Tuscarawas County, Ohio

2022 Hazard Mitigation Plan

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SECTION 1. INTRODUCTION

In Tuscarawas County, safety is a top priority. An important part of being proactive toward safety is planning for natural, technological, and man-made disasters. Disasters can cause significant damage to our communities, businesses, public infrastructure, and environment, in addition to injuries and death. Their impacts include the displacement of people, economic loss and the tremendous costs of response and recovery. Preparing and using the Tuscarawas County Hazard Mitigation Plan (HMP) helps us mitigate the effects of these hazards and return to a normal operating status sooner.

Hazard mitigation planning is a process for identifying an area's hazards, determining their likely impacts, setting mitigation goals, and prioritizing and using appropriate mitigation strategies. While we cannot prevent most disasters, we can reduce or eliminate their effects through a well-organized public education and awareness effort, preparedness activities and mitigation actions.

After a disaster, some people repair and reconstruct in ways that simply restore pre-disaster conditions. Such efforts expedite a return to normalcy, but they can result in a cycle of damage, reconstruction, and repeated damage. Hazard mitigation breaks this cycle by ensuring that post-disaster repairs and reconstruction increase the county's resiliency.

BACKGROUND AND PURPOSE

Each year in the United States, disasters take the lives of hundreds of people and injure thousands more. They also destroy or severely damage buildings and infrastructure. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. Throughout Ohio, many disasters create an extreme burden on city governments, small communities and institutions.

To reduce this burden, Tuscarawas County partnered with a consultant to develop the 2022 Hazard Mitigation Plan (HMP). The county developed this plan in accordance with the Disaster Mitigation Act of 2000. This Act provides the legislative basis for the Federal Emergency Management Agency's (FEMA) hazard mitigation planning requirements and funding, before and after a hazard event. FEMA requires HMPs to be updated every 5 years.

The federal government has made 13 disaster declarations in Tuscarawas County since 1953. They involved severe storms, biological pandemics, snowstorms, a hurricane, and a tornado. These recorded natural hazard events provide a hazard footprint for the region. They help mitigation planners understand the disasters that occur in and around Tuscarawas County, and the associated risks to life and property. Understanding hazard risks provides a foundation for developing ways to mitigate or eliminate their potential impacts. These solutions include public education and outreach, preparedness activities, and mitigation actions.

For hazards that can be mitigated, the county must be prepared to apply efficient and effective short- and long-term actions, where needed. The purpose of the 2022 HMP is to provide Tuscarawas

County with a blueprint for planning hazard mitigation actions. The plan identifies resources, information, and strategies for risk reduction. It is also a tool to measure the success of mitigation actions on a continual basis. The strategies identified in the updated HMP are intended to:

- Reduce risk, through an all-hazards approach, by creating a set of defined mitigation actions.
- Establish a basis for participating agencies and the public to coordinate and collaborate.
- Help meet the requirements of federal assistance programs.

The HMP does not supersede other current plans and strategies. Rather, it enhances the county's ability to communicate about and mitigate the risk of natural, technological, and manmade hazards. We will use the information in this plan to help guide and coordinate mitigation activities and decisions by staff and citizens. Proactive mitigation planning will help reduce the risk and cost of the county's disaster response and recovery by protecting critical facilities, reducing liability exposure, and minimizing the impacts and disruptions of all hazards.

AUTHORITY

This plan was prepared using the requirements of DMA 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations are referred to collectively as the Disaster Mitigation Act (DMA, or DMA 2000.)

DMA emphasizes the need for mitigation plans and more coordinated mitigation planning and implementation. The regulations also establish the requirements local hazard mitigation plans must meet for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). As Tuscarawas County is subject to a variety of hazards, access to federal disaster assistance and hazard mitigation funding is vital to ensure more resilient communities.

PLAN ORGANIZATION

The HMP includes all documentation required to meet the criteria for FEMA approval. It is organized into six sections that reflect the logical procession of the activities taken to develop the plan.

- **Section 1,** Introduction. Describes the background and purpose of the plan, and the authority for developing the plan.
- **Section 2,** Community Profile. Describes Tuscarawas County's history, geography, topography, climate, population, economy, housing, and land use and development trends.
- **Section 3,** Planning Process. Describes the 10-step HMP planning process and the meetings and outreach activities use to engage stakeholders.

- **Section 4,** Hazard Risk Assessment. Identifies and prioritizes all hazards affecting the county and assesses the vulnerability to each identified hazard.
- **Section 5,** Mitigation Strategy. Identifies mitigation goals and objectives and names and prioritizes new mitigation actions.
- **Section 6,** Plan Implementation and Maintenance. Discusses plan adoption and use, as well as the process to monitor, evaluate, update, and maintain the HMP. Discusses continued public involvement.

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SECTION 2. COMMUNITY PROFILE

The Community Profile summarizes Tuscarawas County's history and its existing environmental and socioeconomic conditions, including geography, topography, climate, population, economic, land use and development trends.

1. HISTORY OF TUSCARAWAS COUNTY

Tuscarawas County's history begins even before the formation of the United States. In 1750, the Ohio Land Company sent an explorer by the name of Christopher Gist to the Tuscarawas Valley. When he returned from his expedition, his reports indicated it was an area with natural resources, as well as friendly American Indians.

A decade later, Moravian missionaries were sent on a mission to the region in 1761 where they were invited by the Delaware Indians to the tribal town of Gekelemukpechunk. This town was located in the same location that is now Newcomerstown. In 1763, the mission was scrapped due to the outbreak of the French and Indian War.

Through the 1770s and 1780s, the area continued to gain Christian settlements, including Gnadenhutten. This village was the site for the Gnadenhutten Massacre, in which a lieutenant-colonel accused a group of Delaware Indians of having participated in raids in Pennsylvania. Though the Indians denied the charges, they were tied up and murdered. In all, 28 men, 29 women, and 39 children were killed.

In 1798, the original missionary who had founded many of the original missions twenty years prior, returned to form new missions. Over another ten years, settlers trickled in from Pennsylvania, with the first permanent settlement being named New Philadelphia.

Tuscarawas County was officially formed in 1808, splitting off from the original Muskingum County.

Historic resources can include landmark buildings, historic structures and sites, commercial and residential districts, historic rural resources, archaeological and cultural sites, and the environment in which they exist. Historic resources serve as visual reminders of a community's past. They provide a link to its cultural heritage and a better understanding of the people and events that shaped the patterns of its development. Tuscarawas County is currently home to 26 properties listed on the National Register of Historic Places. The historic places in the County include sites, buildings, and districts. **Appendix C** provides the full list of historic places.

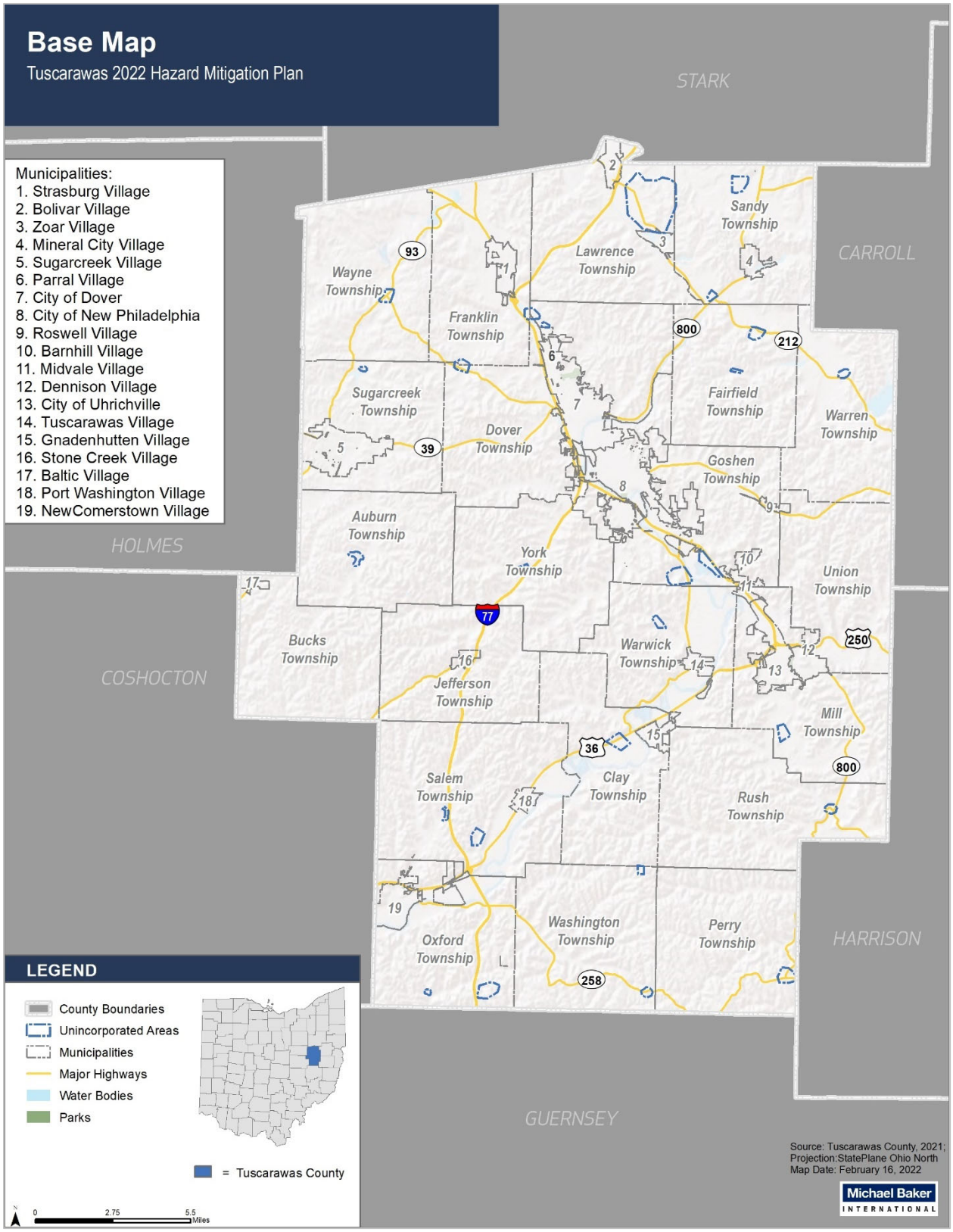
2.1.1 GEOGRAPHY

Tuscarawas County is located in east central Ohio and is bordered by Stark County to the north, Carroll and Harrison Counties to the east, Guernsey County to the south, and Holmes and Coshocton Counties to the west. The county contains 19 municipalities: including the Villages of Baltic, Barnhill, Bolivar, Dennison, Gnadenhutten, Midvale, Mineral City, Newcomerstown, Parral, Port Washington,

Roswell, Stone Creek, Strasburg, Sugar Creek, Tuscarawas, and Zoar, and the Cities of Dover, New Philadelphia, and Uhrichsville.

