

2.0 RISK ASSESSMENT


2.5 Technological Hazards

“Technological hazards are an inevitable product of technological innovation and human development. These hazards, which can occur after the failure of existing technology, tend to be much less understood than their natural counterparts and are increasing in number as the scope and dependence on technology expand” (Haddow, Bullock & Coppola, 2017). This subsection includes the following technological hazards.

- Dam or Levee Failure
- Fires
- Hazardous Materials Incident

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2.5.1 Dam and Levee Failure

A dam is a barrier built across a waterway to control the flow or raise the water level. A dam failure occurs when the barrier constructed does not obstruct or restrain water as designed, which can rapidly result in a large area of completely inundated land.			
	Vulnerability	Period of Occurrence:	At any time, typically after a period of prolonged precipitation causing damages or a prolonged period of drought causing erosion
		Warning Time:	Over 24 hours
		Probability:	Highly unlikely
		Type of Hazard:	Technological
		Hazard Index Ranking:	Lowest
		State Risk Ranking:	3-Medium
		Severity:	Limited
		Disaster Declarations:	None

Hazard Overview

There are approximately 90,580 dams in the United States, the majority of which are privately-owned; state and local authorities, public utilities, and federal agencies own others. Currently, the average age of the dams in the country is 56 years. The American Society of Civil Engineers calculates the status of these dams and generates a grade; the grade of the U.S. dams is 'D,' and 17% of all dams are classified as high-hazard (ASCE, 2017).

The benefits of dams and levees are numerous: they provide water for drinking, navigation, and agricultural irrigation, and save lives by preventing or reducing floods. Dams and levees are human-made structures designed to obstruct or restrain waters that may cause flooding downstream. These structures are generally concrete or earthen.

In terms of emergency management, the Ohio Emergency Management Agency (EMA) characterizes dam failures as either *sunny day failures* or *rainy-day failures* in its hazard mitigation plan. *Sunny day failures* occur during a non-flooding situation with the reservoir near the normal pool level. *Rainy day failures* usually involve periods of rainfall and flooding and can exacerbate inadequate spillway capacity. Improper design of a spillway or operation of gates during high flows can lead to excessive water pressure and subsequent failure as well. Even though both types of failures can be disastrous, a *sunny day failure* could be more catastrophic due to its unanticipated occurrence and the lack of time to warn residents downstream (Ohio

EMA, 2019).

There are three types of failures of earthen dams: overtopping, seepage or piping, and structural failure (ODNR, n.d.).

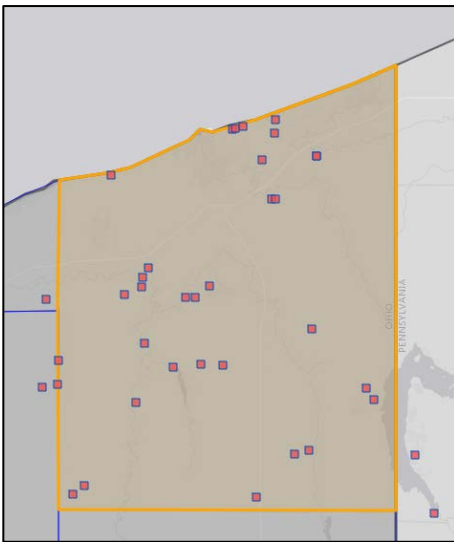
- **Overtopping** failures result from the erosive action of water on the embankment. Erosion is due to the uncontrolled flow of water over, around, and adjacent to the dam. Earthen embankments are not designed to be overtopped and therefore are particularly susceptible to erosion. Once erosion has begun during overtopping, it is almost impossible to stop. Overtopping causes 34% of dam failures.
- **Structural** failures can occur in either the embankment or the appurtenances. Structural failure of a spillway, lake drain, or other appurtenance may lead to failure of the embankment. Cracking, settlement, and slides are the more common signs of structural failure of embankments. Large cracks in an appurtenance or the embankment, major settlement, and major slides will require emergency measures to ensure safety, especially if the problems occur suddenly. Foundation defects and slope instability are the cause of 30% of dam failures.
- All earthen dams have **seepage** resulting from water percolating slowly through the dam and its foundation. Seepage must, however, be controlled in both velocity and quantity. If uncontrolled, it can progressively erode soil from the embankment or its foundation, resulting in the rapid failure of the dam. Erosion of the soil begins at the downstream side of the embankment, either in the dam proper or the foundation, progressively works toward the reservoir, and eventually develops a “pipe” or direct conduit into the reservoir. Seepage can cause slope failure by creating high pressures in the soil pores or by saturating the slope. Seepage or piping causes 20% of dam failures.

The three types of failures often interact in a complex manner. For example, uncontrolled seepage may weaken the soil and lead to a structural failure. Structural failure may shorten the seepage path and lead to a piping failure. Surface erosion may result in structural failure, and so on. Minor defects such as cracks in the embankment may be the first visual sign of a major problem, which could lead to failure of the structure. Someone experienced in dam design and construction should evaluate the seriousness of all deficiencies as soon as they are detected.

Location and Extent

According to the Ohio Administrative Code Rule 1501:21-13-01, dams fall under one of four classes (ODNR, n.d.). For impacts from each dam class, see the impacts and vulnerability section below.

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



Source: USACE NID

- **Class IV:** Dams having a total storage volume of 50 acre-feet or less or a height of 25 feet or less. Class IV dams are exempt from permit requirements.

The U.S. Army Corps of Engineers National Inventory of Dams (NID) reports 31 dams in Ashtabula County with an average age of 56 years. See the graphic to the left for their locations. A state agency regulates 94% of the structures, while federal agencies do not regulate any of them. The NID notes the presence of an emergency action plan at 33% of the high-hazard potential facilities.

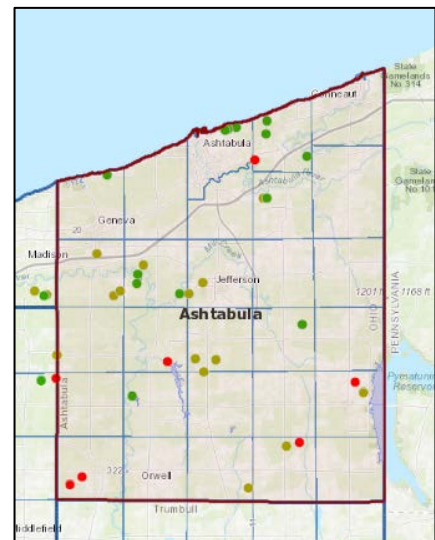
DAMS IN ASHTABULA COUNTY (Source: ODNR DWSR Dam Safety Ohio Dam Locator)

Name	Owner Type	Primary Purpose	Year Completed	NID Height (feet)	NID Storage (acre-feet)	ODNR Class	EAP (Y/N)
Lower Jeffco Lake Dam	Private	Recreation	1963	16.5	139	I	N
Limpert Lower Lake Dam	Private	Recreation	1963	19.9	62	III	Y
Galicki Lake Dam	Private	Recreation	1973	21.7	61	III	N
Lake Cardinal Dam	Private	Recreation	1927	31.4	2532	II	Y
Camp Whitewood Lake Dam	Private	Recreation	1967	20	97	I	N
Roaming Rock Shores Lake Dam	Local Govt.	Recreation	1967	45.3	12000	I	Y
O'Brien Lake Dam	Private	Recreation	1968	23.6	168	III	N
Lenox Lakes Dam	Private	Recreation	1969	27.5	121	III	N
Private Lake Dam	Private	Recreation	1964	18.5	79.9	III	N
Lake Beaumont Dam	Private	Recreation	1965	27	60	N/A	Not Req.
Lake George Dam	Private	Recreation	1964	17.4	315	II	Y
Lindon Lake Dam	Private	Recreation	1961	27	201	III	Y

DAMS IN ASHTABULA COUNTY (Source: ODNR DWSR Dam Safety Ohio Dam Locator)							
Name	Owner Type	Primary Purpose	Year Completed	NID Height (feet)	NID Storage (acre-feet)	ODNR Class	EAP (Y/N)
Lake Asegra Dam	Private	Recreation	1944	28.8	695	II	Y
Pierce-Ruhland Pond Dam	Private	Recreation	1969	33.6	73	II	Y
Ashtabula Co. Outdoor Club Lake Dam	Private	Recreation	1928	22.4	132	I	N
Holiday Camplands Lake Dam	Private	Recreation	1975	10	195	I	Y
Elkem Effluent Treatment Pond No. 4	Private	Recreation	1977	18	275	II	N
Elkem Fluid Waste Pond 3A	Private	Recreation	1967	40	278	II	N
Elkem Sludge Holding Pond 5C Dam	Private	Recreation	1988	20	190	II	Y
Lake Kenisee Dam	Private	Recreation	1974	13.4	99	II	N
Naji Lake Dam	Private	Recreation	1963	18.7	85.2	I	N
North Kingsville Lake Dam	Local Govt.	Recreation	1968	13.3	76	II	N
North Kingsville Route 20 Lake Dam	Local Govt.	Recreation	1900	22.3	50.6	II	N
Sili Lake Dam	Private	Recreation	1972	15	92.4	III	N
Davis Pond Dam	Private	Recreation	1969	32	48	N/A	Not Req.
Fischer Lake Dam	Private	Recreation	N/A	13.7	96.1	II	N
Grenke Lake Dam	Private	Recreation	N/A	16.4	75.7	III	N
Palmetto Lake Dam	Not Listed	Recreation	N/A	11.7	33.1	II	N
Crystal Lake Dam	Private	Recreation	1930	10.5	54.9	III	N
Dorset Wildlife Area Wetland Dam	State	Recreation	2004	8.6	148	II	Y
Fischer Lower Lake Dam	Private	Recreation	N/A	14.4	90	III	N

As required by law, dam owners submit emergency action plans to the appropriate authorities. Local officials, such as the Ashtabula County Emergency Management Agency (EMA) utilize these plans (and the inundation areas identified in them) to identify risk areas and plan appropriate preparedness measures.

The Ohio Department of Natural Resources, Division of Water Resources, Dam Safety lists 32 dams in Ashtabula County. As evidenced in the graphic at right, dams appear throughout the county.



