4.6 Flood

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 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 of occurring each year. The 100-year floodplain can be seen in **Figure 4.6.1: 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.

Location

Flooding can occur throughout Clinton County. Flash flooding is more likely to occur in developed areas or along lakes and rivers. **Figure 4.6.1** shows the location of the 100-year floodplain. Floods can and do occur outside the FEMA defined 100-year flood zone. Sometimes very small watersheds are not included in the FEMA analyses, but floods can occur in these smaller watersheds as well.

Extent

Clinton County currently has 36 flood insurance maps (see **Appendix F**). The most recent update is from November 2019.

Clinton County and five of its communities (City of Wilmington, Village of Blanchester, Village of Clarksville, Village of New Vienna, and Village of Sabina) participate in the National Flood Insurance Program (NFIP) **(Table 4.6.2)**. The Village of Port William does not participate in the NFIP and the Villages of Martinsville and Midland do not have the option.

Figure 4.6.1: Flood Hazard Map of Clinton County, Ohio

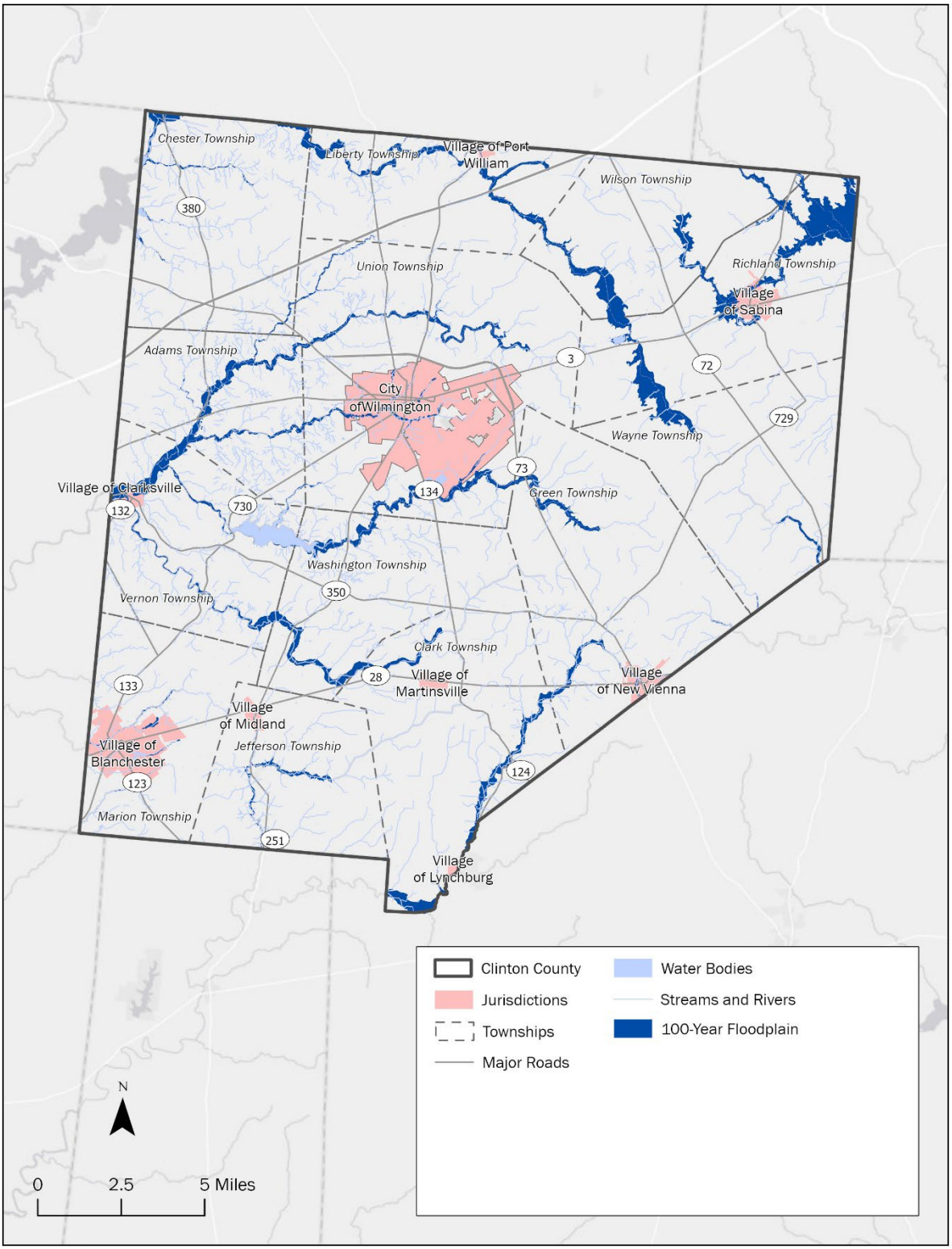


Table 4.6.2: National Flood Insurance Program Participation for Clinton County, Ohio

