead to loss of life.

Economic Losses

Blackouts are often caused by systems that are aging and deteriorating, and updates to these systems may require additional funds. Economic loss can occur because of reduced commercial activity. Goods that need electricity or other utilities for preservation may also be lost. If widespread blackouts occur, people may not be able to work, and wages or income may be lost as a result.

4.15.7 Land Use and Development Trends

Utility failure can impact any development. All development that has occurred since the previous plan and all development in the future can be impacted by utility failure.

4.16 Wildfire

4.16.1 Description

A wildfire is a fire in an area of combustible vegetation that occurs in the countryside or rural area. The Ohio Department of Natural Resources identifies Ohio's wildfire seasons as occurring primarily in the spring (March, April, and May) before vegetation has "greened-up" and in the fall (October and November) when leaf drop occurs. During these times and especially when weather conditions are warm, windy, and low in 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. Each year, an average of 1,000 wildfires burn 4,000 to 6,000 acres of forest and grassland within Ohio's forest fire protection district, which corresponds mostly to the state's unglaciated hill country.

4.16.2 Location

According to the *State of Ohio Hazard Mitigation Plan (SOHMP)*, Clinton County is not identified within the ODNR Division of Forestry's Expanded Forest Fire Protection Area; however, it does border two counties that are included in this protection area – Highland and Brown counties. Counties within this region tend to have abundant forested lands and grasslands and, as such, represent the area of highest wildfire risk and hazard in the State of Ohio. The Ohio Wildfire Hazard Assessment is included in **Figure 4.16.1**. This assessment identifies wildfire risk level by township and classifies all townships in Clinton County as low risk for wildfire.

4.16.3 Extent

Several factors can contribute to the escalation of risk of wildfires including the prevalence of forests and agricultural lands and their close proximity to homes, residences, and structures, as well as the distance between fire and emergency management services. In these cases, presence of fire near structures causes fire departments to shift focus away from fire suppression and towards structure protection.

According to the *SOHMP*, 99.9 percent of wildfires in Ohio are caused by human action or accident. As such, many wildfires in the State burn into close proximity of homes and structures. From 1997 to 2007, the main causes of wildfire in Ohio included debris burning, incendiary (arson), equipment, smoking, campfires, children (playing with matches), lightning, and railroad.

4.16.4 History

The *SOHMP* identifies 134 total fire events from January 1, 2007 to December 31, 2017, which averaged to 12 to 13 events annually. These events burned a total of 897 acres averaging 6.69 acres per event.

Estimating the monetary losses associated with wildfires is difficult due to the fact that most of these events occur in open land or fields with monetary losses often not being recorded. This lack of data may result in inconsistencies if an analysis was done based on reported monetary loss. As such, acres burned per fire event is a more consistent method of analysis for this hazard.

Of the 134 events, 113 fires (84.3 percent of events) burned less than ten acres while 20 events (14.9 percent of events) burned between 10 - 99.9 acres. One event (0.75 percent of events) burned more than 100 acres.

4.16.5 Probability

According to the *State of Ohio Hazard Mitigation Plan*, there is a 100 percent probability that a wildfire will occur within any county in any given year. Since 134 total fire events occurred in Clinton County between January 1, 2007 to December 31, 2017, an average of ten fire events are estimated to occur annually in the County.

4.16.6 Vulnerability Assessment

Infrastructure Impact

There is low risk that wildfire in Clinton County will impact infrastructure. Wildfire will most likely impact the County through property and crop damage.

Population Impact

There is a low risk of wildfire in Clinton County. Accordingly, there is a low risk of impact to the population. If wildfire would occur within the County, the population could be impacted by loss of homes and crops.

Property Damage

As there were 134 recorded wildfire events in Clinton County's history, it is currently estimated that the County has experienced some property and crop damage as a result of wildfires. Occasionally, in the event of a wildfire, fire engines belonging to local fire departments are damaged while suppressing wildfires. Wildfire suppression has resulted in a great amount of personal property being saved by fire departments.

Due to the non-site-specific nature of this hazard, **Table 4.16.1** lists all structures within Clinton County as having potential impacts from wildfires. It also provides values for two worst-case scenarios valued at one percent damage and five percent damage.

Additionally, there are currently 50 state-owned and state-leased critical facilities located within Clinton County, as determined by the Ohio Department of Natural Resources. All 50 of these facilities are located within a low wildfire risk area and have a value of approximately $4,930,612.