Source: ODNR DWSR Dam Safety

DAMS IN ASHTABULA COUNTY (Source: ODNR DWSR Dam Safety Ohio Dam Locator)							
Name	Owner Type	Primary Purpose	Year Completed	NID Height (feet)	NID Storage (acre-feet)	ODNR Class	Also on NID (Y/N)
Lower Jeffco Lake Dam	Private	Recreation	1963	16.5	139	I	Y

DAMS IN ASHTABULA COUNTY (Source: ODNR DWSR Dam Safety Ohio Dam Locator)							
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Galicki Lake Dam	Private	Recreation	1973	21.7	61	III	Y
Lake Cardinal Dam	Private	Recreation	1927	31.4	2532	II	Y
Camp Whitewood Lake Dam	Private	Recreation	1967	20	97	I	Y
Roaming Rock Shores Lake Dam	Local Govt.	Recreation	1967	45.3	12000	I	Y
O'Brien Lake Dam	Private	Recreation	1968	23.6	168	III	Y
Lenox Lakes Dam	Private	Recreation	1969	27.5	121	III	Y
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Ashtabula Co. Outdoor Club Lake Dam	Private	Recreation	1928	22.4	132	I	Y
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Elkem Effluent Treatment Pond No. 4	Private	Recreation	1977	18	275	II	Y
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Lake Kenisee Dam	Private	Recreation	1974	13.4	99	II	Y
Naji Lake Dam	Private	Recreation	1963	18.7	85.2	I	Y
North Kingsville Lake Dam	Local Govt.	Recreation	1968	13.3	76	II	Y
North Kingsville Route 20 Lake Dam	Local Govt.	Recreation	1900	22.3	50.6	II	Y
Sili Lake Dam	Private	Recreation	1972	15	92.4	III	Y
Fischer Lake Dam	Private	Recreation	N/A	13.7	96.1	II	Y
Grenke Lake Dam	Private	Recreation	N/A	16.4	75.7	III	Y
Palmetto Lake Dam	Not Listed	Recreation	N/A	11.7	33.1	II	Y
Crystal Lake Dam	Private	Recreation	1930	10.5	54.9	III	Y
Dorset Wildlife Area Wetland Dam	State	Recreation	2004	8.6	148	II	Y
Fischer Lower Lake Dam	Private	Recreation	N/A	14.4	90	III	Y
Geneva Inn Lake Dam	Private	N/A	N/A	15.2	45.3	III	N
Hemlock Springs Golf Course Lake Dam	Private	N/A	N/A	13.8	5	III	N
Wagon Trails Resort Lake Dam	Private	N/A	N/A	16.2	49.9	III	N

The different number of dams reported by the ODNR likely corresponds to differing regulatory requirements. The ODNR includes 95 dams listed as “Class IV” (x24, property losses limited to rural areas), “Other,” which includes “abandoned” (x5), “exempt” (x47), “unclassified,” (x19). According to the U.S. Army Corps of Engineers’ National Levee Database (<https://levees.sec.usace.army.mil/#/>), there are no levees located in Ashtabula County.

Impacts and Vulnerability

The potential downstream hazards characterize the resultant downstream damage should the dam fail, including probable future development. The hazards correspond to four classes, which coincide with the class of dam defined by height and storage as discussed above.

POTENTIAL DOWNSTREAM HAZARDS	
<i>Class</i>	<i>Description</i>
Class I	<ul style="list-style-type: none"> • Probable loss of life • Structural damage to high-value property (i.e., homes, industries, major public utilities).
Class II	<ul style="list-style-type: none"> • Disruption of a public water supply or wastewater treatment facility, the 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 correctional facilities as determined by the chief • Damage or disruption to railroads or public utilities • Damage to downstream class I, II or III 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
Class III	<ul style="list-style-type: none"> • Property losses including but not limited to rural buildings not otherwise described, and class IV dams and levees not otherwise listed as high-value property. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potentially affected property • Damage or disruption to local roads including but not limited to roads not otherwise listed as major roads.
Class IV	<ul style="list-style-type: none"> • Losses restricted mainly to the dam.

Uncontrolled floodwaters are one of the most powerful and destructive forces in nature. Dams not designed to withstand major storms or those in a state of disrepair may fail catastrophically, increasing flood damage downstream. The potential for damage due to dam failure is increasing along with the increased amount of residential and commercial development within the hydraulic shadow of dams. In many cases, existing dams will need to be modified to keep downstream areas safe from catastrophic flooding.

Historical Occurrences

Stanford University offers access to the National Performance of Dams Program (NPDP) database, which includes information on “dam incidents” (2018). Incidents are safety-related events that have occurred at the dam. One of Ashtabula County’s dams appeared on the NPDP incident list, as shown in the table below.

DAM INCIDENTS IN ASHTABULA COUNTY (Source: NPDP)				
<i>Name</i>	<i>Incident Date</i>	<i>Dam Type</i>	<i>Incident Type</i>	<i>Consequences</i>
Lake Cardinal Dam	2/10/1959	Earth	Not known	Consequence data unavailable

Gerlat Lake Dam Spillway Failure

Source: [https://sharpp.dps.ohio.gov/OhioSHARPP/Documents/OhioMitigationPlan/2019/SOHMP%202019%20DRAFT%20\(003\).pdf](https://sharpp.dps.ohio.gov/OhioSHARPP/Documents/OhioMitigationPlan/2019/SOHMP%202019%20DRAFT%20(003).pdf), p. 2-95

Ashtabula County is in Region 2 of the Ohio EMA's geographic classification of dams in the 2019 draft of the state hazard mitigation plan. That document reports one dam incident between 1852 and 2014. It occurred in 2011 at the Gerlat Lake Dam, where a spillway failed. The Ohio Department of Natural Resources issued an order for the dam to be repaired or breached, and the dam was breached.

Loss and Damages

The owners of ten dams in Ashtabula County submitted emergency actions plans (EAPs) to the county EMA. Those plans identified downstream hazards in various ways. For example, the plans for the Roaming Rock Shores Lake Dam and Holiday Camplands Lake Dam listed downstream hazards of "limited number of residences" and "some homes." Other plans estimated specific structures.

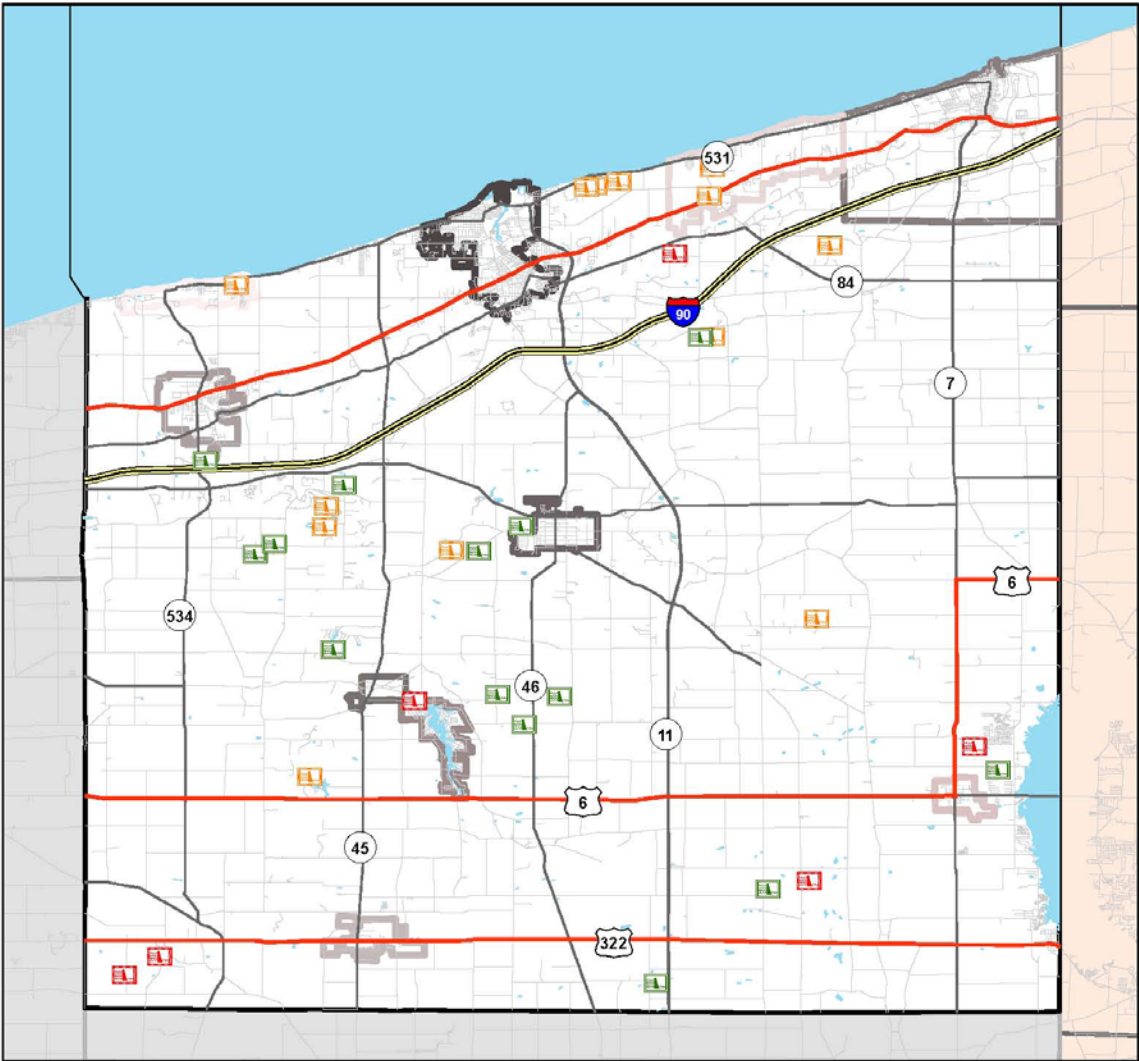
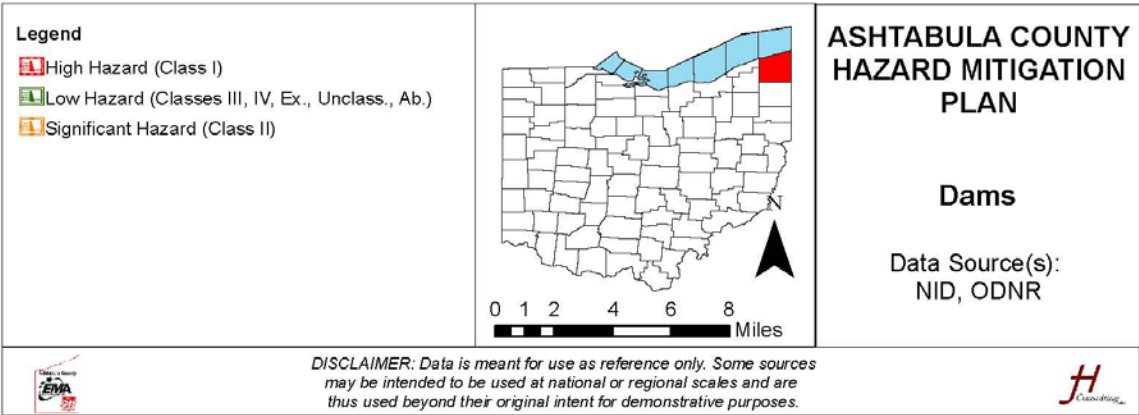
For this estimate, planners tallied the number of structures specifically noted in the EAPs (21 residential, two non-residential, and two critical facilities¹). Figures in the HAZUS database (i.e., 44,877 structures with a total replacement value of \$12,087,380,000) suggest a generalized, rounded value of \$269,300 per structure. Planners used that figure to calculate loss estimates for SHARPP entry.

DAM AND LEVEE FAILURE LOSS ESTIMATE – SHARPP DATA ENTRY		
<i>Structure Type</i>	<i>Number</i>	<i>Loss Estimate</i>
Residential	21	\$5,655,300
Non-Residential	2	\$538,600
Critical Facilities	2	\$538,600
TOTALS	25	\$6,732,500

Risk Assessment

This section summarizes the risk to Ashtabula County from a dam or levee failure. The following map image identifies the dams in Ashtabula County.

¹ As the EMA receives additional, approved EAPs, this estimate will change.




The following table assigns point totals based on the research presented in this profile for each category that appears in Ohio EMA's SHARPP tool.