Tuscarawas County contains approximately 35 miles of Interstate, 39 miles of U.S. highway, and 141 miles of state highway. The major east west roadways in the county include U.S. Route 36 and State Routes 39, 183, and 258; the major north south roadways include Interstate highway 77, U.S. Route 250, and State Routes 21, 93, 212, 416, and 800. Also, vital to the transportation system is a small non-commercial airport. Tuscarawas County was named for the Native American word meaning “open mouth”. The County encompasses approximately 571 square miles. The Tuscarawas River flows through the county.

FIGURE 2-1 TUSCARAWAS COUNTY, OHIO



2.1.2 TOPOGRAPHY

The County is vastly covered by forestland; roughly half (52.5%). About 16% of the County (59,920 acres) was classified as prime farmland in the 1986 USDA soil survey and much of this land lies in the valleys along the Tuscarawas River and other streams. Agriculture competes for this land in these areas, which have attracted urban development due to their flat terrain, suitable conditions for buildings and septic systems, and proximity to rivers. In recent years, conversion of farmland for residential and industrial development has become a growing concern in the County. Approximately 17,000 acres of farmland were converted to non-agricultural uses between 1980 and 2002, representing an average loss of 739 acres per year.

Tuscarawas County is located in the Unglaciated Upper Muskingum Basin ecoregion in the Western Allegheny Plateau, according to the Environmental Protection Agency. An ecoregion is an area of similar ecosystems in the type, quality, and quantity of environmental resources in the area. Ecoregions are applicable to hazard mitigation because they can be used to develop water quality standards as well as biology based on the environmental resources that currently exist in the specific ecoregion.

The Unglaciated Upper Muskingum Basin ecoregion consists of sandstone, shale, siltstone, limestone, and coal with elevations ranging from 660 to 13,50 feet. Soils that are located on the flatter lands of the region consist of fine, silty to dry soil mixed of clay and sand. Soils in this ecoregion are more acidic than in other ecoregions, except for soils that are over areas of limestone. Soils located along hilly areas of the region contain more rocks.

TABLE 2-1 TUSCARAWAS COUNTY LAND COVER, OHIO OFFICE OF RESEARCH

Land Cover	Percent of Total Land
Developed, Lower Intensity	9.05%
Developed, Higher Intensity	1.67%
Barren (strip mines, gravel pits, etc.)	0.39%
Forest	53.20%
Shrub/Scrub and Grasslands	2.22%
Pasture/Hay	22.87%
Cultivated Crops	8.30%
Wetlands	1.17%
Open Water	1.12%

2.1.3 CLIMATE

An area's comfort index is calculated on a number of weather factors, including temperature, probability of precipitation, humidity, wind speed, and cloud cover. The scale ranges from one to ten. The higher the comfort index, the more comfortable the climate is perceived by people across the U.S. One would expect to see a higher index with shirt-sleeve temperatures, minimal chances of rainfall, relatively low humidity, light winds, and fair skies. Lower index values could reflect cool, damp, and windy conditions.

TABLE 2-2 TUSCARAWAS COUNTY CLIMATE SUMMARY

Climate Measurements	Tuscarawas County	United States
Avg. Annual Rainfall (in.)	39.7	38.1
Avg. Annual Snowfall (in.)	26.1	27.8
Avg. Annual Precipitation (days)	133.9	106.2
Avg. Annual Sunny (days)	167	205
Avg. Annual July High	83.4°F	85.8°F
Avg. Annual Jan. Low	19.4°F	21.7°F
Comfort Index (higher=better)	7	7
UV Index	3.7	4.3
Avg. Elevation (ft.)	1,020	2,443

2. POPULATION, OCCUPANCY, AND DEMOGRAPHICS

Population and demographic information provides baseline data about Tuscarawas County. Maintaining and reviewing up-to-date data on demographics allows the county to better assess hazard magnitudes and develop more specific mitigation plans.

TABLE 2-3 COUNTY BASELINE DEMOGRAPHICS (2020 CENSUS)

Demographic Information	Total Count
Male	45,979
Female	47,284
Total Population	**93,263**
Race and Ethnicity	**Residents**
White/Caucasian	87,667
Black or African American	933
Asian American	373
Two or More Races	1,399
American Indian / Alaskan Native	466
Native Hawaiian / Pacific Islander	187
Other	2,238
Previous Years' Populations	**Residents**
2015	92,739
2010	92,582
2000	90,914
1990	84,090
1980	84,614
1970	77,211
1960	76,789
1950	70,320

According to the 2020 US Census, the county's residential population is 93,263. With 567.64 square miles of land, the population density is 164.30 people per square mile. The racial makeup of the county is approximately 94.0% White/Caucasian, 1.5% Two or More Races, 1.0% Black or African American, and 2.4% other races.

The following chart is a comprehensive list of the county's Census population in 2010, the county's Census population in 2020, the percent change in population between 2010 and 2020, the total number of housing units, and the number of housing units occupied versus vacant.

TABLE 2-4 COUNTY DEMOGRAPHIC PROFILE WITH HOUSING

Municipality	Total Count
2010 Population	92,582
2020 Population	93,263
Percent Population Change 2010 – 2020	0.74%
Total Housing Units	40,817
Occupied Housing Units	37,711
Vacant Housing Units	3,106

TABLE 2-5 POPULATION, BY INCORPORATED AREAS

Community	Population
Dover	13,112
New Philadelphia	17,667
Uhrichsville	5,272
Baltic	851
Barnhill	383
Bolivar	1,000
Dennison	2,709
Gnadenhutten	1,240
Midvale	673
Mineral City	652
Newcomerstown	3,702
Parral	205
Port Washington	548
Roswell	219
Stone Creek	153
Strasburg	2,735
Sugarcreek	2,373
Tuscarawas	1,035
Zoar	172
Total Incorporated Population	54,701
Total Unincorporated Population	38,562
Total County Population	**93,263**

2.2.1 EFFECTS OF POPULATION CHANGE ON MITIGATION

Housing occupancy affects the community's overall resilience during and after disasters. Well-maintained homes are less likely to contribute to damage and debris during hazard events. When vacant homes deteriorate, they are more easily damaged or destroyed during hazard events (specifically high winds, thunderstorms, and tornadoes). The building materials from these homes can become projectiles and wind-borne debris that injure people, damage vehicles and structures, and cause a more difficult response and recovery. As communities experience a population decline, blighted properties become a more significant issue.

Because Tuscarawas County's population has been increasing for several decades, there are more people susceptible to hazards within the county. Tuscarawas County also has a significant population 65 years or older, which leaves the county *more* susceptible to hazard events, particularly when additional shelter is required. Hazards such as extreme temperatures, tornadoes, severe winter storms, and severe summer storms can cause power outages. The elderly and the very young are most at risk to the consequent losses of heating and cooling.

2.2.2 SOCIAL VULNERABILITY

FEMA National Risk Index

FEMA developed a National Risk Index map for Natural Hazards at the county-level and census tract-level for all counties and census tracts in the United States. The risk index is calculated through a combination of three factors: expected annual loss, social vulnerability, and community resilience. Expected annual loss is the amount of loss – building value, population, and agricultural value – that is likely to occur each year due to natural hazard events. Social vulnerability is the vulnerability or susceptibility of social groups to natural hazard impacts. Community resilience is a community's ability to withstand natural hazard events through preparation, recovery, and adaptability.

(Expected Annual Loss x Social Vulnerability) / Community Resilience = Risk Index

The Risk Index as a whole, as well as each factoring attribute, is ranked as a scale. The index, from low risk to high risk includes: Insufficient Data, Not Applicable, No Rating, Very Low, Relatively Low, Relatively Moderate, Relatively High, and Very High.

According to the National Risk Index Map, Tuscarawas County has a Risk Index of Very Low, Expected Annual Loss risk of Very Low, Social Vulnerability risk of Relatively Moderate, and Community Resilience of Relatively High. Ranking as a 7.61, Tuscarawas County's Risk Index is in the Very Low ranking, 51.1% of the other Ohio counties have a Risk Index lower than Tuscarawas County's Risk Index; the average Risk Index ranking for Ohio is 8.47. Tuscarawas County's expected annual loss calculates to a total of $2,165,502.61 – $1,534,169.93 in building value losses, 0.07 fatalities, $566,219.48 population equivalence losses, and $65,113.19 in agricultural value losses – 37.5% of the other Ohio counties have an expected annual loss rating lower than Tuscarawas County. The social vulnerability rating for Tuscarawas County, measured by University of South Carolina's Hazards and Vulnerability Research Institute (HVRI), is 37.84. Compared to the state's average social vulnerability ranking, Tuscarawas County has a ranking of 3.56 points higher than the average; 71.5% of Ohio's counties have a lower social vulnerability than Tuscarawas. The community

resilience rating for Tuscarawas County, measured by University of South Carolina's HVRI, is 56.68, only 0.16 points below Ohio's county average community resilience rating. However, 64.8% of the counties in Ohio have a higher community resilience score than Tuscarawas County.