Loss of Life

Clinton County has no recorded wildfire events resulting in loss of life. Because of this, it is unlikely that loss of life will result from wildfire; however, with any wildfire event, there is potential for loss of life. Advanced evacuation warnings can reduce the likelihood of death as a result of wildfire.

Economic Losses

Wildfire has the potential to damage agricultural crops and tree plantations, which can result in economic losses. Potential economic losses and damages associated with Clinton County structures and potential worst-case scenarios are recorded in **Table 4.16.1**, below.

Figure 4.16.1: ODNR Division of Forestry Wildfire Hazard Level

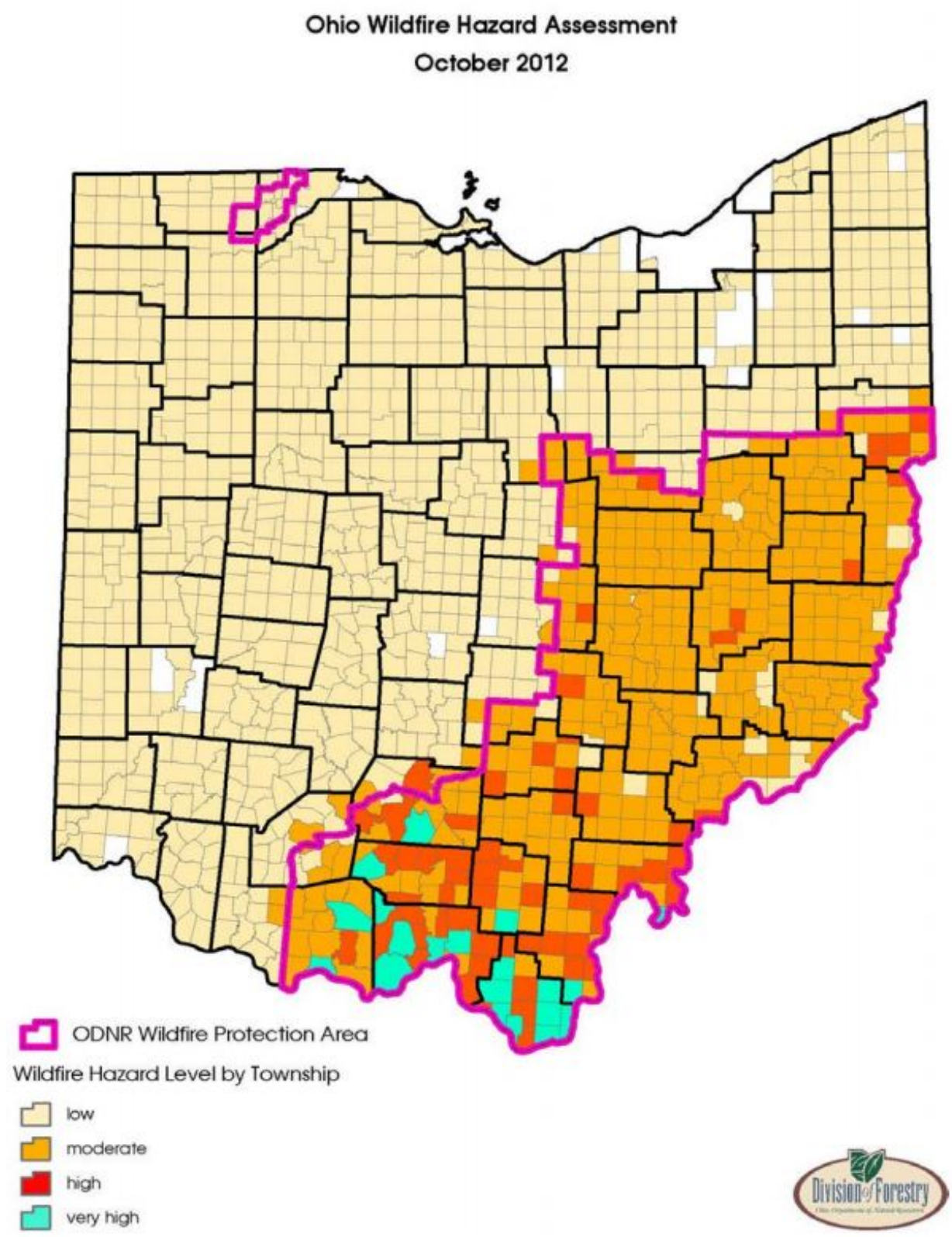


Table 4.16.1: Structure Vulnerability from Wildfires

Structure Type	Number of Properties Exposed	Total Value of Structures	Damage for 1% Scenario	Damage for 5% Scenario
Residential	17,871	$516,675,550	$5,166,756	$25,833,778
Non-Residential	8,935	$887,711,440	$8,877,114	$44,385,572
Critical Facilities	102	$63,454,190	$634,542	$3,172,710
Total	**26,806**	**$1,404,386,990**	**$14,043,870**	**$70,219,350**