Community Name	County	NFIP Coordinator	Init FHBM Identified	Init FIRM Identified	Effective Map Date	Reg-Emer Date	Participating in NFIP
Clinton County*	Clinton	Jeff Linkous	12/09/77	09/16/88	11/19/21	09/16/88	Yes
City of Wilmington	Clinton	Eric Green	05/17/74	09/29/78	11/19/21	09/29/78	Yes
Village of Blanchester	Clinton	Jeffery Hurst	04/05/74	08/05/91	11/19/21	11/06/97	Yes
Village of Clarksville	Clinton	John D. Neeley	11/10/78	05/03/10	05/03/10(M)	05/03/10	Yes
Village of Martinsville	Clinton	Not Available					
Village of Midland	Clinton	Not Available					
Village of New Vienna	Clinton	Kathi Stone	01/12/79	05/03/10	05/03/10(M)	05/31/11	Yes
Village of Port William	Clinton	Stephan Jones	10/13/78	05/03/10	05/03/10	10/13/79	No
Village of Sabina	Clinton	Rob Dean	07/25/75	11/15/89	05/03/10	11/15/89	Yes

Source: NFIP Community Status Book

Repetitive Loss

There are two repetitive loss properties and zero severe repetitive loss properties in or near Clinton County, Ohio, detailed in Table 4.6.3. 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 claim 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.

Table 4.6.3: Repetitive Loss Properties in Clinton County, Ohio

Jurisdiction Occupancy	Total RL/SRL Structures	RL Structures	SRL Structures	Total Losses	Total Paid
Village of Sabina Single Family Residential	2	2	0	2	$52,931
Total	**2**	**2**	**0**	**2**	**$52,931**

Source: Ohio EMA

History

There have been 62 floods or flash floods in Clinton County between January 1995 and December 2023. These events have caused $131,000 in property and crop damage. There was one death on March 19, 2008, in the Clinton when a 54-year-old woman was swept away in a flooding stream. There has been one major disaster declaration related to flooding covering Clinton County since May 1953. The major disaster declaration for flooding, events that have caused the greatest amount of damage, and any events that have resulted in a death or injury are described below:

Flash Flood and Floods in Clinton County on May 6, 2022:

Slow moving thunderstorms brought heavy rainfall to the Ohio Valley on May 6, 2022. Clinton County recorded two floods and one flash flood. One flood was reported at S.R. 134 and Horseshoe Road. The other flood was reported at Mason Road, which was closed due to the high waters. The flash flood caused a road to collapse near Bailey and Gano Roads. Clinton County reported $20,000 in property damage. No deaths or injuries were reported.

Flood in Clinton County on March 19, 2008:

Low pressure systems moved across the Ohio Valley in March 2008 bringing an extended period of heavy rain. There were three to six inches of rain recorded in southwest and central Ohio. Several homes in Clinton County were evacuated due to high water. A 54-year-old woman was pulled into a flooded stream and drowned while trying to cross it. No other injuries or deaths were reported. Clinton County reported $10,000 in property damage.

Floods in Clinton County on January 5-6, 2005:

In early January 2005, Southern and Central Ohio received two to four inches of rain in a 24-hour period. The ground was already saturated from snowmelt, increasing flooding problems in Clinton County. There were several evacuations due to rising water and several roads were flooded. Clinton County reported $20,000 in property damage. No deaths or injuries were reported.