CDC/ATSDR Social Vulnerability Index

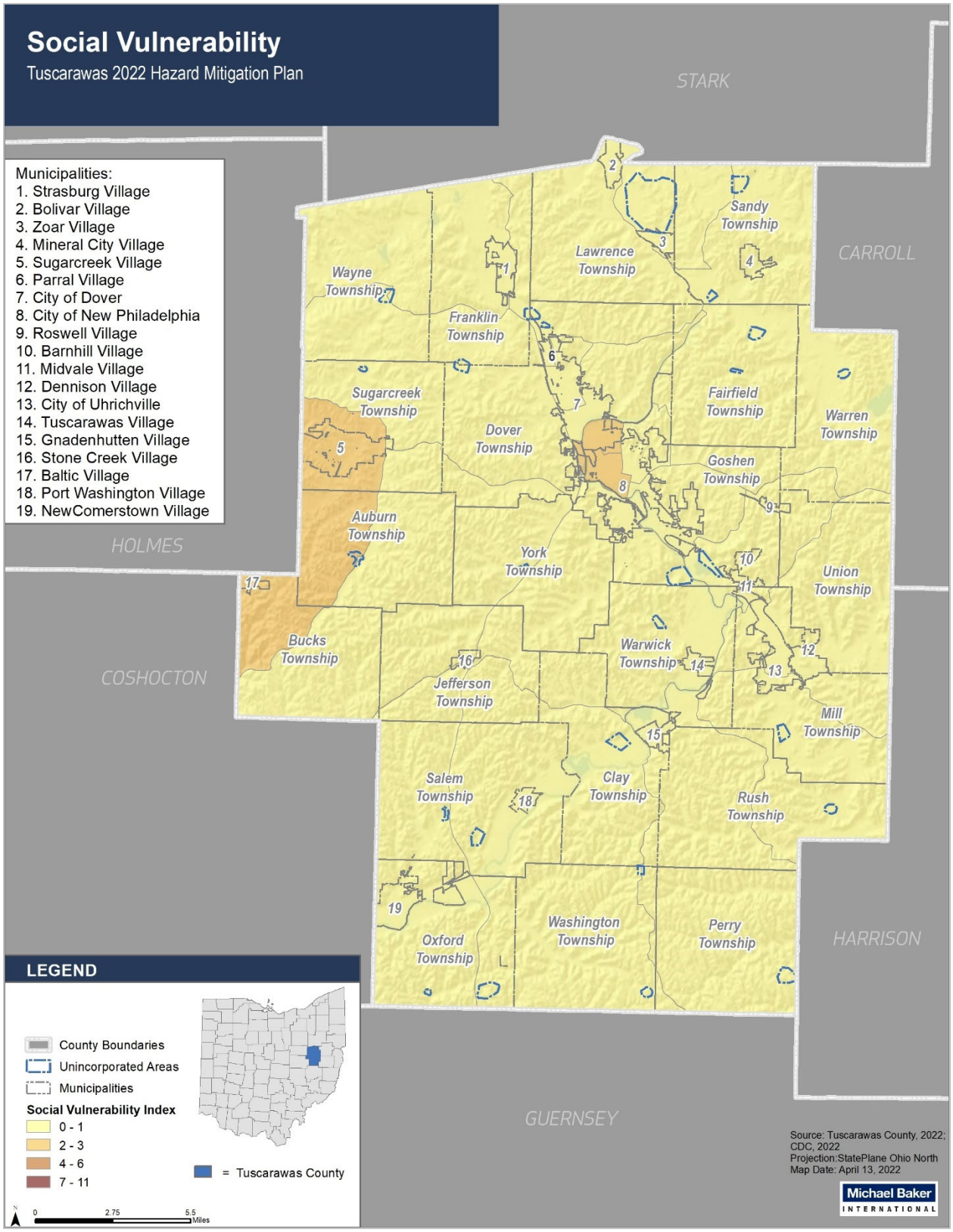
The Center for Disease Control and Prevention (CDC)/Agency for Toxic Substances and Disease Registry (ATSDR) developed a Social Vulnerability Index through the use of fifteen U.S. Census variables to identify social groups that are vulnerable to disaster events. The CDC/ATSDR social vulnerability definition is, "the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss" (CDC, 2021). Socially vulnerable populations in a community are at more risk than the general population due to socioeconomic status, household composition, minority status, housing type, and/or means of transportation.

Socioeconomic factors that are considered vulnerable populations are also known as below poverty, unemployed, low income, or no high school diploma. Household compositions that are considered vulnerable include those with a disability, aged 65 years or older, aged 17 years or younger, older than 5 years of age with a disability, and single-parent households. Those with a minority status may not speak the English language or may not be able to communicate fluently through English. Lastly, the housing type and means of transportation indicates additional vulnerable groups of population. Those who live in multi-unit structures, mobile homes, have crowding conditions in their place of residence, have no vehicle, or reside in group quarters are all examples of socially vulnerable populations.

Tuscarawas County has an overall Social Vulnerability Index (SVI) score of 0.3443 in 2018, with 0 being the lowest vulnerability and 1 being the highest vulnerability. According to the score, the County ranks in a low to moderate level of social vulnerability. Tuscarawas County's socioeconomic ranking is 0.4408; the County's household composition and disability ranking is 0.4387; the County's minority status and language ranking is 0.3321; the County's housing type and transportation ranking is 0.3181.

The figure below display's the social vulnerability of each census tract within Tuscarawas County.

FIGURE 2-2 CDC/ATSDR SOCIAL VULNERABILITY IN TUSCARAWAS COUNTY



SVI scores and locations of vulnerable populations are important to know because they can help local officials target areas that may need additional assistance after a disaster, such as additional supplies needed like food, water, medicine or bedding, or additional emergency personnel that need to be dispatched to a certain area(s) within the County. Local officials can also use the SVI scores at the census tract level to identify areas that are in need of emergency shelters, develop evacuation plans, and other mitigation actions that can help alleviate disaster impacts on the identified communities.

2.2.3 EMPLOYMENT

According to the U.S. Census Bureau's Longitudinal Employer-Household Dynamics (LEHD), 29,954 jobs made up the county's workforce as of 2019. The North American Industry Classification Systems keeps track of jobs based on census blocks. Manufacturing makes up 26.3% of the jobs in the county, followed by Health Care and Social Assistance at 16.3%. The next closest is Retail Trade at 12.9%.

TABLE 2-6 NAICS JOB INVENTORY

Industry	Count	Share
Agriculture, Forestry, Fishing and Hunting	146	0.5%
Mining, Quarrying, and Oil and Gas Extraction	993	3.3%
Utilities	108	0.4%
Construction	1,545	5.2%
Manufacturing	7,892	26.3%
Wholesale Trade	1,170	3.9%
Retail Trade	3,863	12.9%
Transportation and Warehousing	863	2.9%
Information	215	0.7%
Finance and Insurance	680	2.3%
Real Estate and Rental and Leasing	323	1.1%
Professional, Scientific, and Technical Services	1,142	3.8%
Management of Companies and Enterprises	203	0.7%
Administration and Support, Waste Management and Remediation	1,494	5.0%
Educational Services	80	0.3%
Health Care and Social Assistance	4,892	16.3%
Arts, Entertainment, and Recreation	169	0.6%
Accommodation and Food Services	3,238	10.8%
Other Services (excluding Public Administration)	938	3.1%
Public Administration	0	0.0%
Grand Total	**29,954**	**100%**

2.2.4 EFFECTS OF EMPLOYMENT ON MITIGATION PLANNING

Employment, like housing, can influence mitigation planning and disaster events. It is tied directly to housing and community stability. Many small towns in rural areas rely heavily on a particular

company or industry. When these disappear or take on a reduced role, the resulting economic downturn can increase the number of blighted properties.

2.2.5 LAND USE AND FUTURE DEVELOPMENT AREAS

Land use patterns described in general terms within Tuscarawas County are consistent with typical rural counties in the Midwestern part of the U.S. as development has primarily taken place within and immediately surrounding existing incorporated areas, with the exception of several primarily residential settlements in unincorporated areas (Townships) throughout the County.

Very little new development or redevelopment has taken place in Tuscarawas County since the previous HMP. Members of each participating community completed a Changes in Development form on the Tuscarawas County Hazard Mitigation Plan Update project website to determine how they perceived their vulnerability to each hazard had changed in comparison to development trends and larger factors. Each community's response from the Changes in Development form is reflected in the following table.

In addition to the jurisdictions completing the Changes in Development form, stakeholders across the county as well as neighboring communities were invited to submit responses to how the physical planning area has changed in terms of development since the previous plan was created. County agencies and local businesses submitted responses and are also displayed in the following table.