**Note: Critical Facilities are non-residential structures and their value is incorporated into the non-residential totals as well. Calculated totals are determined by summing the residential and non-residential values.*

4.16.7 Land Use and Development Trends

Communities should monitor areas that are especially susceptible to wildfire and avoid development in such areas. New developments in these areas should implement fire protective measures.

5 | Hazard Mitigation

5.1 Hazard Mitigation Strategy

Each potential hazard, including natural, geological, and human-caused hazards, were rated by members of the Core Planning Committee, which included representatives from each jurisdiction in Clinton County. Each potential hazard was rated on a scale of zero to five, with zero indicating the hazard should not be studied and five indicating the most significant threat to the representative's community. **Table 5.1** displays the average of the representatives' ratings as a Priority Score for each hazard. The hazard that scored the highest (Severe Wind and Tornadoes, 4.25), was given a Hazard Rank of one. The mitigation goals follow the ranking of hazards as established by the representatives of the participating jurisdictions.

Table 5.1: Hazard Priorities

Hazard	Priority Score	Hazard Rank
Severe Wind & Tornadoes	4.25	1
Utility Failure	4.04	2
Severe Summer Weather	3.94	3
Drug Misuse & Addiction	3.93	4
Hazardous Materials	3.92	5
Epidemic/Pandemic	3.90	6
Severe Winter Weather	3.65	7
Flooding	3.48	8
Terrorism	3.19	9
Extreme Temperatures	3.11	10
Drought	2.73	11
Invasive Species	2.60	12
Dam Failure	2.29	13
Wildfire	2.26	14
Landslides, Erosion, and Subsidence	2.23	15
Earthquakes	1.85	16

Coastal erosion and hurricanes/tropical storms are hazards that are not applicable to Clinton County and were not assessed; however, if remnants of hurricanes or tropical storms were experienced as thunderstorms, thunderstorm winds, or high/severe winds, those events were included in the severe summer weather and/or severe wind and tornadoes assessments. Several new hazards were included in this Plan that were not included in the 2016 Plan. These hazards include wildfire, epidemic/pandemic, utility failure, and drug misuse/addiction.

Mitigation projects will only be implemented if the benefits outweigh the associated cost of the proposed project. The Core Planning Committee, in coordination with the Clinton County Emergency

Management Agency, performed a general assessment of each action that would require FEMA funding as part of the planning process. A detailed cost-benefit analysis of each mitigation action will be required during the project planning phase in order to determine the economic feasibility of each action. Projects will also be evaluated for social and environmental impact-related feasibility, as well as technical feasibility and any other criteria that evaluate project effectiveness. This evaluation of each project will be performed during the pre-application phase of a grant request. Project implementation will be subject to the availability of FEMA grants and other funding sources, as well as local resources.

Projects that are determined to be infeasible during this review process will be re-evaluated by members of the Core Planning Committee for re-scheduling or deletion.

5.2 Hazard Mitigation Goals and Mitigation Actions

Developing achievable goals forms the foundation for all mitigation actions and activities that will aid Clinton County in attaining the overall mission of the Core Planning Committee. As such, the Core Planning Committee assessed the goals of the 2016 Clinton County Hazard Mitigation Plan and had the opportunity to develop new goals for the 2021 update. Goals were reviewed and established based upon their relationship to the potential adverse impact upon the community.

The goals, as well as the hazards assessed for this Plan, informed the development of actions that the County and participating jurisdictions can take to mitigate the impacts of each of the hazards. The goals of the 2021 Clinton County Hazard Mitigation Plan are as follows:

- **Goal 1:** Increase public information and awareness about hazards that affect Clinton County.
- **Goal 2:** Decrease dam hazard level.
- **Goal 3:** Expand awareness and minimize the effects from drought.
- **Goal 4:** Expand awareness and minimize the effects from flooding.
- **Goal 5:** Minimize the effects from hazardous materials.
- **Goal 6:** Minimize the threat of invasive species.
- **Goal 7:** Expand awareness about tornadoes and severe storms.
- **Goal 8:** Increase protection from possible terrorism events.
- **Goal 9:** Expand awareness about the effects from winter storms.
- **Goal 10:** Generate discussion on drug misuse and addiction within Clinton County.
- **Goal 11**: Increase understanding of epidemics/pandemics on Clinton County.
- **Goal 12**: Minimize possibility of widespread utility failure throughout Clinton County.