DAM AND LEVEE FAILURE RISK SUMMARY			
Category	Points	Description	Notes
Frequency	2	Low	Research suggests that two incidents occurred over 59 years, for an average of 0.034 incident per year. This ranking corresponds to the lowest available when at least one historical incident occurred.
Response	1	Less than half a day	The minimal probability, lack of historical catastrophic failures, and frequent inspections at dams in Ashtabula County suggest that responses would be minimal.
Onset	1	Over 24 hours	Frequent inspections suggest that warning would occur.
Magnitude	1	Localized (Less than 10% of land area affected)	Most facilities are in rural areas.
Business	1	Less than 24 hours	Most facilities are in rural areas.
Human	1	Minimum (minor injuries)	Most facilities in Ashtabula County are Class IV or unclassified.
Property	1	Less than 10% of property affected	The extremely low probability suggests that minimal personal property would be impacted. Further, the two historical instances did not result in measured losses.
Total	8	Lowest	

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2.5.2 Fires

A wildland fire is a large, destructive fire that spreads quickly over woodland or brush areas. An urban fire involves a structure or property within an urban or developed area. For hazard mitigation purposes, major urban fires involving large buildings or multiple properties are of primary concern.			
	Vulnerability	Period of Occurrence:	Wildfire: Typically during dry weather months Urban Fire: At any time
		Warning Time:	Less than 6 hours
		Probability:	Highly likely
		Type of Hazard:	Technological
		Hazard Index Ranking:	Medium
		State Risk Ranking:	Wildfire: 3-Medium Urban Fire: Not ranked
		Severity:	Limited
		Disaster Declarations:	None

Hazard Overview

A wildfire is an unplanned, unwanted fire burning in a natural area, such as a forest, grassland, or prairie. As building development expands, homes and businesses may encroach areas susceptible to wildfires. Wildfires can cause death or injury to people and animals, damage or destroy structures, and disrupt community services, including transportation, natural gas, power, communications, etc. (USDHS, n.d.). There are three main types of wildfires listed below (Borealforest.org, n.d.).

- **Smoldering Fire:** Fire that emits smoke but has no flame and is rarely self-sustained.
- **Flaming Combustion:** Flames are present, and charcoal forms in the absence of oxygen.
- **Glowing Combustion:** A later stage of fire with a slower rate of combustion and blue flame.

Officials may also classify wildfires by the part of the forest in which they occur as listed below.

- **Ground Fires:** Fires that occur on the ground, often below the leaves.
- **Surface Fires:** Fires that occur on the surface of the forest up to 1.3 meters high.
- **Crown Fires:** The most dangerous fire that can spread the fastest. They occur in the tops of trees. This type of fire can depend on surface fires to burn the crowns, be active

in which they occur at the same rate as a surface fire, or be the most destructive, independent fire that can jump from crown to crown.

According to the National Park Service, humans cause approximately 90% of wildfires in the U.S. Human-caused fires result from unattended campfires, burning debris or trash, not adequately extinguishing and discarding cigarettes, and intentional arson. Carelessness by individuals can quickly ignite a wooded area and spread before the fire dies. Nature can also impact forested regions; lightning is notorious for creating wildfires. Lightning can come in two forms: hot and cold. Cold lightning is an intense electrical current that has a short duration. Hot lightning has less electrical current but occurs for an extended period. Hot lightning bolts usually start wildfires due to the length of the flash that occurs. The flash connects with dry areas long enough to ignite available fuel (USDHS, n.d.).

Wildfires need three elements to occur: fuel, oxygen, and heat. Wildfires require flammable material to fuel flame. These materials come in different forms such as trees, grasses, brush, and sometimes structures (i.e., homes or buildings). Air supplies the oxygen that fire requires to burn. Heat sources help ignite wildfires when fuel temperatures rise to a hot enough state that it ignites (National Geographic, 2018).

Wildland fires are not the only type of fire that can be a hazard in Ashtabula County. According to the National Fire Protection Association (NFPA), structure fires comprised 37.8% of the “fires responded to in 2017.” Residential structure fires made up 72% of those structure fires (NFPA, 2019). Terrorists might use fire as a weapon (Byrne, 2017). The potential for causing large-scale damage with little to no cost or technical expertise makes arson particularly appealing.

Location and Extent

Wildfires can occur anywhere in the country. Ashtabula County contains the Geneva and Pymatuning State Parks, which include over 21,000 acres of largely open and wooded areas as well as campgrounds. Wildfires can have extremely devastating effects on communities. With billions of dollars spent nationwide on suppression, the extent of wildfires is endless. There is a potential for flooding, debris flows, landslides, and many other environmental impacts as well as health and economic concerns for residents in the area. Wildfires may deplete the resources that help flourish life for not only humans but also wildlife. Surrounding communities may experience cascading effects from impacted areas. Residents may have to travel farther and into neighboring communities for necessities, housing, and employment.

Structure and other fires can occur anywhere there are structures. In heavily populated areas where buildings are closer together, the potential for greater loss of life and property is present. Areas with lower socioeconomic characteristics have an increased fire risk. Crowded dwellings also result in increased vulnerability to fire. These crowded units may contain room partitions which can impede firefighter movement, potentially leading to injury or death. Mobile homes are not held to the same standard as homes built on-site. Residents of mobile homes often store flammable liquids such as gasoline or propane in the space beneath the home. In mobile home parks, structures are nearby one another. As such, a mobile home fire can become catastrophic very quickly.

Impacts and Vulnerability

Impacts may cover large areas with extensive burning, embers traveling more than a mile away from a wildfire itself, and smoke causing health issues for people far away from the fire. Wildfires damage watersheds and leave areas prone to flooding and mudslides for many years. Wildfires can occur at any time throughout the year, but the potential is always higher during periods with little or no rainfall, which make brush, grass, and trees dry and burn more efficiently. High winds can also contribute to spreading a fire (USDHS, n.d.).

Areas affected by wildfires are usually charred on the ground, causing all organic matter to die. Nutrients from the soil will disappear, and environmental rehabilitation measures may be necessary. Fires can contaminate the area when runoff from rain leads burnt materials into waterways. Lastly, wildfires can have a major impact on wildlife and humans. When a wildfire occurs, habitats vanish, and there is a lessened supply of food for those animals that survive. Like animals, humans can also lose their homes and assets such as food. The devastation may force residents to relocate and result in economic difficulties for residents and the affected area (Auburn University, 2018).

A structure fire may involve the destruction of plastics, foams, fabrics, carpets, wood, and asbestos-containing materials. Soot in smoke usually contains what is burned and may also contain byproducts of items burned (i.e., hydrogen cyanide is a byproduct of burning wool). The Phoenix Fire Department studied the exposure of soot on firefighters after extinguishment. Their findings indicated that chlorinated products become attached to soot and can enter the lungs (Bolstad-Johnson, 2010). Breathing in this soot can cause acute issues such as coronary artery disease, asthma, bronchitis, and many other respiratory illnesses (Keefe, 2013).

Historical Occurrences

Although county-level data is not available for wildfires, data is available for the State of Ohio. The following table summarizes the data presented in the historical year-end fire statistics from the National Interagency Fire Center (2019). As the numbers indicate, even though there are more wildland fires, fewer acres burn compared to prescribed-burn acreage.

OHIO WILDLAND AND PRESCRIBED FIRES, 2009-2018				
Year	Wildland		Prescribed	
	Fires	Acres	Fires	Acres
2009	1,164	10,962	15	4,487
2010	571	4,218	16	1,927
2011	246	1,203	4	1,476
2012	309	1,250	11	1,617
2013	31	152	3	1,789
2014	63	684	7	3,031
2015	69	548	5	2,328
2016	410	1,116	218	4,652
2017	68	733	70	2,308
2018	67	337	N/A	N/A
TOTALS	2,998	21,203	349	23,615

Ohio has a low rate of wildfires compared to other states. With a three-year average of 182 wildland fires reported statewide between 2016 and 2018 (National Interagency Fire Center, 2019), an average of two wildland fires per year could occur Ashtabula County (i.e., 182 annual events divided by the 88 counties of Ohio). Further, the National Interagency Fire Center data suggests that Ohio experiences an average of 6.8 acres burned per wildland fire. As such, Ashtabula County could expect an average of 13.6 acres burned by wildfires annually.

Other fires have occurred in Ashtabula County. Individual fire departments maintain statistics for their response districts and often upload that data into the National Fire Incident Reporting System (NFIRS). The U.S. Fire Administration (USFA) compiles statistics based on NFIRS and other data. The NFPA produced a report entitled *U.S. Fire Experience by Region* in (Karter, 2013). Ohio was in the midwest region, where an average of approximately 5.4 fires per thousand population occurred annually. Based on the county's population of 97,493, Ashtabula County could expect to experience 524 fires each year.

Local media outlets do not report all fires, and it is thus difficult to aggregate all historical occurrences, even for an annual period. The following table presents a summary of high-profile files reported by local media outlets.

HIGH PROFILE FIRES IN ASHTABULA COUNTY, 2010-2019 (as reported by local media outlets)	
<i>Date</i>	<i>Description (headline)</i>
March 2010	Three structures destroyed by fires in two days (<i>Star Beacon</i>)
January 2013	Home explosion/fire (<i>Star Beacon</i>)
November 2017	Home fire, one death (News5, Cleveland)
February 2019	Martini's Restaurant (<i>Star Beacon</i>)
March 2019	House fire, arson (<i>Star Beacon</i>)

Loss and Damages

For every acre burned nationally, firefighters may incur an average of \$203 worth of suppression costs (based on federal agency expenditures – i.e., forest service, department of interior agencies, etc.) per acre burned (National Interagency Fire Center, 2019). Based on the calculations above for Ashtabula County, these estimates would total to \$2,759 worth of loss annually.

The NFPA (2019) reported the total number of fires between 2013 and 2017, along with civilian deaths and injuries and property loss. The following table summarizes that data.