TABLE 2-7 TUSCARAWAS COUNTY CHANGES IN DEVELOPMENT RESPONSE

Jurisdiction/Organization	Changes in Development Response
Tuscarawas County	Nothing significant to report at this time that has impacted our vulnerability to hazards.
Dover	There has been no significant changes in development for the City of Dover.
New Philadelphia	No major areas of development have occurred within New Philadelphia to impact vulnerability to hazard impacts. Minor areas of new housing have been built in the following areas: Kelly St NW by Bowers Ave, 2nd St NW at Carrie Ave NW; and 5th St SE at Creekside SE. A newly expanded park was built at the Southside Park along Oldtown Valley Rd as well. The Howden Buffalo/Joy Tech factory was also demolished for future development
Uhrichsville	The biggest change in the past five years has been industry changes - some of the vacant industrial structures are now being used as storage for gas/oil companies. Occupying vacant property lessens vulnerability, but hazardous materials are being stored in the buildings. Storage units have been constructed in a residential area, and we do not always know what is being stored in the units. Since the storage units were constructed, zoning restrictions have been implemented to prohibit additional units being built.
Baltic	We have annexed land into the corporation which means we are not responsible for the lives of more people.
Barnhill	No changes to the physical environment that has changed our vulnerability to hazard impacts.
Bolivar	Sand and gravel mining to the northwest - became operational in 2021. Anticipating heavy traffic eventually. Nothing new besides the new mining plant.
Dennison	There has been an aggressive demolition of 35-45 blighted homes and garages to lessen vulnerability of the village. We appropriate money each year to remove vacant homes that may be at risk. We have seen the bigger lots be developed - approximately 10 new homes - and new site be developed into residential homes. All new residential development has been developed away from floodplains and according to current building code.

Jurisdiction/Organization	Changes in Development Response
Gnadenhutten	Upgrading water and wastewater treatment plants.
Midvale	The village has torn down a couple of structures that have caught fire in the past 5 years. There has been no other development that has impacted the village's vulnerability.
Mineral City	No significant changes in development have occurred in the Village of Mineral City.
Newcomerstown	The hydrochloric acid transfer station is the most recent major development. This increases our vulnerability.
Parral	One restaurant burnt down a few years ago.
Port Washington	There have been no significant changes in the last 5 years.
Roswell	We have not had any development in the village in the past 5 years. Our vulnerability to hazards has not changed.
Stone Creek	Two abandoned properties have been torn down in the past 6 months that were a risk to hazard impacts. The demolition of the properties has reduced the village's vulnerability to hazard impacts. No new development or policy has occurred in the past 5 years.
Strasburg	A large window plant was constructed in the past few years. This has brought in several hundred employees. If something were to happen, it would tax our resources to respond in time.
Sugarcreek	There has been no development that changes our vulnerability.
Tuscarawas	Storm sewers have been retrofit along School, Main, and Heritage to reduce flooding.
Zoar	There have been no physical changes since the last Plan.
Trinity Twin City Medical Center	Staffing levels have been impacted by vaccine mandates and overall shortages. CMS Emergency Preparedness Ruling has generated dedicated roles in emergency management for hospitals.
Tuscarawas County Regional Planning Commission, Floodplain Office	More homes built farther out in country, no public water for fire protection, lack of cellphone coverage

From 2015 to 2019, there have been 340 residential units constructed, according to the Tuscarawas County Profile 2020 Edition developed by the Ohio Office of Research. The table below shows the residential construction that has occurred within the County each year, broken down by residential building type.

TABLE 2-8 RESIDENTIAL DEVELOPMENT IN TUSCARAWAS COUNTY, 2015-2019

Residential Construction	2015	2016	2017	2018	2019
Total Units Constructed	68	67	90	66	49
Total value of constructed units	$11,997,000	$12,857,000	$12,978,000	$11,373,000	$8,622,000
Single-Unit Buildings Constructed	60	67	82	48	35
Average Cost per Single Unit	$187,791	$191,889	$151,566	$203,617	$210,924
Multi-Unit Buildings Constructed	8	0	8	18	14
Average Cost per Unit in Multi-Unit	$91,250	$0	$68,750	$88,838	$88,571

Commercial and residential development is expected to continue to saturate more urban areas, like the cities of Dover, New Philadelphia, and Uhrichsville and the surrounding villages, in the next 25

years. One reason is that the retail and service market is far from being saturated in the incorporated communities in Tuscarawas County. Another is that the already high transportation costs are expected to continue to rise. These are keeping more travelers closer to home in their search for goods and services.

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SECTION 3. THE PLANNING PROCESS

This section describes each stage of the planning process used to develop the 2022 HMP. This process provides a framework for developing the document and follows FEMA's recommended steps. The prescribed series of planning steps followed for the 2022 HMP includes organizing resources, assessing risk, developing the mitigation plan, drafting the plan, reviewing and revising the plan, and adopting and submitting the plan for approval. Each is described in this section.

1. PLANNING PROCESS

Hazard mitigation planning in the United States is guided by the statutory regulations described in DMA 2000 and implemented through 44 Code of Federal Regulations (CFR) Parts 201 and 206. FEMA's HMP guidelines outline a four-step planning process for the development and approval of HMPs. Table 3-1 lists the specific CFR excerpts that identify the requirements for approval.

TABLE 3-1 DMA 2000 CFR PLANNING PROCESS

DMA 2000 (44 CFR 201.6)	HMP Plan Section
(1) Organize Resources	Section 3
201.6(c)(1)	Organize to prepare the plan
201.6(b)(1)	Involve the public
201.6(b)(2) and (3)	Coordinate with other agencies
(2) Assess Risks	Section 4
201.6(c)(2)(i)	Assess the hazard
201.6(c)(2)(ii) and (iii)	Assess the problem
(3) Develop the Mitigation Plan	Section 5
201.6(c)(3)(i)	Set goals
201.6(c)(3)(ii)	Review possible activities (actions)
201.6(c)(3)(iii)	Draft an action plan
(4) Plan Maintenance	Section 6
201.6(c)(5)	Adopt the plan
201.6(c)(4)	Implement, evaluate, and revise

To develop the 2022 HMP, a planning process was customized to address Tuscarawas County's unique population and demographics. This process met all basic federal guidance documents and regulations. As shown in the following figure and documented in the corresponding sections, the HMP planning process included organizing resources, assessing risk, developing the mitigation action strategy, drafting the plan, reviewing and revising the plan, and adopting and submitting the plan.

FIGURE 3-1 MITIGATION PLANNING PROCESS

2. ORGANIZE RESOURCES

Organizing the resources consists of developing a planning team and reviewing documents.

3. BUILDING THE PLANNING TEAM

Having a planning team, the backbone of the planning process, was critical for developing the 2022 HMP. Tuscarawas County staff invited private and non-profit agencies and members of a consultant team to join this group, which was known as the Hazard Mitigation Planning Committee (HMPC).

4. HAZARD MITIGATION PLANNING COMMITTEE

The 2022 HMPC consisted of key decision makers in specific county functions. It included stakeholders who participated actively in the planning process. Planning processes included:

- Holding a series of structured coordination meetings;
- Collecting valuable local information and other requested data;
- Deciding on plan process and content;
- Developing mitigation actions for the HMP;
- Reviewing and commenting on plan drafts; and
- Coordinating the public input process.

Preparing the 2022 HMP required a series of meetings and workshops. These were intended to facilitate discussion and initiate data collection efforts with local community officials. More importantly, the meetings and workshops prompted local officials to provide continuous input and feedback throughout the update process.

The following tables provide lists of the 2022 HMP Steering Committee and Planning Committee members, with the jurisdiction they represented, their title/role, and the meeting(s) they attended.

The Steering Committee is a combination of County and local officials as well as the consultant team. The Steering Committee was responsible for contacting the local jurisdictions within Tuscarawas County to alert and invite them to the planning process. The Steering Committee was also responsible for identifying the stakeholders to be invited to the planning process. Regular updates regarding the progress made on the plan and participation status of the local jurisdictions were provided to the Steering Committee throughout the plan's development.

TABLE 3-2 HMP STEERING COMMITTEE

Name	Department	Title / Role
Alex McCarthy	Tuscarawas County HS & EMA	Director
McKenzie Villatoro	Tuscarawas County HS & EMA	Deputy Director
Noah Porter	Tuscarawas County HS & EMA	Emergency Management Planner
Joe Bachman	Tuscarawas County Engineer's Office	County Engineer
Jill Lengler	Tuscarawas County Regional Planning Commission	Director / Floodplain Coordinator
Lee Finley	New Philadelphia Health Department	Director of Environmental Health

The range of stakeholders, including neighboring communities, businesses, nonprofits, and other interested parties, were invited and encouraged to participate in developing the Plan. These stakeholders included the cities, villages, and townships within the county, the fire and police departments of each community within the county, Tuscarawas County Sheriff's Department, Tuscarawas County Agriculture & Natural Resources, Tuscarawas County Chamber of Commerce, Tuscarawas County Engineer's Office, Tuscarawas County GIS Department, Tuscarawas County Health Department, New Philadelphia Health Department, Tuscarawas County Commission, Tuscarawas County Convention and Visitors Bureau, Tuscarawas County Ohio Farm Bureau, Tuscarawas County Soil and Water Conservation District, Tuscarawas County OSU Extension, Tuscarawas County Regional Planning Commission, TuscTransit, Tuscarawas County Senior Center, American Red Cross, Cleveland Clinic Union Hospital, Trinity Twin City Medical Center, Muskingum Watershed Conservancy District, Newcomerstown Chamber of Commerce, Twin City Chamber of Commerce, Stark County, Carroll County, Harrison County, Guernsey County, Coshocton County, and Holmes County. The county encouraged stakeholder involvement by inviting agencies and individuals to participate in Planning Committee Meeting #1 as well as individual meetings and submitting forms through the Tuscarawas County HMP Website.

The planning committee is the culmination of all participants of the planning process.