5.3 Hazard Mitigation Action Priority

Members of the Core Planning Committee completed a Previous Mitigation Action Status survey, which indicated the status of mitigation actions included in the 2016 Hazard Mitigation Plan. This survey asked representatives to indicate whether the mitigation action from the previous plan was completed, deleted, deferred, unchanged, or ongoing. It also asked the representative if the action should be included in the updated Plan.

Once all mitigation actions from the previous plan were reviewed and their status indicated (**Appendix B**), all mitigation actions for the 2021 Clinton County Hazard Mitigation Plan were reviewed and rated on a scale of one to five by members of the Core Planning Committee based on the several criteria, including whether the action was cost-effective, technically feasible, environmentally sound, needed immediately, and the action's total risk reduction.

All of the surveys collected were tabulated to develop a single raw score for each individual mitigation action. These scores are indicated on the Hazard Mitigation Action Priority Table on the following pages. Overall, the score was determined by two factors:

1. The rankings of the hazard, as determined by the Hazard Priority Survey (**Table 5.1**, above).
2. The ratings received from the Core Planning Committee and the public on each of the mitigation actions.

The raw scores were then ranked, and each mitigation action was assigned a number (1-72) to indicate the priority of that specific action, according to the survey responses. The lower the action priority, the higher the priority. For example, an action assigned a priority of "1" should be prioritized higher than an action assigned a priority score of "38".

Hazard Mitigation Action priorities are organized by hazard in **Table 5.2**. The information used to develop the priorities can be found in the Matrix Score Spreadsheet, which is located in **Appendix C**. Comments from the jurisdictions responsible for each action can be found in **Appendix G**, along with all completed surveys that were used to make **Table 5.2**.

Table 5.2: Mitigation Actions Priority Table by Hazard

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
Multiple Hazards								
1	Collaborate with public and private sector interests to obtain/create information regarding disaster preparedness, recovery assistance and other post-disaster strategies for citizens and businesses.	Clinton County, Wilmington, Blanchester, Clarksville, New Vienna, Port William, Sabina	1	5	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Staff Time	1/1/21-12/31/25	Previous
2	Update the Clinton County Emergency Operations Plan (EOP) and aid in creating Standard Operating Procedures (SOPs) for each department or agency.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, Port William, Sabina	1	4	Clinton County EMA	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	Previous
3	Coordinate between Clinton County's and the municipal building and zoning offices to encourage the adoption of updated building codes.	Clinton County, Wilmington, Blanchester, Martinsville, Sabina	1	6	Clinton County RPC	Staff Time	1/1/21-12/31/25	Previous