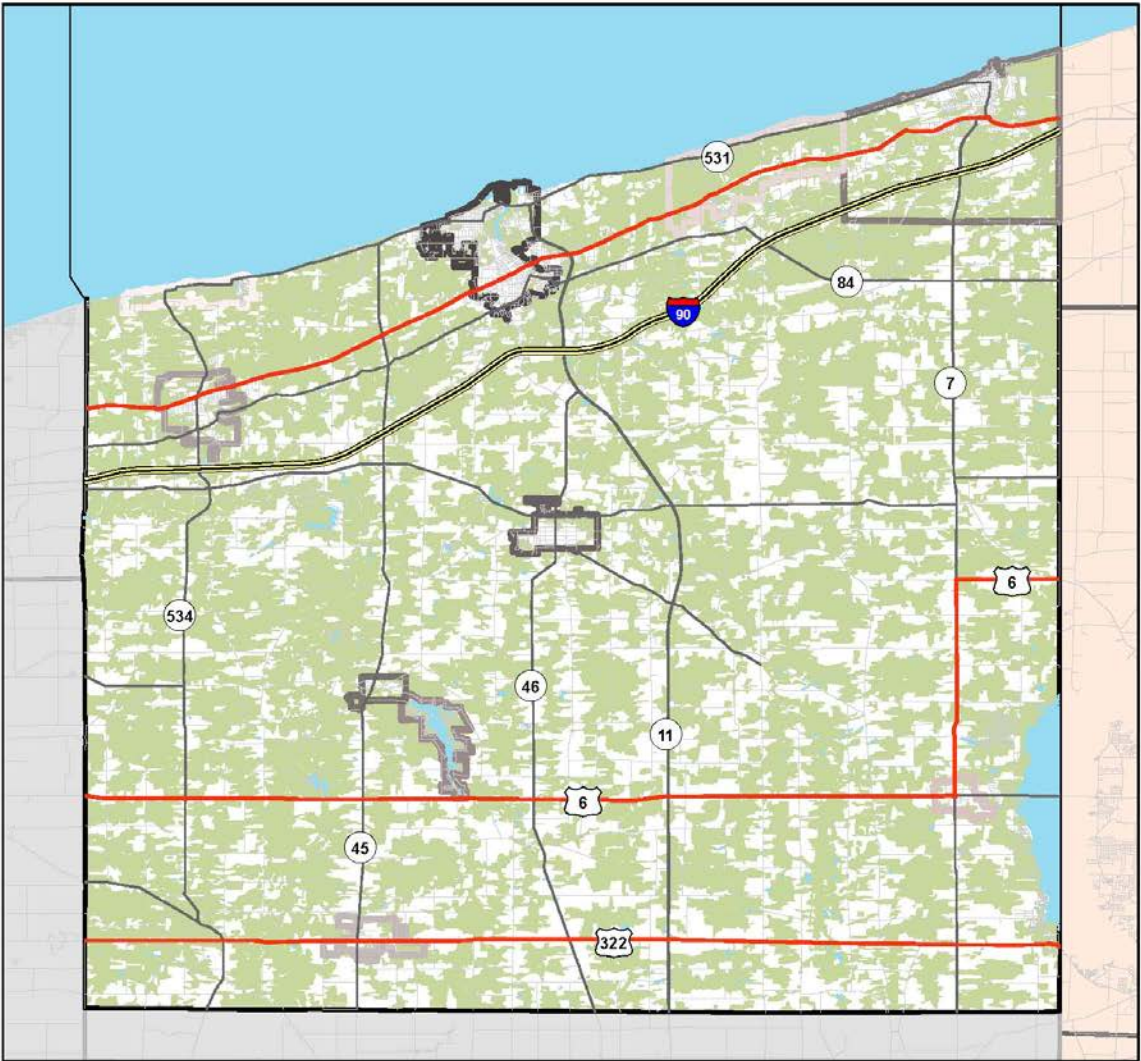
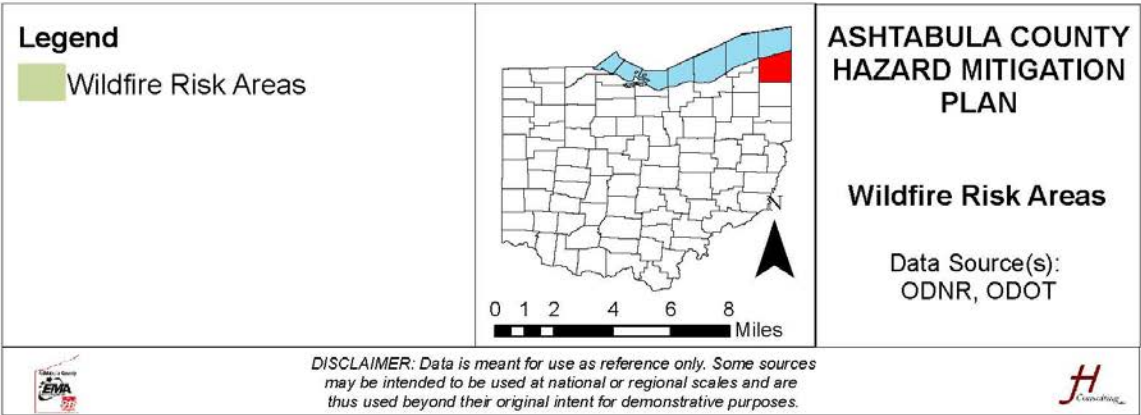
NFPA FIRE STATISTICS, 2013-2017					
<i>Type</i>	<i>Fires</i>	<i>Civilian Deaths</i>	<i>Civilian Injuries</i>	<i>Property Loss</i>	<i>Average Property Loss (per fire)</i>
Outside or Unclassified Fire	620,002	92	815	\$2,938,616,923	\$4,700
Structure Fire	591,495	2,833	13,087	\$9,649,957,600	\$19,600
Vehicle Fire	197,502	392	1,442	\$1,625,975,109	\$8,200
TOTALS	1,308,999	3,317	1,5344	\$14,214,549,632	\$10,900

Planners utilized a 2005 study by the U.S. Department agriculture that reported one-third of homes as being located either in an “interface wildland-urban interface” area or an “intermix WUI” to calculate estimates for SHARPP data entry (USDA, 2013, p. 12). Further, according to the NFPA (2017), the average per-incident loss attributed to wildfires captured in ten years of large-loss fire reports was \$195,729,342.

FIRES LOSS ESTIMATE – SHARPP DATA ENTRY		
<i>Structure Type</i>	<i>Number</i>	<i>Loss Estimate</i>
Residential	11,000	\$143,688,200
Non-Residential	3,300	\$43,481,200
Critical Facilities	660	\$8,560,000
TOTALS	14,960	\$195,729,342

Risk Assessment

This section summarizes the risk to Ashtabula County from fires. The following map image graphically depicts risk areas with potential wildland fire fuel in Ashtabula County.



The following table identifies the assets located in risk areas, particularly with respect to wildfires.

ASSETS IN WILDFIRE RISK AREAS			
<i>Name or Description</i>	<i>Address</i>	<i>City</i>	<i>Asset Type</i>
Ashtabula Traffic	110 West 44th Street	Ashtabula	Built Environment: Existing Structure
Walnut Beach	Lake Avenue & West 1st Street	Ashtabula	Built Environment: Cultural Resource
Ashtabula City Justice Center	110 West 44th Street	Ashtabula	Built Environment: Critical Facility
Harpersfield Covered Bridge	1122 Harpersfield Road	Harpersfield	Built Environment: Cultural Resource
Community Care Ambulance Network	115 East 24th Street	Ashtabula	Built Environment: Critical Facility
Ashtabula Harbor Commercial District	1200 5th Street	Ashtabula	Built Environment: Cultural Resource
Cascade Ohio Inc.	1209 Maple Avenue	Conneaut	Economy
Geneva HS	1301 South Ridge East	Geneva	People
Roaming Shores Association Clubhouse	15 Rome Rock Creek Boulevard	Roaming Shores	Built Environment: Existing Structure
Lake Pointe Rehabilitation & Nursing	22 Parrish Road	Conneaut	People
Gateway ES/Conneaut MS	229 Gateway Avenue	Conneaut	People
Huron/Michigan/Ontario Primary Schools	2300 Wade Avenue	Ashtabula	People
Roaming Rock Shores Lake Dam	2500 Hayford Road	Roaming Shores	Built Environment: Infrastructure
Roaming Shores PD & Village Hall	2500 Hayford Road	Roaming Shores	Built Environment: Critical Facility
Rock Creek Village PWS/WWTP	2600 Stiles Avenue	Rock Creek	Built Environment: Infrastructure
Ashtabula Township Bldg.	2718 North Ridge East	Ashtabula	Built Environment: Existing Structure
Ashtabula Township FD/EMS	2718 North Ridge Road East	Ashtabula	Built Environment: Critical Facility
Austinburg PO	2773 State Route 307	Austinburg	Built Environment: Existing Structure
Morgan Hose FD	3033 East Water Street	Rock Creek	Built Environment: Critical Facility
Conneaut Public Library	304 Buffalo Street	Conneaut	Built Environment: Existing Structure
Rock Creek PO	3046 East Water Street	Rock Creek	Built Environment: Existing Structure
Cork ES	314 State Route 534	Geneva	People
Sheffield Twp. Fire Dept./EMS	3636 Sheffield Monroe Road	Kingsville	Built Environment: Critical Facility
Conneaut HS	381 Mill Street	Conneaut	People
Ashtabula City FD/EMS	4326 Main Avenue	Ashtabula	Built Environment: Critical Facility


ASSETS IN WILDFIRE RISK AREAS			
<i>Name or Description</i>	<i>Address</i>	<i>City</i>	<i>Asset Type</i>
Honeywell Smart Energy	436 North Eagle Street	Geneva	Economy
Blakeslee Log Cabin	441 Seven Hills Road	Ashtabula	Built Environment: Cultural Resource
Geneva-on-the-Lake Village FD/EMS	4931 South Warner Drive	Geneva-on-the-Lake	Built Environment: Critical Facility
Geneva-on-the-Lake Sewage Treatment	4946 South Spencer	Geneva-on-the-Lake	Built Environment: Infrastructure
Geneva-on-the-Lake Village Hall and PD	4964 South Spencer	Geneva-on-the-Lake	Built Environment: Critical Facility
Lake Erie Correctional Facility	501 Thompson Road	Conneaut	Built Environment: High Potential Loss
Eagle Cliff Hotel	5254 Lake Road East	Geneva-on-the-Lake	Built Environment: Cultural Resource
Windsor Township FD/EMS	5388 State Route 322 West	Windsor	Built Environment: Critical Facility
Harpersfield Twp FD Stn #1	5430 State Route 534	Harpersfield	Built Environment: Critical Facility
Kingsville ES	5875 State Route 193	Kingsville	People
Geneva Shores Skilled Nursing & Rehabilitation	60 West Street	Geneva	People
Dominion East Ohio Natural Gas	7001 Center Road	Ashtabula	Economy
Geneva Platt R. Spencer ES	755 Austin Road	Geneva	People
North Kingsville FD/EMS Stn #2	7676 Poore Road	North Kingsville	Built Environment: Critical Facility
Wiswell Road Covered Bridge	7696 Warner Hollow Road	Windsor	Built Environment: Cultural Resource
Rae-Ann Geneva	839 West Main Street	Geneva	People
University Hospital Geneva Medical Ctr.	870 West Main Street	Geneva	Built Environment: Critical Facility
Country Club Center III	925 East 25th Street	Ashtabula	People
New Lyme Institute	929 Brownville Road	New Lyme	Built Environment: Cultural Resource
West Fifth Street Bridge	SR 531 over Ashtabula River	Ashtabula	Built Environment: Cultural Resource
Windsor Mills Christ Church Episcopal	Wisell Rd & US Route 322	Windsor Mills	Built Environment: Cultural Resource

The following table assigns point totals based on the research presented in this profile for each category that appears in Ohio EMA's SHARPP tool.

FIRES RISK SUMMARY			
Category	Points	Description	Notes
Frequency	5	Excessive	Data suggests as many as 524 fires could occur annually.
Response	2	1 day	The response to most fires in Ashtabula County takes one day or less.
Onset	4	Less than 6 hours	Fires occur with little to no warning.
Magnitude	1	Localized (Less than 10% of land area affected)	Acreage estimates (i.e., 13.6 acres burned per year) are far less than 10% of the county's land area.
Business	1	Less than 24 hours	Unless impacted by the fire, business interruptions should be less than 24 hours.
Human	2	Low (some injuries)	Fires can result in injuries, as evidenced by the NFPA data.
Property	1	Less than 10% of property affected	A fire would not likely impact more than 10% of the county's total property assets.
Total	16	Medium	

2.0 RISK ASSESSMENT

2.5.3 Hazardous Materials Incident

A chemical or biological material that may pose a threat to life, health, property, or the environment. For this profile, the hazardous materials incidents include only those that are not intentional.			
 HIGHEST HIGH MEDIUM LOW LOWEST	Vulnerability	Period of Occurrence:	At any time
		Hazard Index Ranking:	Medium
		Warning Time:	Less than 6 hours
		State Risk Ranking:	Not ranked
		Probability:	Likely
		Severity:	Limited
		Type of Hazard:	Technological
		Disaster Declarations:	None

Hazard Overview

A hazardous material is a substance or material which, because of its chemical, physical or biological nature, poses a threat to life, health, or property if released from a confined setting. A release may occur by spilling, leaking, emitting toxic vapors, or any other process that enables the material to escape its container, enter the environment, and create a potential hazard. Several common hazardous materials include those that are explosive, flammable or combustible, poisonous or radioactive. Related combustible hazardous materials include oxidizers and reactive materials, while toxins produced by etiological (biological) agents are types of poison that can cause disease.