TABLE 3-3 2021 HMP PLANNING COMMITTEE

Name	Jurisdiction / Organization Represented	Title / Role	Meeting(s) Attended
Alex McCarthy	Tuscarawas County HS & EMA	Director	1
Noah Porter		Deputy Director / Emergency Management Planner	1
Russ Volkert	City of Dover Fire Department	Fire Chief	1, Ind. Meeting
Joel Day	City of New Philadelphia	Mayor	1
Ron McAbier		Service Director	1
Lee Carl Finley, REHS	City of New Philadelphia Health Department	Director of Environmental Health	1
Robert J. Snyder III	City of New Philadelphia Fire Department	Captain	1
Justin Edwards	City of Uhrichsville Fire Department	Fire Chief	1, Ind. Meeting
Belle Everett	City of Uhrichsville	Director of City Services	1
Rose Baxter	Village of Baltic	Fiscal Officer	1, Ind. Meeting
Mike Ohler	Village of Barnhill	Mayor	Ind. Meeting
Tim Lang	Village of Bolivar	Mayor	1, Ind. Meeting
Matt Judy		Village Administrator	Ind. Meeting
Greg DiDonato	Village of Dennison	Mayor	Ind. Meeting
Kim Stull	Village of Gnadenhutten	Fiscal Officer	Ind. Meeting
Dave McConnell	Village of Midvale	Fire Chief	Ind. Meeting
Laurie Green	Village of Mineral City	Mayor	1, Ind. Meeting
Sam Moore	Village of Mineral City Fire Department	Fire Chief	1, Ind. Meeting
Pat Cadle	Village of Newcomerstown	Mayor	1, Ind. Meeting
Crystal DiGenova	Village of Parral	Mayor	Ind. Meeting
Jeff Stearns	Village of Port Washington	Police Chief	Ind. Meeting
Kim Meek-Obed	Village of Roswell	Fiscal Officer	1
Mitch Belknap		Mayor	Ind. Meeting
Darren Prouty	Village of Stone Creek	Fire Chief	Ind. Meeting
Leslie Kissinger		Mayor	Ind. Meeting
Daniel Hughes		Council Member	Ind. Meeting
Steven Smith	Village of Strasburg	Mayor	1, Ind. Meeting
Connie Bowen	Village of Sugarcreek	Fiscal Officer	Ind. Meeting
Brian Dalton	Village of Sugarcreek Police Department	Assistant Chief	1
DJ Meek	Village of Tuscarawas	Village Administrator	Ind. Meeting
Dana Moore		Mayor	Ind. Meeting
Gayle Potelicki	Village of Zoar	Council President	1
Chris Zoller	Tuscarawas County Agriculture & Natural Resources	Extension Educator	1
Scott Robinson	Tuscarawas County Chamber of Commerce	President	1

Name	Jurisdiction / Organization Represented	Title / Role	Meeting(s) Attended
Joe Bachman	Tuscarawas County Engineer's Office	County Engineer	1
Steven Brooks	Tuscarawas County GIS Department	GIS Coordinator	1
Natasha Yonley	Tuscarawas County Health Department	Director of Prevention	1
Jill Lengler	Tuscarawas County Regional Planning Commission	Director and Floodplain Coordinator	1
Don Frey	Fairfield Township Volunteer Fire Department	Fire Chief	1
Harold Booth	Warwick Township Fire Department	Fire Chief	1
Jon Specht	York Township Fire Department	Firefighter	1
Tim Reichel	American Red Cross	Program Manager	1
Nadal Montoya, Jr.	Cleveland Clinic Union Hospital / Trinity Twin City Medical Center	Emergency Manager	1, Ind. Meeting
Tom Cottis	Carroll County	Director of Emergency Management	1
Scott Tritt	Muskingum Watershed Conservancy District	Safety Administrator	1

3.4.1 PLANNING COMMITTEE MEETINGS

The HMPC met throughout the development of the updated HMP. Table 3-4 summarizes the meetings conducted throughout the planning process, including meeting date, type, and topics discussed.

TABLE 3-4 MEETING SUMMARY

Date	Meeting Type	Topics
June 17, 2021	Internal Kickoff (Steering Committee)	• Scope of Work • Review of Mitigation Planning Standards • Schedule and Meetings • Participation • Relevant Data and Documentation • Questions and Next Steps
October 27, 2021 10:00 AM and 5:30 PM	Planning Committee Meeting #1	• Hazard Mitigation Overview • Planning Committee Introductions • Review of the 2017 HMP • Hazard Mitigation Planning Process • Hazard Identification and Risk Assessment • Development of Mitigation Goals, Objectives, and Actions • Tuscarawas County HMP Website • Next Steps and Action Items
November 10, 2021-May 9, 2022	Individual Meetings with Each Community	• Review of Planning Process • Review of HIRA • Review Mitigation Techniques ○ Categories of Action • Completion of the 6 Forms (Risk Evaluation, Vulnerability Assessment, Changes in Development, Capability Assessment, Previous Mitigation Actions, New Mitigation Actions • Next Steps

TABLE 3-5 JURISDICTIONAL PARTICIPATION

Jurisdiction	Meeting Participants			Documentation Provided					
	Meeting 1	Ind. Meeting	Any Meeting	Risk Evaluation	Vulnerability Assessment	Changes in Development	Capability Assessment	Previous Mitigation Actions	New Mitigation Action
Tuscarawas County	0		0	0	0	0	0	0	0
Dover	0	2/15/2022	0	0	0	0	0	0	0
New Philadelphia	0		0	0	0	0	0	0	0
Uhrichsville	0	4/7/2022	0	0	0	0	0	0	0
Baltic	0	4/12/2022	0	0	0	0	0	0	0
Barnhill		3/23/2022	0	0	0	0	0	0	0
Bolivar	0	2/16/2022	0	0	0	0	0	0	0
Dennison		3/30/2022	0	0	0	0	0	0	0
Gnadenhutten		12/21/2021	0	0	0	0	0	0	0
Midvale		5/4/2022	0	0	0	0	0	0	0
Mineral City	0	2/15/2022	0	0	0	0	0	0	0
Newcomerstown	0	11/15/2021	0	0	0	0	0	0	0
Parral		2/21/2022	0	0	0	0	0	0	0
Port Washington		1/4/2022	0	0	0	0	0	0	0
Roswell	0	5/2/2022	0	0	0	0	0	0	0
Stone Creek		2/16/2022, 3/10/2022	0	0	0	0	0	0	0
Strasburg	0	11/10/2021	0	0	0	0	0	0	0
Sugarcreek	0	5/9/2022	0	0	0	0	0	0	0
Tuscarawas		1/27/2022	0	0	0	0	0	0	0
Zoar	0		0	0	0	0	0	0	0

The "Any Meeting" column represents participation in the planning process through meetings. These criteria can be met through participating in either scheduled group meetings or individual meetings.

Stakeholders were able to participate in Planning Committee Meeting #1, individual meetings if desired, and submit responses to 4 of the 6 forms on the Tuscarawas County HMP Website. A separate tab, titled Partners in Mitigation, allowed for stakeholders to provide additional input on the Risk Evaluation, Vulnerability Assessment, Changes in Development, and Capability Assessment forms. The following table outlines the stakeholders that participated and provided feedback during the planning process. Trinity Twin City Medical Center, in addition to submitting the 4 forms that were available to stakeholders, also submitted two new mitigation actions for the 2022 plan update.

TABLE 3-6 STAKEHOLDER PARTICIPATION

Stakeholder	Meeting Participation		Documentation Provided			
	Meeting 1	Ind. Meeting	Risk Evaluation	Vulnerability Assessment	Changes in Development	Capability Assessment
Tuscarawas County Agriculture & Natural Resources	0					
Tuscarawas County Chamber of Commerce	0					
Tuscarawas County Engineer's Office	0					
Tuscarawas County GIS Department	0					
Tuscarawas County Health Department	0					
Tuscarawas County Regional Planning	0		0	0	0	0
Fairfield Township	0					
Warwick Township	0					
York Township	0					
American Red Cross	0					
Cleveland Clinic Union Hospital	0					
Trinity Twin City Medical Center	0	11/1/2021	0	0	0	0
Carroll County	0					
Muskingum Watershed Conservancy District	0					

3.4.2 PUBLIC OUTREACH STRATEGY

Public outreach is a major component of the 2022 HMP. Participation from the public is necessary to gain a full picture of the potential issues and hazards that affect the county.

Outreach Media

The Outreach Strategy used several methods for communicating information about the planning process to the public.