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
4	Clinton County Fire Chief Association development of standardized hazardous materials response equipment procurement, interoperable PPE, and updated MOU for fire and hazardous materials response.	Clinton County, Wilmington, Blanchester, Clarksville, Midland, Port William, Sabina	1	3	Clinton County EMA	Hazardous Materials Emergency Planning Grant (HMEP)	1/1/21-12/31/25	Previous
5	Adopt the International Building Code (IBC) and International Residential Code (IRC).	Clinton County, Wilmington, Blanchester, Clarksville	1	7	Clinton County Building & Zoning	Staff Time	1/1/21-12/31/25	New
6	County and Municipality Grant Commission: For representatives from each municipality and county to meet, share, and research grant possibilities to improve each aspect of the county in an open online meeting forum.	Sabina	1	1	Sabina Mayor	Staff Time	1/1/21-12/31/26	New
7	Development of joint law enforcement county-wide policy for use of Police Body cameras to protect Officers, the public, and municipalities.	Sabina	1	2	Sabina Mayor	Capital Improvement Budgets	1/1/21-12/31/27	New
Dam Failure								
8	Coordinate with the ODNR to update dam safety plans and increase inspection rates on at-risk dams.	Clinton County, Wilmington, Blanchester, Clarksville	14	68	Clinton County Engineer	Staff Time	1/1/21-12/31/25	Previous
9	Map inundation areas for all Class I and Class II dams.	Clinton County, Wilmington, Blanchester, Clarksville, Midland	14	67	Clinton County EMA	United States Army Corps of Engineers (USACE) Planning Assistance to States	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
			Drought					
10	Create a public information and education program highlighting the responsibilities residents have towards water conservation and resource use.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Port William, Sabina	12	61	Clinton County Building & Zoning, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	Previous
11	Coordinate with Subject Matter Experts (SMEs) on best practices to minimize drought impacts and to develop benchmark criteria for implementing drought-related actions.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Port William, Sabina	12	62	Clinton County EMA, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	Previous
12	Recommend the planting of local plant species on public properties (xeriscaping).	Clinton County, Wilmington, Blanchester, Sabina	12	63	Clinton County Building & Zoning, Mayors & Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
13	Regularly (to be defined by each jurisdiction) check for leaks in the water supply system and provide documentation.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, Sabina	12	60	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
14	Establish an irrigation time/scheduling program or process to ensure that all agricultural land gets the required amount of water.	Clinton County, Blanchester, Midland	12	65	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
15	Establish a grazing policy or permitting program to prevent overgrazing on public property.	Clinton County, Martinsville	12	64	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
16	Ensure the availability of back-up water supplies.	Wilmington	12	59	Wilmington Public Works	General Operating Budget	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
Drug Misuse & Addiction								
17	Monitor overdoses, deaths, opioid prescriptions, and drug related crimes to identify problem areas.	Clinton County, Wilmington, Blanchester, Clarksville, Midland, New Vienna, Port William, Sabina	5	29	Clinton County Health District	General Operating Budget	1/1/21-12/31/25	New
18	Produce an annual report on the status of overdoses, deaths, and drug related crimes in the County.	Clinton County, Wilmington, Blanchester, Clarksville, Midland, New Vienna, Port William, Sabina	5	30	Clinton County Health District	General Operating Budget	1/1/21-12/31/25	New
19	Create a task force of local law enforcement, public health officials, mental health professionals, medical professionals, elected officials, and other appropriate personnel to identify problems and potential solutions.	Clinton County, Wilmington, Blanchester, Clarksville, Midland, New Vienna, Port William, Sabina	5	32	Clinton County Health District	General Operating Budget	1/1/21-12/31/25	New
20	Create an informational packet on opioid alternatives and distribute to all practicing doctors, hospitals, and dentists.	Clinton County, Wilmington, Blanchester, Clarksville, New Vienna, Port William, Sabina	5	31	Clinton County Health District	General Operating Budget	1/1/21-12/31/25	New
21	Public property monitoring: Installation of camera systems for use by law enforcement in parks, on trails, and on other government owned public properties to reduce crime and public drug use.	Sabina	5	27	Clinton County Health District	Capital Improvement Budgets	1/1/21-12/31/26	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
22	County-wide training for neighborhood watch groups to educate and help develop a county-wide watch support program.	Sabina	5	28	Clinton County Health District	General Operating Budget	1/1/21-12/31/27	New
				Earthquakes				
23	Educate homeowners on safety techniques to follow during and after an earthquake.	Clinton County, Wilmington, Blanchester, Clarksville	17	74	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
				Epidemic/Pandemic				
24	Identify potential health hazards to local livestock, including infectious disease.	Clinton County, Clarksville, Midland, Sabina	7	34	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
25	Regularly coordinate with public or private veterinary epidemiologists to monitor livestock-related disease in the area.	Clinton County, Clarksville, Midland, Sabina	7	35	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
26	Complete a public health plan to identify risk factors in the County, including epidemics, pandemics, drug abuse, and other public health issues.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, Port William, Sabina	7	36	Clinton County Health District	General Operating Budget	1/1/21-12/31/25	New
				Extreme Temperatures				
27	Inform residents that they can leave faucets dripping to prevent freezing pipes.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, Port William, Sabina	11	56	Clinton County EMA, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	New
28	Continue seasonal verification and promotion of heating and cooling stations in public buildings.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	11	57	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