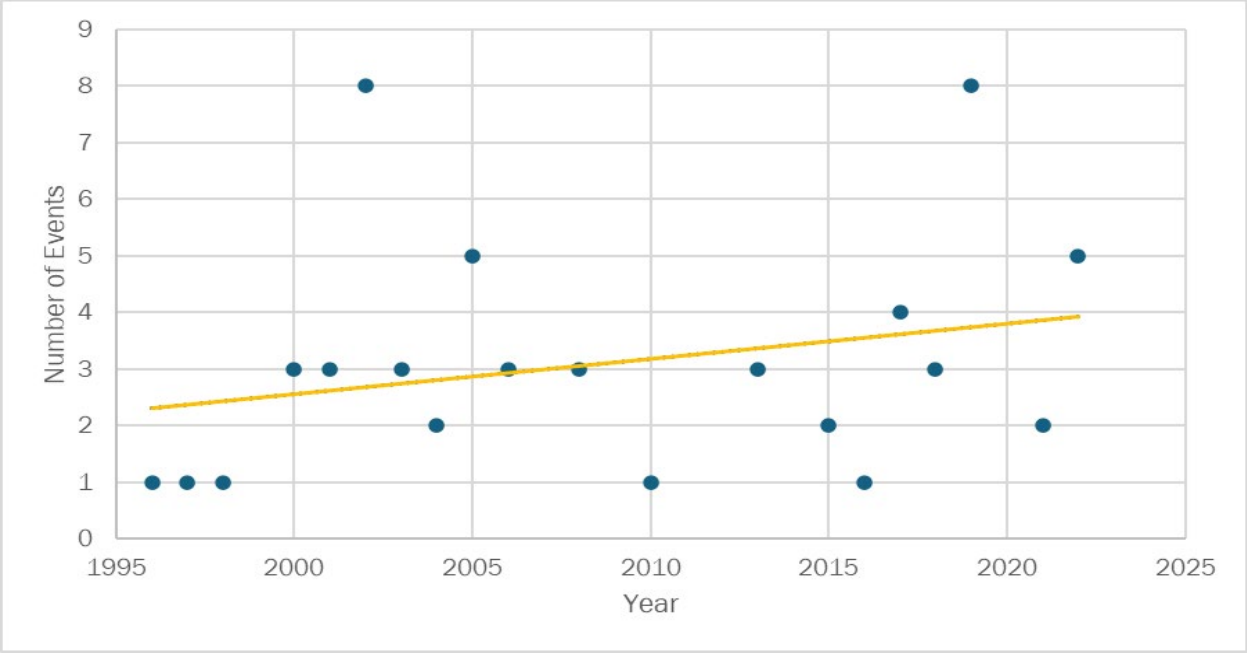
Major Disaster Declaration for Heavy Rains and Flooding, June 5, 1968:

On June 5, 1968, a major disaster declaration (DR-243-OH) was issued for 28 counties. Individual and public assistance was offered to each of the 28 counties, including Clinton County.

Probability

Figure 4.6.4 Between 1995 and 2023, Clinton County experienced 62 flooding events, including both floods and flash floods. Annually, this amounts to approximately two floods or flash floods per year. The yellow trendline of flood occurrences per year is increasing, which may suggest that Clinton County can expect an increased frequency of flood events each year. According to the State of Ohio Hazard Mitigation Plan (SOHMP), increased precipitation and variability from weather patterns could increase the likelihood and intensity of flood events.

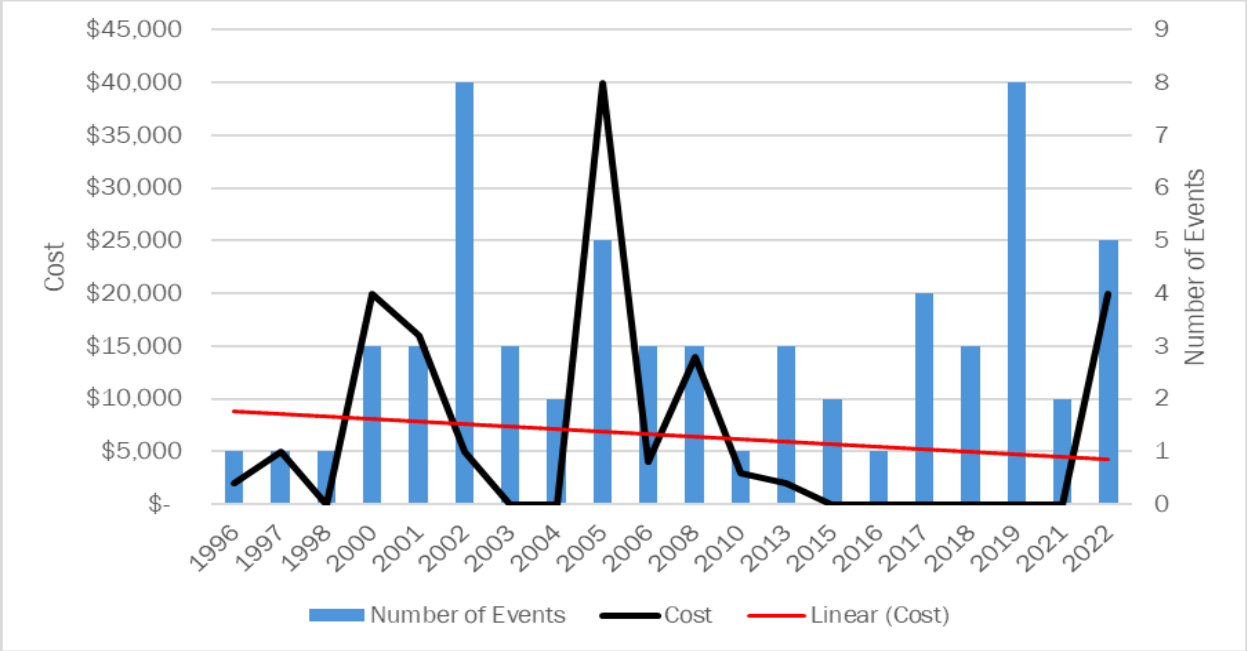
Figure 4.6.4: Probability of Flooding



Data Source: NOAA

Figure 4.6.5 shows both the trend of flood events and affiliated cost over time since January 1995. Between 1995 and 2023, floods or flash flood events have resulted in $130,000 in property damages and $1,000 in crop damages (Source: NCEI). Annually, this amounts to approximately $4,482 in property damages and $34 in crop damages. The trendline (shown in red) indicates that the expected property loss is decreasing.