Tuscarawas County Hazard Mitigation Plan Public Survey

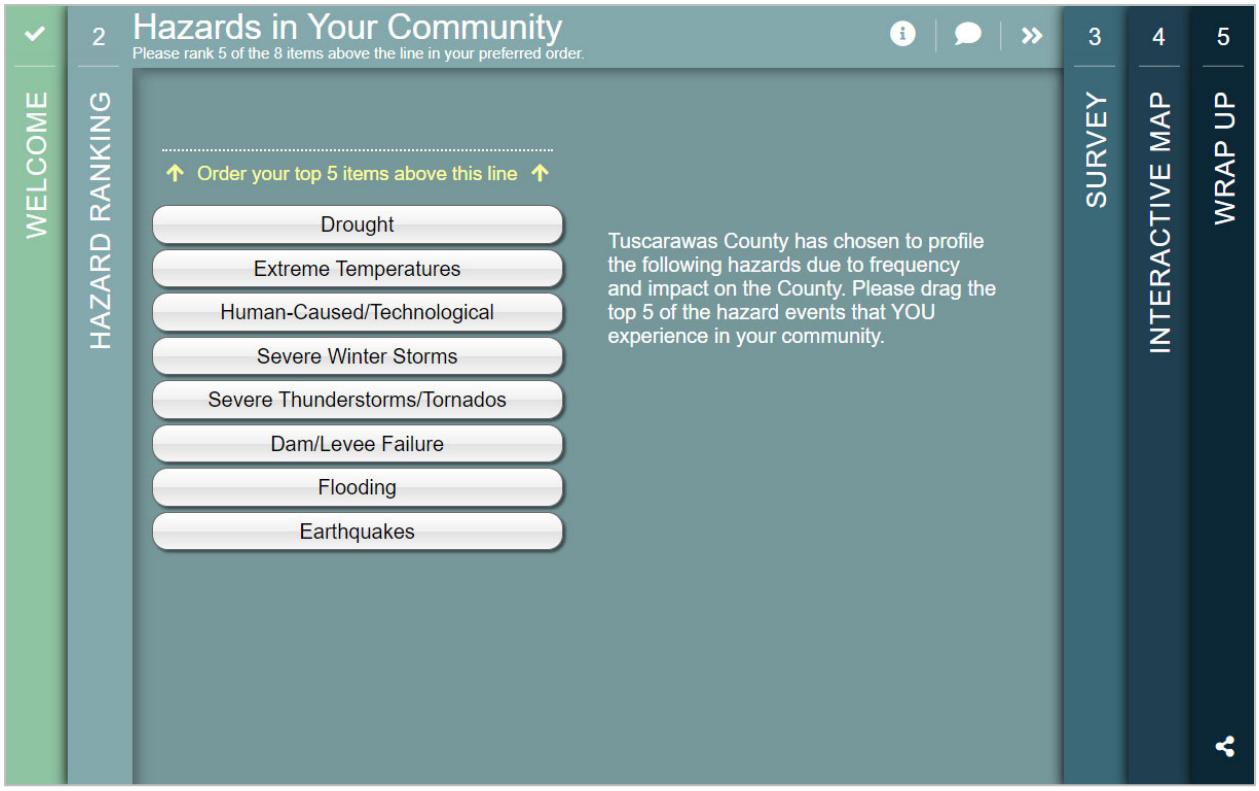
A public survey was developed through MetroQuest for the residents of Tuscarawas County to complete. The survey was offered from March 21, 2022, through May 30, 2022, for all residents of the county. MetroQuest, an online engagement platform, was used to develop the public survey.

The survey itself included a beginning slide that provided the survey participant with context on hazard mitigation, the importance of the plan, how the survey results would be incorporated into the hazard mitigation plan and alerted the participant to additional participation opportunities. The following image is the introductory slide to the virtual survey.

FIGURE 3-2 INTRODUCTORY SLIDE OF THE PUBLIC SURVEY

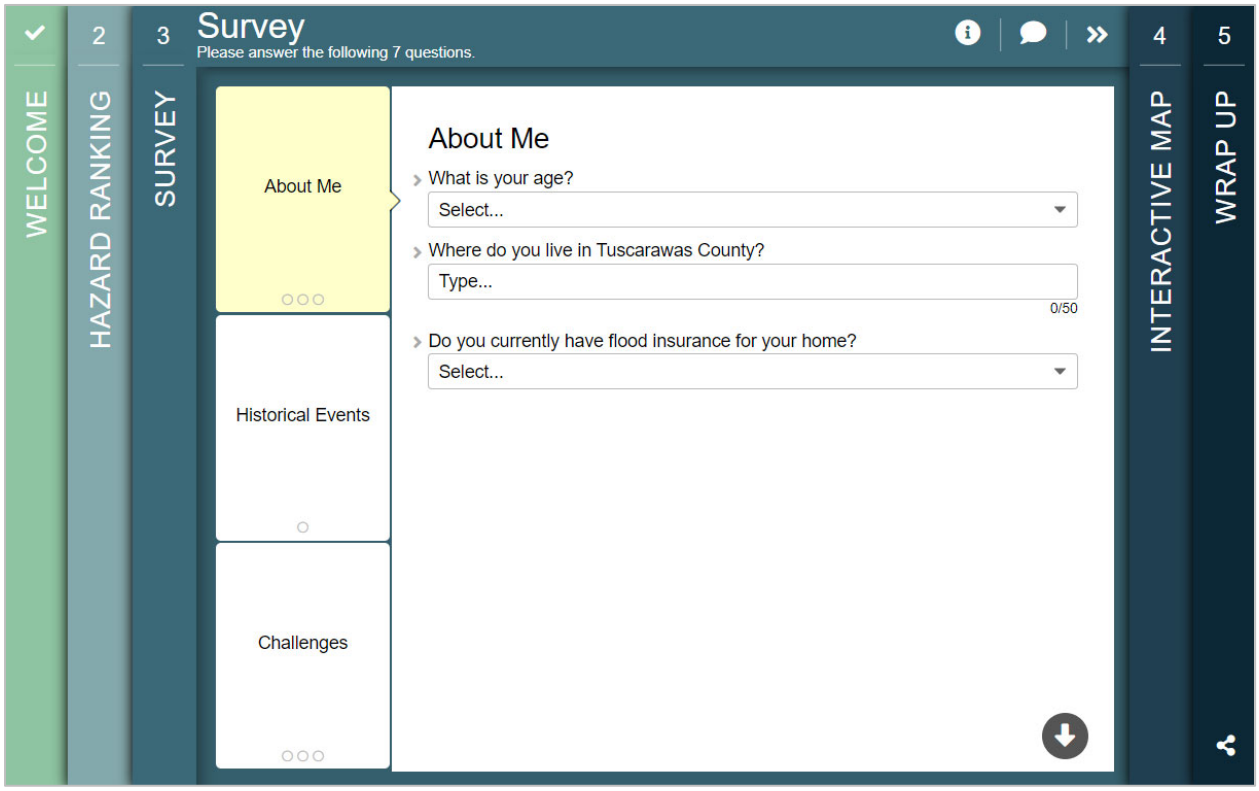
Following the introductory slide, the survey participant was asked to rank the top five hazards for where the participant lives in the county. The hazards were grouped together based on similarity of impacts, if applicable. The options to rank included: drought, extreme temperatures, human-caused/technological, severe winter storms, severe thunderstorms/tornadoes, dam/levee failure, flooding, and earthquakes. The following image is the second slide of the virtual survey.

FIGURE 3-3 HAZARD RANKING SLIDE OF THE PUBLIC SURVEY



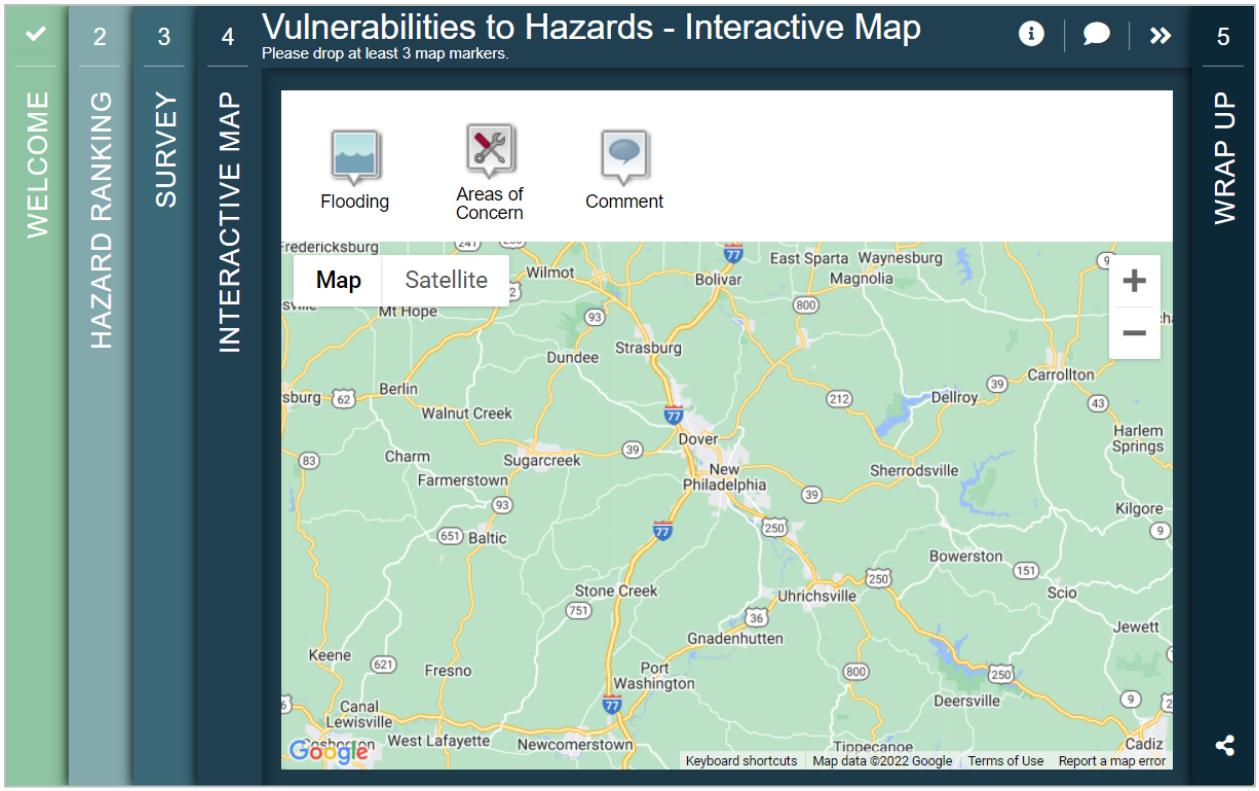
The third slide of the public survey included a brief survey of the participant, including asking the age range of the participant, community of which the participant lives in, if the participant currently has flood insurance. The third slide also asks the survey participant to provide information on the worst hazard event they have experienced in Tuscarawas County. Lastly, the third slide asks if there are any disaster events the survey participant's community is vulnerable to as well as any challenges the community faces that may delay disaster response. The following image is the third slide of the public survey.