29	Increase canopy coverage by planting more trees in public areas and rights-of-way to reduce urban heat.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	11	58	Mayors/ Administrators of Jurisdictions	Capital Improvement Budgets	1/1/21-12/31/25	New
				Flooding				
30	Create a public information and education program to sensitize residents to the floodplain and the benefits of preserving these areas.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	9	42	Clinton County Soil & Water Conservation District	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	Previous
31	Develop a program involving public information and education to encourage donation of stream corridors and keep those areas adequately maintained free of debris.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	9	44	Clinton County Soil & Water Conservation District	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	Previous
32	Complete a stormwater drainage study for known problem areas to identify further mitigation actions.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	9	41	Clinton County Engineer, Mayors/ Administrators of Jurisdictions	United States Army Corps of Engineers (USACE) Planning Assistance to States	1/1/21-12/31/25	New
33	Encourage or require (to be decided by each jurisdiction) the use of pervious surface materials for sidewalks, roadways, parking lots, and other paved areas.	Clinton County, Wilmington, Blanchester, Clarksville, Midland, Port William	9	45	Clinton County Building & Zoning, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	New
34	Require a drainage study with new development within jurisdictional boundaries.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	9	46	Clinton County Engineer, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
35	Conduct annual outreach or community workshops to provide information to property owners about flood insurance.	Clinton County, Wilmington, Blanchester, Clarksville, Midland	9	43	Clinton County EMA	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
36	Change parking minimums to parking maximums in the building and zoning code to reduce total impervious surface area.	Clinton County, Wilmington, Blanchester	9	47	Clinton County Building & Zoning, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	New
37	Encourage/assist the Village of Port William to participate in the NFIP.	Clinton County, Port William	9	48	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
38	Acquire, demolish, and/or retrofit flood-prone properties, as they are identified.	Clinton County	9	49	Clinton County EMA	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
Hazardous Materials								
39	Complete a Commodity Flow Study (CFS) for Clinton County.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	6	33	Clinton County EMA	Hazardous Materials Emergency Planning Grant (HMEP)	1/1/21-12/31/25	Previous
Invasive Species								
40	Work with local universities and experts to perform a countywide Invasive Species study.	Clinton County, Blanchester, Sabina	13	66	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
Landslides, Erosion, and Mine Subsidence								
41	Use GIS to map landslide risk areas throughout the County.	Clinton County	16	73	Clinton County GIS	General Operating Budget	1/1/21-12/31/25	New
42	Limit or prohibit development in identified risk areas.	Clinton County, Midland, Sabina	16	71	Clinton County Building & Zoning, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
43	Acquire and demolish properties within high risk areas.	Clinton County, Blanchester, Port William, Sabina	16	72	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
				Severe Summer Weather				
44	Coordinate with building code enforcement responsibilities to create an improved wind resistance requirement for buildings.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Sabina	4	24	Clinton County Building & Zoning, Mayors/ Administrators of Jurisdictions	Staff Time	1/1/21-12/31/25	Previous
45	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.	Clinton County, Blanchester, Clarksville, Martinsville, Midland, Port William, Sabina	4	25	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
46	Establish standards for all utilities regarding tree pruning around electrical lines.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Port William, Sabina	4	23	Clinton County EMA	Staff Time	1/1/21-12/31/25	New
47	Convert traffic lights to mast arms.	Clinton County, Blanchester, Clarksville, Midland	4	26	Clinton County Engineer	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
				Severe Wind & Tornadoes				
48	Increase the number of safe rooms in the County by installing safe rooms in residential and public buildings and working with local businesses, places of worship, etc. to install additional safe rooms.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, Port William, Sabina	2	9	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
49	Create a map of publicly available safe rooms in the County and distribute to the public.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, Port William, Sabina	2	8	Clinton County GIS	General Operating Budget	1/1/21-12/31/25	New
				Severe Winter Weather				
50	Create a public information and education campaign for information dissemination about snow emergency alerts, snow levels, and corn stick windbreaks.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Port William, Sabina	8	37	Clinton County EMA, Mayors/Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	Previous
51	Discourage or prohibit the use of flat roofs in new development to reduce the chance of roof collapse.	Clinton County, Wilmington, Blanchester, Clarksville, Midland, Sabina	8	39	Clinton County Building & Zoning, Mayors & Administrators of Jurisdictions	Staff Time	1/1/21-12/31/25	New
52	Bury overhead powerlines that are outside of flood areas to eliminate exposure to ice and snow.	Clinton County, Blanchester, Clarksville, Midland, Sabina	8	38	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
53	Use snow fences or "living snow fences" (rows of trees and vegetation) to control snow blow.	Clinton County, Blanchester, Clarksville, Sabina	8	40	Clinton County EMA, Mayors/ Administrators of Jurisdictions	General Operating Budget	1/1/21-12/31/25	New
				Terrorism				
54	Develop and distribute online materials about the different types of terrorism and how they might affect Clinton County.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	10	51	Clinton County EMA	State Homeland Security Program (SHSP)	1/1/21-12/31/25	Previous