A hazmat release while in transit is of great concern to the U. S. Department of Transportation. While fixed sites store and use hazardous materials, the materials are usually produced elsewhere and shipped to a fixed facility by rail car, truck, or onboard ships or barges. Signs or placards denoting the hazard identify the vehicles carrying hazardous materials. The possibility of release is present at any time. Hazardous materials constantly move through Ohio on interstate highways, the rail system and on shipping lanes in rivers and tributaries.

The hauling, storage, and use of hazardous materials play a vital role in the economy of our nation. Over four billion tons of hazardous materials are transported annually and 100,000 trucks haul hazardous materials on the country's highways each day. Almost half of all freight trains carry hazardous materials. The majority of the transportation infrastructure utilized to move hazardous materials through Ashtabula County is in the northern portion of the county,

which is also the most populated area of the county. An incident causing the accidental release of a hazardous material is spontaneous, with little time of warning. Further, the recovery and clean-up activities involved in a hazmat incident may require several hours, days, or even weeks to complete. Hazardous materials can release as a secondary result of a natural disaster like an earthquake or flood. In either case, buildings or vehicles can release their hazardous materials inventories when structurally compromised or involved in traffic accidents.

Location and Extent

Two major agencies collect data as they relate to hazardous materials incidents the Pipeline and Hazardous Materials Safety Administration (PHMSA) governed by the U.S. Department of Transportation (DOT), and the National Response Center (NRC), governed by the U.S. Coast Guard (USCG). The types of materials that can cause a hazmat release are wide-ranging and may include chlorine, sodium hydroxide, sulfuric acid, radioactive isotopes, anhydrous ammonia, gasoline, and other hydrocarbons, as well as medical/biological waste from hospitals or clinics. Hazardous materials subject to reporting under the Emergency Planning and Community Right-to-Know Act (EPCRA) or Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA) include these four groups:

- **Extremely Hazardous Substances (EHS):** These are materials with acutely toxic properties that may do irreversible damage or cause death to people or harm the environment when released or used outside their intended use. Examples include ammonia, chlorine, and sulfuric acid.
- **Hazardous Substances:** These are any materials posing a threat to human health and the environment or any substance designated by the Environmental Protection Agency (EPA) to be reported if a designated quantity of the substance is spilled into the waters of the United States or otherwise released into the environment.
- **Hazardous Chemicals:** If present at a chemical facility in certain amounts, these substances require a Material Safety Data Sheet (MSDS) under the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. Such substances are capable of producing fires and explosions or adverse health effects such as cancer, burns, or dermatitis.
- **Toxic Chemicals:** Chemicals or chemical categories that appear on the list because of their chronic or long-term toxicity.

Hazardous materials spills, leaks, or accidents can occur anywhere in Ashtabula County. More specifically, they are more likely to happen on transportation pathways such as roads and railways, and at facilities that routinely handle hazardous materials such as gas stations, chemical companies, and other Tier II reporting or Toxic Release Inventory (TRI) facilities. During the 2019 update, planning committee members reported an increase in rail shipping activities. The railways serving Ashtabula County run north-south through the central portions of the county and east-west in the northern areas. There are gas transmission pipelines in the north-central and northeast portions of Ashtabula County (NPMS, 2019). Due to Ashtabula County's proximity to Lake Erie, where there is commercial water transportation of commodities, the lake is also a location where hazardous materials incidents could occur. There are currently four brownfield sites (former industrial or commercial sites where future use is affected by real or perceived environmental contamination) in Ashtabula County, according to the Ohio Environmental Protection Agency's brownfield inventory database (n.d.). Two of the sites, the former New York Central Railroad on North Bend Road and "Plant C" on Lake Road East, are in Ashtabula. The other two are in Geneva: Advance Technology Corporation and Tackle Hill, LLC at 193 North Cedar and Benson Gas Station on East Main Street.

The extent of the damage from hazmat can be clean up on the road, or widespread, to include hazardous materials reaching source water via storm drains, and the rivers and streams.

Impacts and Vulnerability

Due to the wide variety of substances used, transported and stored in the area, it is difficult to assign an overall impact of these substances to public health, the environment, the economy, and the infrastructure. Some spills cause minor if any damage to the area. For example, spilling a few gallons of gasoline on concrete during transfer causes minimal economic impact; rarely does the spilled substance cause any environmental impacts. This is not to say that all spills are minor, some can be very harmful to human health and the environment and costs thousands, if not millions of dollars to clean up. Spills into waterways and those that reach the groundwater are of particular concern due to the threat they impose to drinking water and subsequently public health, the environment, and fauna in the area.

Additionally, transportation-based hazard incidents have the potential to result in cascading impacts. For example, a rail-based incident could isolate a community in Ashtabula County as well as several other communities in the region. Officials from such operators as CSX Transportation concur. In a recent interview, the company's hazmat manager out of Pittsburgh

noted that a significant problem associated with rail incidents, particularly those involving hazardous materials, is that a stopped train can block several roadway intersections, essentially cutting some areas off. These blocks not only hinder evacuation from those areas but also emergency services access to those areas.

Hazardous materials incidents can occur rapidly over a large area. The chemical, physical, and biological properties of hazardous materials pose a potential risk to life, health, the environment, and property when not properly contained.

Many factors determine the impact of a potential incident including quick and solid decision-making by emergency officials, location and type of release, evacuation and shelter-in-place needs, public health concerns, and relevant economic considerations. Additionally, while most incidents are generally brief, the resulting recovery and cleanup may take time to exact.

If evacuation is necessary due to a chemical emergency, road closures and traffic jams may result. If a large-scale evacuation is deemed necessary, it can pose serious long-term economic consequences to the involved population area. A delay in the resumption of industry commerce may cause economic losses for both business owners and employees. Also, an evacuation ordered on short-notice could cause serious problems for businesses requiring time to shut down specialized equipment. Public or private emergency response organizations agencies may be challenged by the expenses dictated by a hazardous material release and may need to wait an uncomfortable length of time for the responsible party to reimburse any outstanding costs, further straining the economic resources of the region.

A major incident involving significant injuries may severely tax regional medical services, as medical facilities aren't generally designed to handle mass amounts of victims on short notice. Consequently, in the event of a major incident, hospitals and other medical facilities must still be able to provide their customary level of service to all patients, regardless of whether they were incident victims or not.

Historical Occurrences

In total, there have been 59 incidents at fixed facilities, 11 highway or mobile incidents, 41 waterway incidents, 24 rail incidents (with a release), and one pipeline incident involving hazardous materials. The total approximate number of incidents¹ in Ashtabula County between 2009 and 2018 are 136 incidents. The source of information for these incidents is the National Response Center (NRC) (USGS, 2019). The following list outlines the findings.

¹ The figure is approximate because not all incidents are reported. Additionally, data comparisons between the NRC and the PHMSA may not yield consistent results due to reporting inconsistencies.

- **Fixed Facilities:** According to the National Response Center (NRC) (run by the U.S. Coast Guard), there have been 59 incidents reported at fixed facilities between 2009 and 2018. The majority of these incidents were due to equipment failure, intentional dumping, or were “unknown.” Additionally, there were nine reported storage tank incidents in Ashtabula County in the same period.
- **Transportation:** Ohio experienced 2,911 transportation-based hazardous material incidents in the ten years (2009-2018) (PHMSA, 2019).
 - **Highway:** According to PHMSA, there were 15 highway incidents in Ashtabula County between 2009 and 2018; these account for 0.6% of the total highway incidents in the state.

HIGHWAY INCIDENTS IN ASHTABULA COUNTY 2009-2018											
City	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	Total
Ashtabula	2		2	1			2	1	1		9
Austintown					1	1		1			3
Conneaut								1			1
Geneva										1	1
Kingsville		1									1
Total	2	1	2	1	1	1	2	3	1	1	15

Source: PHMSA, 2019

According to the NRC (USCG, 2019), there were 11 mobile incidents (indicating that they are related to transportation, including highway incidents) in Ashtabula County between 2009 and 2018. The main causes were due to equipment failure, operator error, or transportation accident.

- **Waterway:** According to the NRC, 41 incidents involving vessels occurred; the causes included vessel sinking, equipment failure, and “unknown.” NRC data also yielded 11 reports of an “unknown sheen” on waterways.
- **Rail:** According to PHMSA, there were five rail incidents in Ashtabula County between 2009 and 2018; these account for 8.6% of the total rail incidents in the state. All five incidents occurred in Ashtabula City.

Data differ significantly between PHMSA and the NRC; the NRC reports 24 rail incidents between 2009 and 2018. The causes of the incidents were primarily equipment failure, though the NRC reported four derailments. The NRC reported

an additional 17 rail-related incidents that did not result in a release of hazardous material.

- **Pipeline:** According to the NRC, one incident involving pipelines occurred in 2014. A caller reported a natural gas odor and believed a gas line ruptured due to generator vibrations. The incident did not result in an evacuation.