FIGURE 3-4 THIRD SLIDE OF THE PUBLIC SURVEY



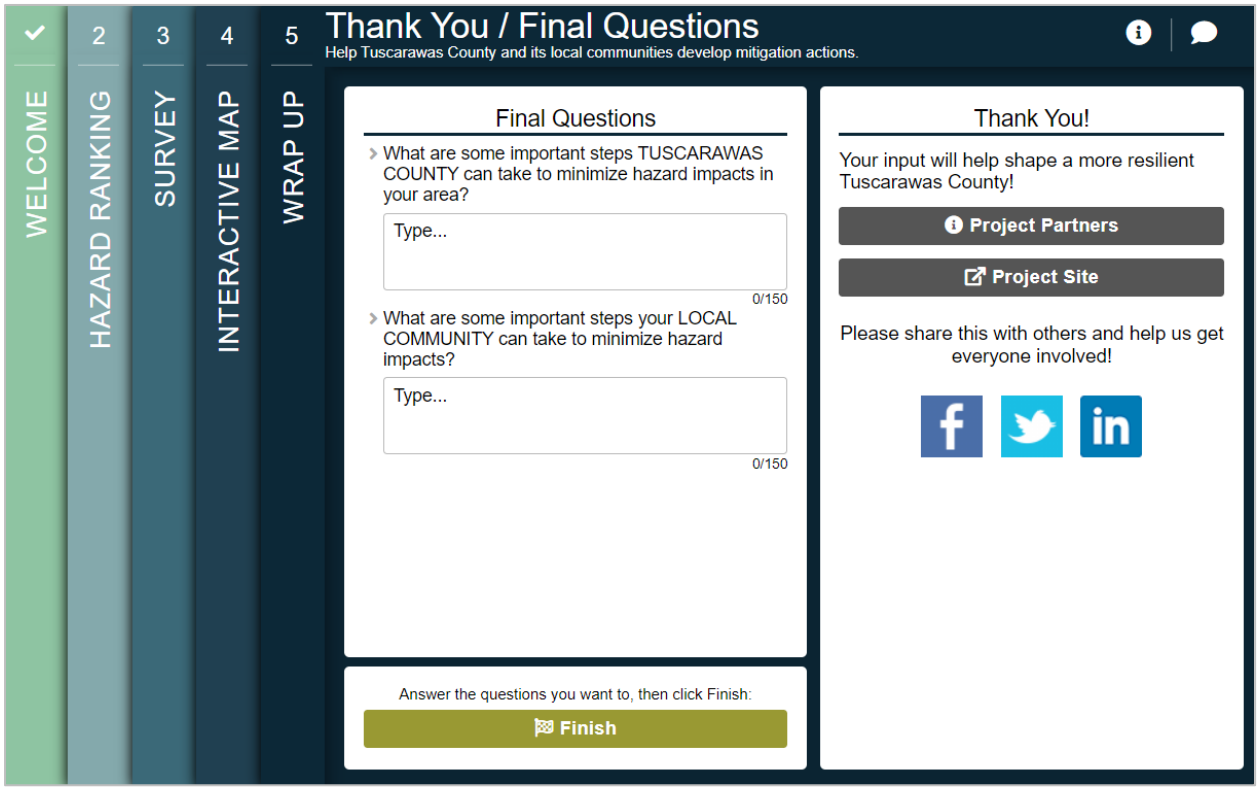
The fourth slide of the public survey asked participants to identify areas in their community that are known to constantly face issues from the hazards the community is vulnerable to through an interactive map that markers that were able to be placed on specific locations. The markers that the participant was able to place on the map included flooding, areas of concern, and general comment markers. The following image is the fourth slide of the public survey.

FIGURE 3-5 FOURTH SLIDE OF THE PUBLIC SURVEY



The last slide of the public survey included a Final Questions section that allowed the participant to identify important steps Tuscarawas County, as well as the respondent's local community, can take to minimize hazard impacts in the area. The survey participant was also able to share the public survey through their personal Facebook page, Twitter profile, and LinkedIn page. The following image is the last slide of the public survey.

FIGURE 3-6 FINAL SLIDE OF THE PUBLIC SURVEY



The following images are sample postings from the Tuscarawas County Emergency Management Agency's Facebook account to spread awareness of the public survey. There were 2 participants in the survey.

FIGURE 3-7 TUSCARAWAS COUNTY EMA FACEBOOK POST

The summarized responses of the Tuscarawas County Hazard Mitigation Plan Public Survey are presented in the following narrative.

TABLE 3-7 SURVEY PARTICIPATION WEEKLY BREAKDOWN

Week of Survey	Cumulative Total Number of Participants
March 21st – March 28th	0
March 29th – April 5th	0
April 6th – April 13th	2
April 14th – April 21st	0
April 22nd – April 29th	0
April 30th – May 7th	0
May 8th – May 15th	0
May 16th – May 23rd	0
May 24th – May 30th	0

The following table displays the results from the hazard ranking slide of the public survey with the Hazard, the Ranking Average with 1 being the highest ranked and five being the lowest ranked, and Number of Inputs identifying how often the hazard was ranked in the top five by each survey respondent. Overall, Flooding and Severe Thunderstorms/Tornadoes had the highest average ranking of 2. The first respondent ranked the top five hazards as follows: Human-Caused/Technological, Severe Winter Storms, Severe Thunderstorms/Tornadoes, Extreme Temperatures, and Drought. The second respondent ranked the top five hazards as follows: Severe Thunderstorms/Tornadoes, Dam/Levee Failure, Flooding, Severe Winter Storms, and Human-Caused/Technological.

TABLE 3-8 HAZARD RANKING PUBLIC SURVEY RESULTS

Hazard	Ranking Average	Number of Inputs
Severe Thunderstorms/Tornados	2	2
Drought	5	1
Extreme Temperatures	4	1
Dam/Levee Failure	3	1
Severe Winter Storms	3	2
Flooding	2	1
Human-Caused/Technological	3	2
Severe Thunderstorms/Tornados	2	2

The following table displays the age groups that responded to the public survey with the age ranges that were included in the survey as well as the number of respondents that were in each age range. One of the two survey participants did not submit their age in the survey.

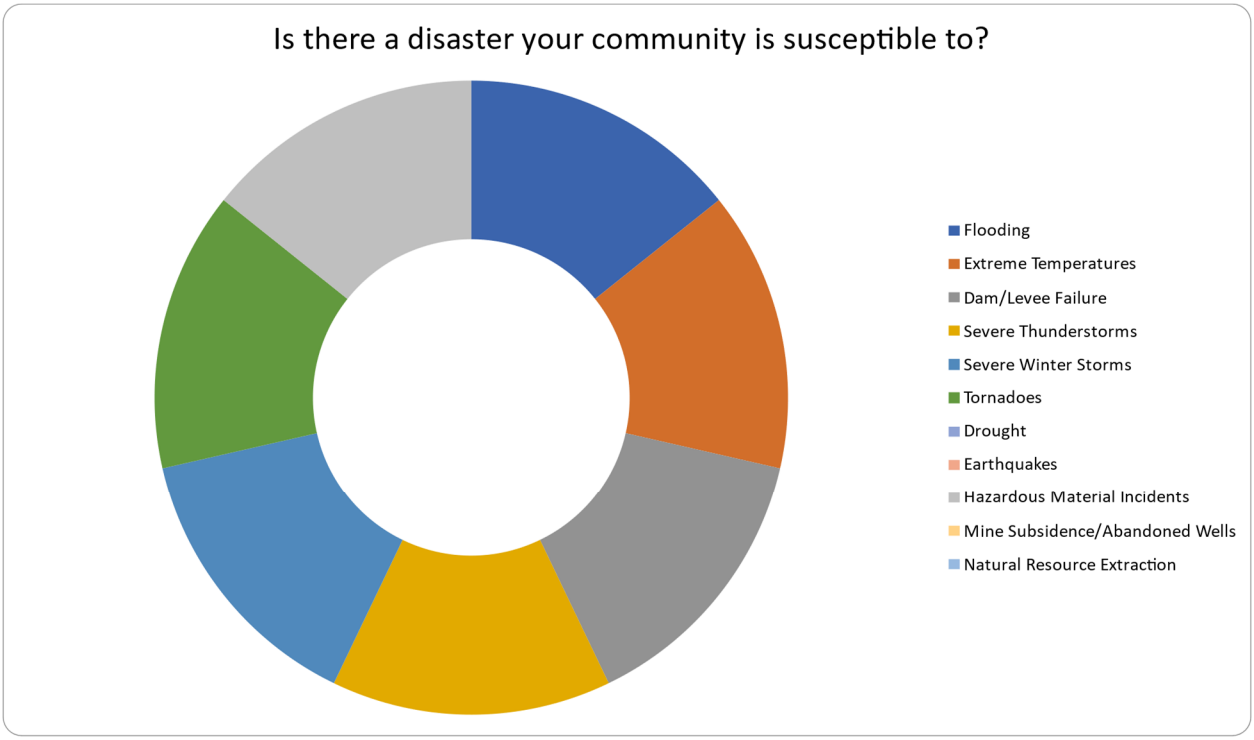
TABLE 3-9 AGE OF SURVEY PARTICIPANTS

Age Range	Number of Respondents
18-29 years old	0
30-39 years old	0
40-49 years old	0
50-59 years old	0
60-69 years old	1
70-79 years old	0
80+ years old	0

One of the two survey participants responded to the flood insurance question. The one response indicated that the participant does not currently have flood insurance for their home. The top response for the worst historical hazard event the survey participant has experienced in Tuscarawas County was an electric outage caused by a transformer blowing up.