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
55	Leverage Federal and State Subject Matter Experts (SMEs) to deliver presentations to community organizations/schools about terrorism and the See Something Say Something program.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	10	53	Clinton County EMA	State Homeland Security Program (SHSP)	1/1/21-12/31/25	Previous
56	Create a network security policy and associated actions to take in the event of a suspected intrusion or attack.	Clinton County, Wilmington, Blanchester, Clarksville, Sabina	10	52	Clinton County EMA, Mayors/ Administrators of Jurisdictions	State Homeland Security Program (SHSP)	1/1/21-12/31/25	Previous
57	Agroterrorism: Identify State personnel or employ local personnel with the skills to identify and treat foreign animal diseases.	Clinton County, Blanchester, Clarksville, Midland	10	54	Clinton County EMA	State Homeland Security Program (SHSP)	1/1/21-12/31/25	New
58	Agroterrorism: Require annual reporting on internal quality control and emergency response practices for commercial farms, food processing plants, food packaging plants, and other commercial agriculture uses.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland	10	55	Clinton County EMA	State Homeland Security Program (SHSP)	1/1/21-12/31/25	New
59	Online presence training for parents and children to reduce predation and prohibit exposure to inappropriate material.	Sabina	10	50	Sabina Mayor	General Operating Budget	1/1/21-12/31/26	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
Utility Failure								
60	Ensure that all critical facilities and public buildings have backup generators in case of power failure.	Clinton County, Wilmington, Blanchester, Clarksville, Martinsville, Midland, New Vienna, Sabina	3	21	Clinton County EMA, Mayors/ Administrators of Jurisdictions	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New
61	Internet Service: Assign or hire personnel who can take a leadership role in the internet connectivity effort.	Clinton County, Blanchester, Clarksville, Midland, Port William, Sabina	3	18	Clinton County EMA	General Operating Budget	1/1/21-12/31/25	New
62	Internet Service: Inform local elected officials on the need for internet connectivity.	Clinton County, Blanchester, Clarksville, Midland, Port William, Sabina	3	10	Clinton County EMA	Staff Time	1/1/21-12/31/25	New
63	Internet Service: Incorporate annual discussions regarding the importance of internet connectivity at public meetings.	Clinton County, Blanchester, Clarksville, Midland, Sabina	3	12	Clinton County EMA	Staff Time	1/1/21-12/31/25	New
64	Internet Service: Use GIS to map all internet assets within the county including, but not limited to, fiber status, roof top access, tower access, right-of-way access across bridges and railroads, and available conduits.	Clinton County, Blanchester, Clarksville, Midland, Sabina	3	14	Clinton County GIS	Staff Time	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
65	Internet Service: Annually track the demand for internet service within the County, through surveys or other means. This includes asking about needed service and better service.	Clinton County, Blanchester, Clarksville, Midland, Sabina	3	16	Clinton County RPC	Staff Time	1/1/21-12/31/25	New
66	Internet Service: Catalogue information about local internet providers, including service areas, services offered, and price.	Clinton County, Blanchester, Clarksville, Midland	3	15	Clinton County RPC	Staff Time	1/1/21-12/31/25	New
67	Internet Service: Encourage placement of fiber or conduits during public works projects ("dig once").	Clinton County, Wilmington, Blanchester, Clarksville, Midland, Sabina	3	19	Clinton County Engineer	General Operating Budget	1/1/21-12/31/25	New
68	Internet Service: Simplify permitting processes for internet and cell service providers.	Clinton County, Blanchester, Clarksville, Martinsville, Midland, Sabina	3	13	Clinton County Building & Zoning, Mayors/ Administrators of Jurisdictions	Staff Time	1/1/21-12/31/25	New
69	Internet Service: Leverage local assets to create partnerships with internet providers. Examples include allowing access to public utility poles and public light fixtures.	Clinton County, Blanchester, Clarksville, Sabina	3	17	Clinton County RPC	General Operating Budget	1/1/21-12/31/25	New
70	Internet Service: Contact and work with the State of Ohio office for broadband services.	Clinton County, Blanchester, Clarksville	3	20	Clinton County RPC	Staff Time	1/1/21-12/31/25	New
71	Internet Service: Determine if a municipal internet service provider is feasible.	Clinton County, Blanchester, Clarksville, Sabina	3	22	Mayors/ Administrators of Jurisdictions	Staff Time	1/1/21-12/31/25	New