Loss and Damages

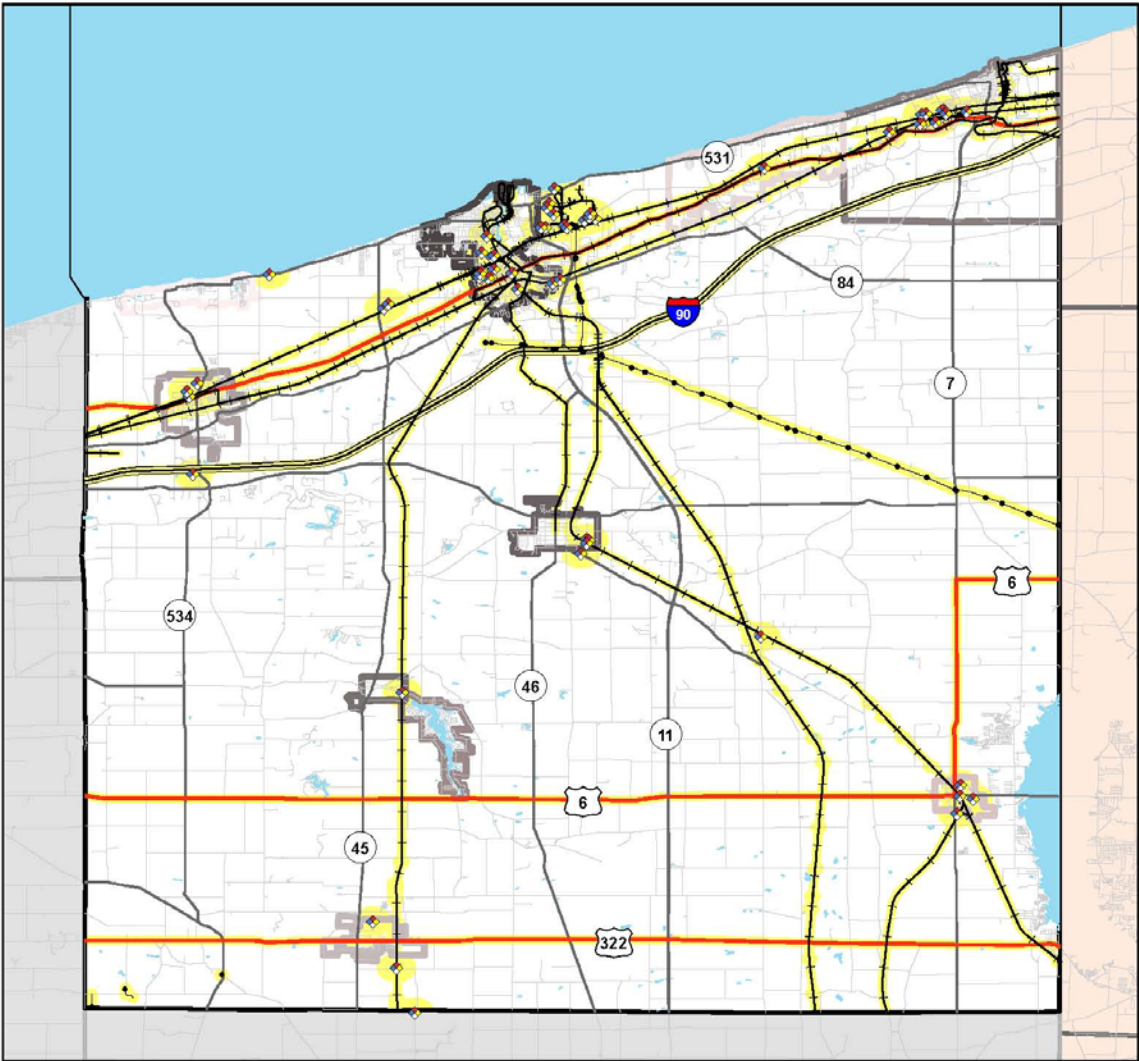
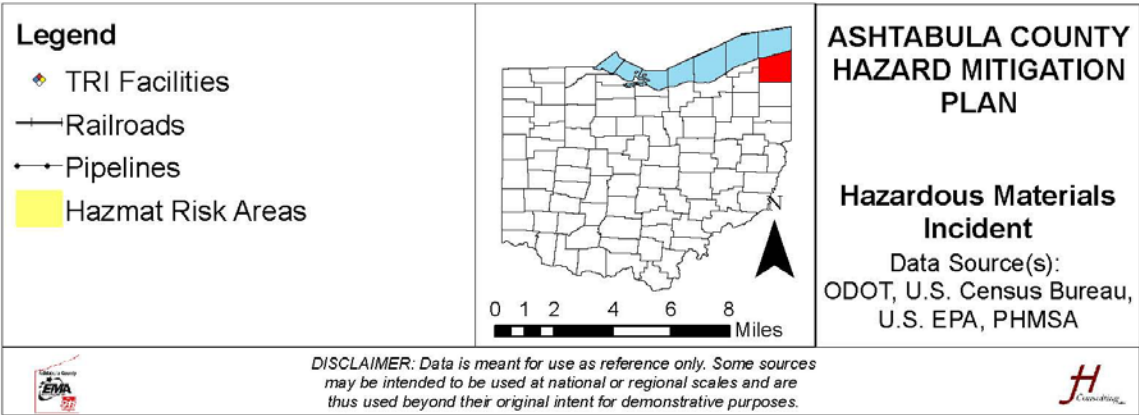
The NRC does not provide losses or damages; PHMSA provides loss data for some incidents. The Ashtabula County data did not include losses. The total reported damages in Ohio between 2009 and 2018 was \$15,351,900 (PHMSA, 2019). That is roughly \$1.5 million per year for all hazardous materials incidents reported by PHMSA. Ashtabula County accounted for 0.69% of the Ohio incidents reported to PHMSA between 2009 and 2018. Further calculations produce an average annual hazardous material loss in Ashtabula County of \$10,500.

The average estimated loss comprises 0.0001% of the total building stock exposure in Ashtabula County. Planners thus applied that percentage to the categorized number of structures and exposure to derive SHARPP loss figures.

HAZMAT LOSS ESTIMATE – SHARPP DATA ENTRY		
<i>Structure Type</i>	<i>Number</i>	<i>Loss Estimate</i>
Residential	1	\$7,700
Non-Residential	1	\$2,300
Critical Facilities	1	\$500
TOTALS	3	\$10,500

Risk Assessment

This section summarizes the risk to Ashtabula County from hazardous materials incidents. The following map image graphically depicts buffers around the TRI facilities (1/2 mile) and along highways and railways (800 feet), mainly along highways and railways in transportation and around TRI facilities.



The following table identifies the assets located in buffered risk areas.

ASSETS IN HAZMAT RISK AREAS			
<i>Name or Description</i>	<i>Address</i>	<i>City</i>	<i>Asset Type</i>
Ashtabula Traffic	Â 110 West 44th Street	Ashtabula	Built Environment: Existing Structure
Grand Valley Public Library	1 North School Street	Orwell	Built Environment: Existing Structure
Jefferson Rescue District	11 South Market Street	Jefferson	Built Environment: Critical Facility
A. Schulman, Inc.	110 North Eagle Street	Geneva	Economy
Ashtabula City Justice Center	110 West 44th Street	Ashtabula	Built Environment: Critical Facility
Community Care Ambulance Network	115 East 24th Street	Ashtabula	Built Environment: Critical Facility
Ashtabula Harbor Commercial District	1200 5th Street	Ashtabula	Built Environment: Cultural Resource
Cascade Ohio Inc.	1209 Maple Avenue	Conneaut	Economy
Andover Village Hall & PD	134 Maple Street	Andover	Built Environment: Critical Facility
Cherry Valley Town Hall	134 Maple Street	Andover	Built Environment: Existing Structure
General Aluminum Mfg.	1370 Chamberlain Road	Conneaut	Economy
Andover Public Library	142 West Main Street	Andover	Built Environment: Existing Structure
Lake Shore & Mich. Southern RR Station	147 East Jefferson Street	Jefferson	Built Environment: Cultural Resource
Masco/KraftMaid Cabinetry	150 Grand Valley Avenue	Orwell	Economy
Mother of Sorrows Church	1500 West 6th Street	Ashtabula	Built Environment: Cultural Resource
Pymatuning Area Ambulance Service	153 Station Street	Andover	Built Environment: Critical Facility
University Hospital Conneaut Medical Ctr.	158 West Main Road	Conneaut	Built Environment: Critical Facility
Village of Orwell	176 West Main Street	Orwell	Built Environment: Existing Structure
Kennametal Inc.	180 Penniman Road	Orwell	Economy
SPIRE Institute	1822 South Broadway	Geneva	Built Environment: Cultural Resource
Arthur Lewis Steel	185 Water Street	Geneva	Economy
Rome Rock Association HQ	1875 US Route 6	Roaming Shores	Built Environment: Existing Structure
Sts John & Paul ES	2150 Columbus Avenue	Ashtabula	People
Camplands Water Company LLC	217 W Main Street	Andover	Built Environment: Infrastructure
Lake Pointe Rehabilitation & Nursing	22 Parrish Road	Conneaut	People
Carrington Park	2217 West Avenue	Ashtabula	People
Jefferson Geriatric & Rehabilitation Center	222 East Beech Street	Jefferson	People

ASSETS IN HAZMAT RISK AREAS			
<i>Name or Description</i>	<i>Address</i>	<i>City</i>	<i>Asset Type</i>
Cleveland Hotel	230 State Street	Conneaut	Built Environment: Cultural Resource
Huron/Michigan/Ontario Primary Schools	2300 Wade Avenue	Ashtabula	People
Dorset Township FD	2405 State Route 193	Dorset	Built Environment: Critical Facility
Ashtabula County Medical Center	2420 Lake Avenue	Ashtabula	Built Environment: Critical Facility
Harwood Block	246, 250, 256 Main Street	Conneaut	Built Environment: Cultural Resource
Dorset PO	2477 State Route 193	Dorset	Built Environment: Existing Structure
Ashtabula County Sheriff's Dept.	25 West Jefferson Street	Jefferson	Built Environment: Critical Facility
Roaming Rock Shores Lake Dam	2500 Hayford Road	Roaming Shores	Built Environment: Infrastructure
Roaming Shores PD & Village Hall	2500 Hayford Road	Roaming Shores	Built Environment: Critical Facility
Andover PO	255 East Main Street	Andover	Built Environment: Existing Structure
Geneva Township Hall	256 North Cedar Street	Geneva	Built Environment: Existing Structure
Andover FD	257 West Main Street	Andover	Built Environment: Critical Facility
Roaming Shores WWTP	2595 Rome Rock Creek Road	Roaming Shores	Built Environment: Infrastructure
Conneaut PO	268 State Street	Conneaut	Built Environment: Existing Structure
Jefferson Town Hall	27 East Jefferson Street	Jefferson	Built Environment: Existing Structure
North Kingsville PO	2716 East Center Street	North Kingsville	Built Environment: Existing Structure
Ashtabula Township Bldg.	2718 North Ridge East	Ashtabula	Built Environment: Existing Structure
Ashtabula Township FD/EMS	2718 North Ridge Road East	Ashtabula	Built Environment: Critical Facility
Austinburg PO	2773 State Route 307	Austinburg	Built Environment: Existing Structure
Austinburg Town Hall	2794 State Route 307	Austinburg	Built Environment: Existing Structure
Austinburg Township FD	2800 State Route 307	Austinburg	Built Environment: Critical Facility
Molded Fiber Glass Companies	2925 MFG Place	Ashtabula	Economy
Conneaut City Hall, FD/EMS and PD	294 Main Street	Conneaut	Built Environment: Critical Facility
David Cummins Octagon House	301 Liberty Street	Conneaut	Built Environment: Cultural Resource
Conneaut Public Library	304 Buffalo Street	Conneaut	Built Environment: Existing Structure
South Central Ambulance District	3100 US Route 6	Rome	Built Environment: Critical Facility

ASSETS IN HAZMAT RISK AREAS			
<i>Name or Description</i>	<i>Address</i>	<i>City</i>	<i>Asset Type</i>
Cork ES	314 State Route 534	Geneva	People
Rome Township FD	3162 US Route 6 East	Rome	Built Environment: Critical Facility
Ashtabula County District Library	335 West 44th Street	Ashtabula	Built Environment: Existing Structure
Premix Inc.	3365 East Center Street	Conneaut	Economy
Lake Shore & Mich. Southern RR Depot	342 Depot Street	Conneaut	Built Environment: Cultural Resource
Wallace Braden JHS	3436 Edgewood Drive	Ashtabula	People
Ridgeview ES	3456 Liberty Street	Ashtabula	People
North Kingsville PD	3541 East Center Street	North Kingsville	Built Environment: Existing Structure
Jefferson PO	37 West Jefferson Street	Jefferson	Built Environment: Existing Structure
Wayne Township FD	3787 State Route 322	Williamsfield	Built Environment: Critical Facility
Conneaut HS	381 Mill Street	Conneaut	People
Lakeside Intermediate School	401 West 44th Street	Ashtabula	People
Andover Township Hall	410 East Main Street	Andover	Built Environment: Existing Structure
Ashtabula PO	4307 Station Avenue	Ashtabula	Built Environment: Existing Structure
Ashtabula City FD/EMS	4326 Main Avenue	Ashtabula	Built Environment: Critical Facility
Honeywell Smart Energy	436 North Eagle Street	Geneva	Economy
Geneva City Hall, FD and PD	44 North Forest Street	Geneva	Built Environment: Critical Facility
Blakeslee Log Cabin	441 Seven Hills Road	Ashtabula	Built Environment: Cultural Resource
Ashtabula County Senior Center	4632 Main Avenue	Ashtabula	People
Orwell PO	47 South Maple Street	Orwell	Built Environment: Existing Structure
Ashtabula City Hall	4717 Main Avenue	Ashtabula	Built Environment: Existing Structure
Hotel Ashtabula	4726 Main Avenue	Ashtabula	Built Environment: Cultural Resource
Villa at the Lake, A Randall Residence	48 Parrish Road	Conneaut	Built Environment: Cultural Resource
Andover Retirement Village Community	486 South Main Street	Andover	People
Lake Erie Correctional Facility	501 Thompson Road	Conneaut	Built Environment: High Potential Loss
Ashtabula Public Works	501 West 24th Street	Ashtabula	Built Environment: Infrastructure
Hartsgrove Township FD	5321 State Route 534	Rome	Built Environment: Critical Facility
Windsor Township FD/EMS	5388 State Route 322 West	Windsor	Built Environment: Critical Facility
Sts John & Paul JHS/HS	541 West 34th Street	Ashtabula	People