Figure 4.6.5: Probability and Cost of Flooding



Data Source: NOAA

Vulnerability Assessment

Infrastructure Impact

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

Population Impact

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

For social vulnerability, in the National Risk Index, "riverine flooding" had a score of 44.1 ("Relatively Low"). People that are most vulnerable to flooding are those who live within the 100-year floodplain in structures that are not elevated above the base flood elevation. The index indicates an expected annual loss of $286,000 due to flood events with 1.8 events occurring per year.

Property Damage

Floods have the potential to damage infrastructure, resulting in the economic burden of clean up and repairs. Potential economic losses and damage associated with Clinton County for riverine flooding according to FEMA's National Risk Index are recorded in **Table 4.6.6** below, in order of highest EAL to lowest. Expected losses for buildings, population ($11.6 million for each fatality or 10 injuries), and agriculture per census tract for riverine flooding are listed below.

Table 4.6.6: Structure and Population Vulnerability from Riverine Flooding

Census Tract	Expected Annual Loss (Building)	Expected Annual Loss (Population Equivalence)	Expected Annual Loss (Agriculture)	Expected Annual Loss (Total)
39027964300	$1,650	$121,984	$16	$123,650
39027964800	$930	$45,417	$4	$46,351

Census Tract	Expected Annual Loss (Building)	Expected Annual Loss (Population Equivalence)	Expected Annual Loss (Agriculture)	Expected Annual Loss (Total)
39027964600	$1,225	$32,619	$0	$33,844
39027964900	$819	$19,871	$1	$20,691
39027964400	$508	$16,619	$14	$17,141
39027964700	$803	$14,585	$2	$15,390
39027964501	$129	$10,258	$0	$10,387
39027964502	$338	$7,311	$1	$7,650
39027965100	$139	$5,681	$12	$5,832
39027965000	$159	$5,354	$8	$5,521
Grand Total	**$6,700**	**$279,699**	**$58**	**$286,457**

Source: FEMA National Risk Index

Loss of Life

There was one reported death on March 19, 2008, when a 54-year-old woman attempted to cross a flooded stream and she was pulled into the water and drowned. Loss of life is possible in future floods or flash floods.

Economic Losses

Floods can halt economic activity, block roadways, and destroy agricultural crops. Businesses may need to shut down their operations due to flood water damage or road closures. Crop losses are also possible during floods or flash floods.

Future Trends

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.

More buildings but less people can mean more property loss but less population vulnerability to riverine flooding. Similarly, older structures could mean more vulnerability to properties and inhabitants. In 2023, Clinton County authorized 101 new residential units at a total value of $25,454,000. Though there are more buildings slated for construction, Clinton County's population has decreased 80 individuals from 2020 to 2023. The decline is set to continue such that by 2030 the population will lose an additional 1,343 people (3.2 percent). More buildings but less people may potentially mean more property loss but less population vulnerability. However, with state-of-the-art engineering there is very little potential damage. Given these estimates, there are no known changes in risks associated with earthquakes in Clinton County.

0. If construction practices, including the location of the new housing units, follow best practices for floodplain management, there are no known changes in the risks associated with riverine flooding.

Communities that are participating in the National Flood Insurance Program (NFIP) are required to adopt and enforce regulations and codes that apply to new developments in Special Flood Hazard Areas (SFHAs). These local floodplain management regulations must contain, at a minimum, NFIP requirements and standards that apply not only to new structures, but also to existing structures which

are Substantially Improved (SI), or Substantially Damaged (SD) from any cause, whether natural or human-induced hazards.

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

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

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

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

Shifting Weather Patterns and Environmental Trends

Shifting weather patterns and environmental trends have impacted human and natural systems. For example, infrastructure and stormwater systems in the Midwest are threatened by increased precipitation frequency and intensity induced by shifting weather patterns. According to the SOHMP, increased precipitation and variability could also increase the likelihood and intensity of flood events, which would mostly occur during the summer and fall months. These events would mainly occur from late summer to early winter, increasing the likelihood of cool season flood events in late autumn and early winter. Additionally, heavy precipitation events are projected to increase during winter and spring, causing flooding, sewer overflow, inundated roadways, delayed growing season and crop damage, and infrastructure damage. Emergency action plans, green infrastructure, and anticipating extreme events are important steps to prepare for any change in weather patterns.