#	Mitigation Action	Community	Hazard Priority	Action Priority	Lead Agency	Funding Source	Start/ End	Status
72	Internet Service: Research & identify grants or other funding opportunities available to expand internet service throughout the County.	Clinton County, Blanchester, Clarksville, Midland, Sabina	3	11	Clinton County RPC	Staff Time	1/1/21-12/31/25	New
				Wildfire				
73	Map wildfires as they occur in the County to identify risk areas.	Clinton County, Wilmington, Midland, Sabina	15	70	Clinton County GIS	Staff Time	1/1/21-12/31/25	New
74	Perform maintenance in risk areas, including fuel management techniques such as pruning/clearing dead vegetation, selective logging, cutting high grass, planting fire-resistant vegetation, and creating fuel/fire breaks (i.e., areas where the spread of wildfires will be slowed or stopped by the removal of fuels).	Clinton County, Wilmington, Sabina	15	69	Clinton County EMA	Emergency Management Performance Grant (EMPG) Special Project Grants	1/1/21-12/31/25	New

6 | Schedule and Maintenance

6.1 Participation Overview

The 2021 Clinton County Hazard Mitigation Plan will be adopted by all jurisdictions in Clinton County, including the County, all townships, and the city and villages. After the jurisdictions have adopted the plan, their signed resolutions or ordinances will be added to the plan as an Appendix.

6.2 Continued Public Involvement

The public will continue to be able to provide feedback on the Plan, as the Plan will be available through the Clinton County Emergency Management Agency and Ohio Emergency Management Agency websites. The Clinton County Emergency Management Agency will provide access to the Plan to all County, municipality, and township offices, and will make the Plan available in hardcopy and electronic format to the public as appropriate. The Clinton County Emergency Management Agency Director 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. All meetings will be open to the general public. The Clinton County Emergency Management Agency will publicly announce the mitigation action items that are slated for development in the current year, as well as any updates to the Plan as part of the annual review process.

6.3 Plan Integration and Annual Review

6.3.1 Previous Integration Efforts

The Clinton County Emergency Management Agency and Local Emergency Planning Committee (LEPC) have worked to integrate the previous Hazard Mitigation Plan into planning processes in the County. Members of the Core Planning Committee indicated that they are pursuing planning efforts associated with previous mitigation actions, such as developing localized policies for order of succession, developing additional training opportunities for first responders and emergency management teams, creating educational materials for the public, coordinating with the Environmental Protection Agency (EPA), and updating zoning codes and floodplain maps..

6.3.2 Future Integration Efforts

Local government plays a major role in the execution and implementation of mitigation strategies. This happens in large part during the daily operations that guide the development of various communities in the County. As such, each community will be responsible for understanding which items they are accountable for implementing. The Core Planning Committee may meet annually in order to monitor and evaluate the Clinton County Hazard Mitigation Plan. During the annual meeting, a status update should be provided for each mitigation action by the responsible agency.

All participating jurisdictions will be encouraged to attend this yearly plan update meeting. The meeting will coincide with the budget process so that future funding sources can be determined and set aside for actions slated for that particular year. This meeting will also be available to the public. Additionally, each jurisdiction and the County will review the Hazard Mitigation Plan during other planning processes, such as development of comprehensive plans or capital improvement plans and incorporate appropriate goals and mitigation actions into such documents.

Furthermore, the County and its participating jurisdictions will make a concerted effort to integrate the hazard mitigation plans and its mitigation actions into existing plans and regulations, such as the comprehensive plans, subdivision regulations, zoning resolutions, zoning maps, parks and open space plans, and emergency operations plans. Specifically, the County will begin updating its Comprehensive Plan in 2021. The Clinton County Regional Planning Commission will coordinate with the selected consultant to integrate mitigation actions identified in this Plan into the Comprehensive

Plan. Additionally, participating jurisdictions may incorporate mitigation strategies into their local comprehensive plans, zoning codes, and subdivision regulations.

6.4 Updating the Plan

The Plan must be updated within five years and re-adopted by the County and all participating jurisdictions in order to maintain compliance with federal regulations and ensure eligibility for certain federal mitigation grant funds. The Clinton County Emergency Management Agency will identify any necessary modifications to the Plan, including changes in mitigation goals and actions that should be incorporated into the next update. The Clinton County Emergency Management Agency Director and the County Commissioners will initiate the process of updating the plan in accordance with federal guidelines in sufficient time to meet state and federal deadlines.