ASSETS IN HAZMAT RISK AREAS			
<i>Name or Description</i>	<i>Address</i>	<i>City</i>	<i>Asset Type</i>
Pymatuning PS/MS/HS	5571 Rt. 6 West	Andover	People
Saybrook Fire Dept./EMS	5714 North Ridge Road West	Ashtabula	Built Environment: Critical Facility
Williamsfield PO	5911 US Route 322	Williamsfield	Built Environment: Existing Structure
Geneva Shores Skilled Nursing & Rehabilitation	60 West Street	Geneva	People
Geneva Senior Center	62 West Main Street	Geneva	People
North Kingsville FD/EMS Stn #1	6571 Church Street	North Kingsville	Built Environment: Critical Facility
Lakeside HS/JHS	6600 Sanborn Road	Ashtabula	People
Ashtabula PO	718 Lake Avenue	Ashtabula	Built Environment: Existing Structure
Saybrook Township Administrative Office	7247 Center Road	Ashtabula	Built Environment: Existing Structure
Orwell Village FD and PD	78 East Main Street	Orwell	Built Environment: Critical Facility
Saybrook ES	7911 Depot Road	Ashtabula	People
Rae-Ann Geneva	839 West Main Street	Geneva	People
Jefferson Village PD	86 East Jefferson Street	Jefferson	Built Environment: Critical Facility
Eagle Pointe Skilled Nursing & Rehabilitation	87 Staley Road	Orwell	People
University Hospital Geneva Medical Ctr.	870 West Main Street	Geneva	Built Environment: Critical Facility
Country Club Center III	925 East 25th Street	Ashtabula	People
Jefferson Village FD	98 East Jefferson Street	Jefferson	Built Environment: Critical Facility
West Fifth Street Bridge	SR 531 over Ashtabula River	Ashtabula	Built Environment: Cultural Resource
Windsor Mills Fort & Village Site	US Route 322	Windsor Mills	Built Environment: Cultural Resource
Windsor Corners District	US Route 322 & State Route 534	Windsor	Built Environment: Cultural Resource
Conneaut Harbor West Breakwater Light	West Breakwater in Harbor	Conneaut	Built Environment: Cultural Resource
Windsor Mills Christ Church Episcopal	Wisell Rd & US Route 322	Windsor Mills	Built Environment: Cultural Resource

The following table assigns point totals based on the research presented in this profile for each category that appears in Ohio EMA's SHARPP tool.

HAZARDOUS MATERIALS INCIDENT RISK SUMMARY			
Category	Points	Description	Notes
Frequency	5	Excessive	136 incidents occurred over ten years, which averages 1.4 incidents per year. Per SHARPP categories, this is "excessive."
Response	2	1 day	A full day serves as a conservative estimated duration of hazmat response.
Onset	4	Less than 6 hours	Hazmat incidents typically occur with no warning.
Magnitude	1	Localized (Less than 10% of land area affected)	Hazmat incidents are site-specific, and thus highly localized.
Business	1	Less than 24 hours	Hazmat incidents in Ashtabula County rarely disrupt an area for longer than 24 hours.
Human	2	Low (some injuries)	There is a potential for a minor injury.
Property	1	Less than 10% of property affected	Again, as a site-specific hazard, hazmat impacts are highly localized.
Total	16	Medium	


2.0 RISK ASSESSMENT

2.6 Intentional Human-Caused Hazards

Intentional human-caused hazards can be technological, but do not occur by accident. Rather, they are intentional acts to cause harm to people, property, or the environment. This subsection profiles “Terrorism and Civil Disturbance.”

2.0 RISK ASSESSMENT

2.6.1 Terrorism and Civil Disturbance

Terrorism is 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. Civil disturbances include active assailants, bomb threats, and riots.			
 HIGHEST HIGH MEDIUM LOW LOWEST	Vulnerability	Period of Occurrence: At any time	Hazard Index Ranking: Medium
	Warning Time: Varies: Less than 6 hours for attack-style incidents, while protests may be scheduled in advance	State Risk Ranking: Not ranked	
	Probability: Unlikely	Severity: Limited	
	Type of Hazard: Intentional human-caused	Disaster Declarations: None	

Hazard Overview

Anecdotally, the nation has seen an upswing in violent acts, and it is beneficial to profile types of violence and the potential impacts they could have in Ashtabula County. Civil disturbances, for this plan, encompass those acts that law enforcement does not consider routine, including the following topics.

- **Active Assailant:** “An active assailant is an armed person(s) who uses any type of weapon to inflict serious harm and/or deadly physical force on others in public and continues to do so while having access to additional victims. Examples of active assailant attacks include an active shooter incident, mass stabbings, explosives, vehicle-as-a-weapon, fire-as-a-weapon, and so forth. (These are also known as active shooter events, hostile incidents, mass violence attacks, rampage violence, spree killings, and so forth.)” (North Carolina Active Assailant and Active Shooter Work Group, 2017).
- **Bomb Threat:** An actual or rumored threat of a bomb. Perpetrators often call-in bomb threats to an office or person to disrupt normal business and activities, and these threats do not usually involve a bomb. Nonetheless, every bomb threat must be considered real until authorities investigate and determine it is safe (Ohio State University, n.d.)
- **Riots:** Group protests that become or have the potential to become violent. A riot is a violent offense against public order involving three or more people; it involves a gathering of persons for an illegal purpose. It is the most elementary form of collective

violence, and it is also referred to as “social unrest.” Riots can include such events as gang violence, coups, rebellions, and revolutions (Encyclopedia Britannica, 2018).

Violence is usually caused by the “crowd psychology,” when in a crowd an individual is more likely to act like others, which means a few looking to engage violent behavior can sway a large group to act violently (Sarkis, 2011). Not all protests end in violence; the majority of protesting is peaceful. The following table lists recent protests that occurred peacefully in Ashtabula County.

PROTESTS IN ASHTABULA COUNTY (2006-2019)	
<i>Date</i>	<i>Description</i>
N/A (Yearly)	Animal rights activists concerned with the treatment of a circus elephant protest a local Medieval Faire
September 2006	Conneaut man protested Ashtabula Police Department
March 2011	Hundreds of union workers rallied in Jefferson as one of 17 rallies held throughout the state; the rallies occurred in support of unions
October 2011	“Protest” to further departmental cuts by one employee (part of nationwide “occupy” protests)
October 2016	Protests at a 2016 presidential campaign rally
November 2016	School officials protest additional graduation tests for high school students

Additionally, violence could come in the form of a domestic or international terrorist incident. Terrorism is a form of violence aimed at a public audience. The Federal Bureau of Investigation (FBI) defines it as “the unlawful use of force or violence against persons or property to intimidate or coerce a government, civilian population, or any segment thereof in furtherance of political or social objections.” More importantly, it is necessary to understand that the objective of terrorism is not destruction or death; it is the psychological impact on the targeted population and world opinion. Disruption to public services, economies, and social patterns, or a feeling of insecurity is the desired goal.

There is no single cause of acts of violence or terrorism; there are typically non-rational, complicated, intertwined, series of reasons that results in violence. In his article, *Causes of Terrorism* (2011), Nick Grothaus lays out the most common causes cited by leaders in the field of counterterrorism. These categories may also apply to other types of violence.

- **Ethno-Nationalism:** The desire of a population to break away from a government or ruling power and create a state of their own.
- **Alienation/Discrimination:** Individuals or groups face discrimination leading to further feelings of isolation. These people may become jaded towards society and feel excluded.

- **Religion:** Religion as a part of terrorism has been mainly attributed to Islamic fundamentalism, although other religions have also had involvement in terrorist activities. For example, Christian Fundamentalists target abortion clinics, the Aryan Nation, and the Church of Christ; Christians target the Jews and minorities (Post, 2007, pp. 211-212).
- **Socio-Economic Status:** Individuals and groups may have a sense of relative deprivation and lack of upward mobility within society.
- **Political Grievances:** A lack of political inclusiveness or grievances against a certain political order may cause individuals to join or create terrorist groups.

Location and Extent

Any location or community asset can be the target of violence. Historically, there have been violent acts at malls, schools, universities, workplaces, government buildings, and places of worship. The location itself or the people inside could be the intended target. Bomb threat targets are similar. Typically, the incident is limited to a specific location or building. Riots are not typically location-targeted events and generally occur in the streets of a city or village; they can be localized to just one city block, or spread in pockets nation-wide.

Due to the high unpredictability of violent acts, any location could be a target. The extent of damages or impact from an attack is also unpredictable. However, there may be areas or types of locations that may be more prone to attacks. For example, based on the information for Ohio, five incidents of active shooters have been in educational facilities, four at commerce locations or places of business, and one at a residence.

Impacts and Vulnerability

Survivors of violence will most likely experience common stress reactions lasting several days to a few weeks. These reactions can include the following:

- **Emotional Reactions:** Shock, fear, grief, anger, guilt, shame, helplessness, numbness, sadness.
- **Cognitive Reactions:** Confusion, indecisiveness, worry, shortened attention span, trouble concentrating.
- **Physical Reactions:** Tension, fatigue, edginess, insomnia, body aches, easily startled, tachycardia, nausea, loss of appetite.
- **Interpersonal Reactions:** distrust, conflict, withdrawal, irritability, loss of intimacy,

feeling abandoned.

Some individuals may experience severe stress symptoms following a violent incident. Individuals experiencing the following are at a higher risk for posttraumatic stress disorder:

- **Intrusive Re-Experiencing:** Terrifying memories, nightmares, and flashbacks.
- **Extreme Emotional Numbing:** Inability to feel emotions, feeling empty.
- **Extreme Attempts to Avoid Disturbing Memories:** Such as through substance abuse.
- **Hyperarousal:** Panic attacks, rage, extreme irritability, intense agitation, acting out with violence.
- **Severe Anxiety:** Debilitating worry, extreme helplessness, compulsions, or obsessions.
- **Severe Depression:** Loss of ability to feel hope, pleasure, or interest; feeling worthless, suicidal ideations or intent.
- **Dissociation:** Fragmented thoughts, spaced out, unaware of surroundings, amnesia (National Center for PTSD, 2018).

Treatment and support are critical to recovery. For most, the memories will not go away, but survivors can learn to manage responses to their memories. Several methods can help survivors cope, including psychotherapy, medication, support groups, and self-care.

Deciding which groups are vulnerable is challenging. There will always be variation between groups and the people within them about the risks they face. However, the elderly, children, homeless persons, people with disabilities, religious groups and members of the LGBT community experience higher rates of exposure to violence (Phillips, Thomas, Fothergill, & Blinn-Pike, 2010). Between 2003 and 2013, the elderly reported 56% of all violent crimes (USDOJ, 2014). A 2009 study showed that almost 40% of all American children were victims of two or more violent acts (USDOJ, 2009). In 2010, there were 113 violent acts against the homeless reported; twenty-four of the attacks were fatal (National Coalition for the Homeless, 2012). An analysis of the 2011 FBI hate-crime statistics show, “LGBT people are more than twice as likely to be the target of a violent hate crime as Jews or black people” (Potok, 2011).

Historical Occurrences

In Ohio, there have been 10 active shooter incidents from 2000 to 2017, as outlined in an FBI report; one of these incidents occurred in Ashtabula County.

ACTIVE SHOOTER INCIDENTS IN OHIO 2000-2017						
City/Town	Date	Event	Type	Killed	Wounded	Description
Cleveland	5/9/2003	Case Western Reserve University, Weatherhead School of Management	Education	1	2	On May 9, 2003, at 3:55 p.m., a male, 62, armed with a rifle and a handgun, began shooting in the Weatherhead School of Management building at Case Western Reserve University in Cleveland, Ohio. One person was killed; two were wounded. The shooter was wounded during an exchange of gunfire with police.
Andover	8/19/2003	Andover Industries	Commerce	1	2	On August 19, 2003, at 8:20 a.m., a male, 32, armed with four handguns, began shooting in the Andover Industries facility in Andover, Ohio, after his boss threatened to fire him. One person was killed; two were wounded. The shooter committed suicide before police arrived.
West Chester	11/6/2003	Watkins Motor Lines	Commerce	2	3	On November 6, 2003, at 9:57 a.m., a male, 50, armed with two handguns, began shooting in the offices of Watkins Motor Lines in West Chester, Ohio. He had been employed by the Atlanta, Georgia, office of Watkins Motor Lines until he resigned in 2001. Two people were killed; three were wounded. The shooter was apprehended by police in Indiana later that day.
Toledo	1/26/2005	DaimlerChrysler's Toledo North Assembly Plant	Commerce	1	2	On January 26, 2005, at 8:34 p.m., a male, 54, armed with a shotgun, returned from his lunch break and began shooting in DaimlerChrysler's Toledo North Assembly plant in Toledo, Ohio. He took a woman hostage before beginning to shoot at his co-workers. One person was killed; two were wounded. The shooter committed suicide before police arrived.
Perrysburg	8/8/2007	Liberty Transportation	Commerce	2	0	On August 8, 2007, at 3:15 p.m., a male, 43, armed with at least two handguns and two rifles, began shooting at his co-workers in the Liberty Transportation facility in Perrysburg, Ohio. He had just been fired. Two people were killed; no one was wounded. The shooter fled the scene and was apprehended by police two hours later.
Cleveland	10/10/2007	SuccessTech Academy	Education	0	4	On October 10, 2007, at 1:02 p.m., a male, 14, armed with two handguns, began shooting in SuccessTech Academy in Cleveland, Ohio. No one was killed; four were wounded. The shooter committed suicide before police arrived.
Columbus	3/9/2010	The Ohio State University, Maintenance Building	Education	1	1	On March 9, 2010, at 3:30 a.m., a male, armed with two handguns, began shooting in the maintenance building at The Ohio State University in Columbus, Ohio. He had just been fired for allegedly lying on his job application. One person was killed; one was wounded. The shooter committed suicide before police arrived.
Copley Township	8/7/2011	Copley Township Neighborhood, Ohio	Residence	7	1	On August 7, 2011, at 10:55 a.m., a male, 51, armed with two handguns, began shooting in a neighborhood in Copley Township, Ohio, where many of his girlfriend's family members were present. Seven people were killed; his girlfriend was wounded. The shooter was killed by police.

ACTIVE SHOOTER INCIDENTS IN OHIO 2000-2017						
City/Town	Date	Event	Type	Killed	Wounded	Description
Chardon	2/27/2012	Chardon High School	Education	3	3	On February 27, 2012, at 7:30 a.m., a male, 17, armed with a handgun, began shooting in the cafeteria at Chardon High School in Chardon, Ohio. The shooter was chased out of the building by a school coach. Three people were killed; three were wounded. The shooter was apprehended by police near the school.
Middletown	2/29/2016	Madison Junior/Senior High School	Education	0	4	On February 29, 2016, at 11:30 a.m., a male, 14, armed with a handgun, allegedly began shooting in the cafeteria of Madison Junior/Senior High School in Middletown, Ohio. He shot two students before fleeing the building. No one was killed; four students were wounded (two from shrapnel). The shooter was apprehended near the school by law enforcement officers.

Source: FBI

There have been no acts of terrorism, domestic or international, within the borders of Ashtabula County. Other historical occurrences of civil disturbances include the following.

May 2019 School Lockdowns

Source: The Star Beacon

The local newspaper reported several schools had been locked down out of caution after reports of shots fired on Westshore Drive in Ashtabula (Terry, 2019). Kent State Ashtabula, the Ashtabula Lakeside Elementary campus, ACESC, and the ABC Preschool locked down. The lockdown lasted for approximately 90 minutes, and there were no reported injuries.

June 2019 Carjackings

Source: The Star Beacon

The local newspaper reported at least three attempted carjackings after an accident on Interstate 90 (Wysochanski, 2019). Ashtabula County Sheriff's deputies assisted the Ohio State Highway Patrol after dispatchers received calls regarding a transgender man with a gun who was "stealing things and trying to carjack people." Police apprehended the individual and charged him with operating a vehicle while under the influence of alcohol or drugs, aggravated disorderly conduct, and robbery.

Loss and Damages

Estimating the economic impact of violence is difficult. Initial impacts can be the immediate costs for a response to the event and business closures in the vicinity. The full

economic impact could include long-term costs, emotional costs, etc. A large-scale event could significantly affect industry and government as well as privately-owned infrastructure. A terrorist incident involving wastewater, drinking water, or chemical facilities could have long-term environmental effects. The potential losses due to these variables make it difficult to quantify the cost of repair or replacement of infrastructure.

As opposed to other types of hazards, terrorist incidents aim to cause mainly injury and death. At times, structures and infrastructure can also suffer damage beyond repair. According to FEMA's benefit-cost analysis tool, the value of human life is \$6.9 million. Calculating per the deaths from active shooters in Ohio (21), the losses would be \$144.9 million. Two deaths have resulted from active shooter incidents in Ashtabula County (including the shooter), for a total of \$13.8 million locally per this methodology.

Risk Assessment

This section summarizes the risk to Ashtabula County from terrorism and civil disturbance. The following table assigns point totals based on the research presented in this profile for each category that appears in Ohio EMA's SHARPP tool.

TERRORISM AND CIVIL DISTURBANCE RISK SUMMARY			
Category	Points	Description	Notes
Frequency	2	Low	Research yields three instances over 16 years, for an average of 0.19 incidents per annum.
Response	5	More than one month	The immediate response may be over rapidly, as in the case of an active shooter incident; however, recovery and other emotional issues often linger.
Onset	5	N/A	Some incidents, such as protests, that could ultimately lead to a civil disturbance are scheduled in advance; however, active assailant and other instances may occur without warning.
Magnitude	1	Localized (Less than 10% of land area affected)	Terrorist incidents and civil disturbances are site-specific and highly localized.
Business	2	1 week	Businesses in the vicinity of an incident may see decreased traffic for a period following the event.
Human	3	Medium (multiple severe injuries)	Typically, terrorist incidents and civil disturbances target (or are a result of) the human population. They can result in multiple severe injuries.
Property	1	Less than 10% of property affected	Terrorist incidents and civil disturbances are site-specific and highly localized.
Total	19	Medium	

2.0 RISK ASSESSMENT

2.7 Hazard Rankings

One of the components of the risk assessment is to determine the risk of and vulnerability to hazards, determined by the probability of occurrence and the potential severity of hazard events. This process helps identify which hazards pose the most significant concerns to Ashtabula County and its municipalities. The probability of an event derives from the number of historical events within a certain timeframe. Timeframes vary based on information available from different sources (and they can vary widely).

The Ohio State Hazard Analysis Resource and Planning Portal (SHARPP) supports an overall ranking for the hazards considered in the state's mitigation plans. Like the SHARPP tool, this plan recognizes the value of implementing several categories to determine the overall risk and vulnerability. The following narrative and tables describe the categories utilized by this plan and how they relate to the available data.

Historical occurrences inform all calculations, not worst-case scenarios. In cases with zero occurrences, determinations derive from other available data (which varies across the hazards and is outlined in each profile).

"Frequency" refers to the number of times a hazard occurs in a specific period (based on available historical data). In most instances, the total occurrences (e.g., three

occurrences), are divided by the length of time (in years) that data is available (e.g., ten years). Thus three occurrences divided by ten years equals 0.3. The table above translates the resultant numeric values into a narrative description of frequency (that corresponds to SHARPP categories). In the example described here, the hazard would have a 'low' frequency. At times, no historical data is available; in these cases, the hazard receives the lowest possible points for

FREQUENCY			
<i>Value</i>	<i>Score</i>	<i>Description</i>	<i>Definition</i>
.76 - >1.0	5	Excessive	Will occur during a year (SHARPP: hazard or event resulted in nine or more declarations)
.51 - .75	4	High	Likely to occur in a year (SHARPP: hazard or event resulted in six to eight declarations)
.26 - .50	3	Medium	May or may not occur in a year (SHARPP: hazard or event resulted in three to five declarations)
0 - .25	2	Low	Unlikely to occur in a year (SHARPP: hazard or event resulted in one to two declarations)
0	1	None	So unlikely that it can be assumed it will not occur in a year (SHARPP: hazards or events result in no local disaster declarations)

the category (i.e., one). The table below presents the remainder of the categories (including “frequency”).

SHARPP CATEGORIES							
	<i>Frequency</i>	<i>Response</i>	<i>Onset</i>	<i>Magnitude</i>	<i>Business</i>	<i>Human</i>	<i>Property</i>
1	None	Less than half a day	Over 24 hours	Localized (Less than 10% of land area affected)	Less than 24 hours	Minimum (minor injuries)	Less than 10% of property affected
2	Low	1 day	12-24 hours	Limited (10-25% of land area affected)	1 week	Low (some injuries)	10-25% of property affected
3	Medium	1 week	6-12 hours	Critical (25-50% of land area affected)	At least 2 weeks	Medium (multiple severe injuries)	25-50% of property affected
4	High	1 month	Less than 6 hours	Catastrophic (More than 50% of land area affected)	More than 30 days	High (multiple deaths)	More than 50% of property affected
5	Excessive	More than one month	N/A	N/A	N/A	N/A	N/A

Each hazard receives a score for each category that corresponds to the number in the far left column. Hazards receive scores of between 7 (i.e., all seven categories receive a value of one) and 30 points (i.e., all seven categories receive a value of four or five). The list below represents an overall range by which planners ranked all of the hazards in this plan.

<u><i>Range of Points (Score)</i></u>	<u><i>Hazard Ranking</i></u>
7 - 10	Lowest
11 - 15	Low
16 - 20	Medium
21 - 25	High
26 - 30	Highest

The following table summarizes risk and vulnerability rankings for all of the hazards included in the plan. It outlines the points each hazard received per the above methodology.

SUMMARY OF HAZARD RANKINGS									
Hazard	Risk	Frequency	Response	Onset	Magnitude	Business	Human	Property	Total
Natural Hazards									
Coastal Erosion	Low	5	5	1	1	1	1	1	15
Drought	Low	3	1	1	3	1	1	1	11
Earthquake	Low	4	2	5	1	1	1	1	15
Flood	High	5	3	2	5	1	2	2	20
Health-Related Emergencies	Low	2	5	1	1	2	2	1	14
Severe Thunderstorms and Hail	Medium	5	1	2	5	1	1	1	16
Severe Wind and Tornado	Medium	5	3	4	1	2	2	1	18
Severe Winter Storms	Medium	5	3	1	5	1	1	3	19
Technological Hazards									
Dam and Levee Failure	Lowest	2	1	1	1	1	1	1	8
Fires	Medium	5	2	4	1	1	2	1	16
Hazardous Materials Incident	Medium	5	2	4	1	1	2	1	16
Intentional Human-Caused Hazards									
Terrorism and Civil Disturbance	Medium	2	5	5	1	2	3	1	19