The following pie chart shows the hazards that the participants' communities are vulnerable to. The survey respondents selected the following hazards as the hazards their community is susceptible to: flooding, extreme temperatures, dam/levee failure, severe thunderstorms, severe winter storms, tornadoes, and hazardous material incidents.

FIGURE 3-8 HAZARD VULNERABILITY RESULTS FROM PUBLIC SURVEY



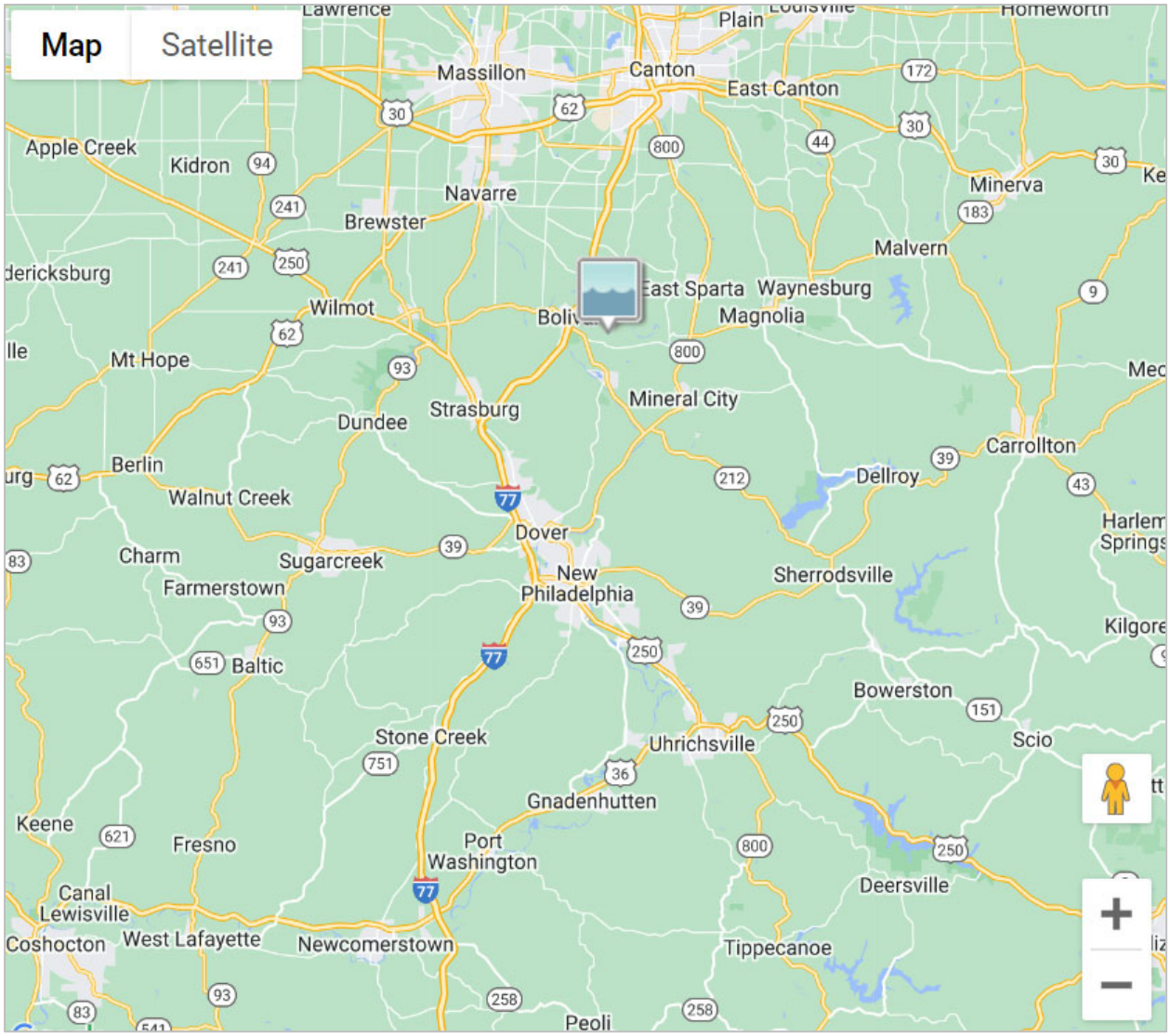
The following table displays the results from the question that asked what challenges the participant's community may delay disaster response. The table includes the challenges that the

participant was able to pick from as well as the number of times the specific challenge was identified as applicable by a survey participant.

Challenge in Community	Number of Participant Selection
Lack of notice prior to a hazard event (i.e., tornado warning or no tornado sirens in area)	1
Not enough emergency personnel to respond to citizens in need	1
Community does not have a plan for post-disaster clean up	0
Post-disaster insurance issues	0
Other	0

The following image shows the geographical results of the interactive map. There was only one marker placed on the interactive map of Tuscarawas County. A flooding marker was placed east of Bolivar, southeast of Bolivar Dam. The respondent added a comment regarding the Tuscarawas River flooding in the location of the flooding marker.

FIGURE 3-9 INTERACTIVE MAP MARKER RESULTS FROM PUBLIC SURVEY



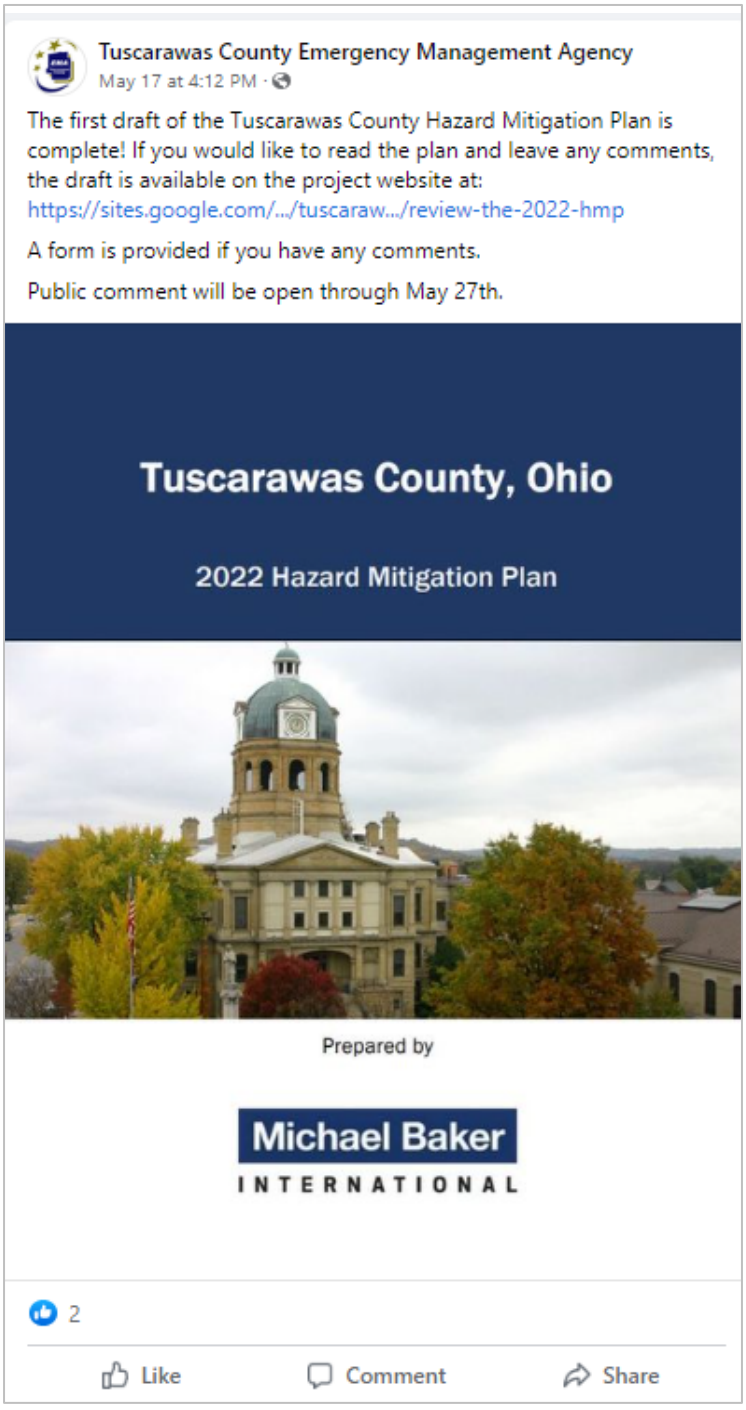
The final slide of the survey provided the participants an opportunity to share thoughts on important steps Tuscarawas County and their local community can take to minimize hazard impacts going forward. Neither survey participant submitted any comments on the last slide of the survey regarding what important steps Tuscarawas County or their local community could take to minimize hazard impacts.

3.4.3 DRAFT PLAN COMMENTS RECEIVED

The plan was posted for public review on the Tuscarawas County Hazard Mitigation Plan website starting May 17th. The comment period for the public was open for two weeks, closing on May 27th. Extensive efforts were made to gather input from the participating jurisdictions, stakeholders, and the public during the draft plan comment period.

Tuscarawas County publicized the draft plan comment period to the public through the Tuscarawas County Emergency Management Agency's Facebook page.

FIGURE 3-10 TUSCARAWAS COUNTY EMA DRAFT PLAN FACEBOOK POST



The county also emailed all jurisdictions that participated in the planning process as well as the list of stakeholders who were invited to participate in the plan's development to alert them of the completed draft and capability of submitting feedback of the plan online.

There were no comments received from Tuscarawas County, the participating jurisdictions, stakeholders, or the public during the draft plan's comment period.

3.4.4 REVIEW AND INCORPORATE EXISTING INFORMATION

The HMPC reviewed and assessed the existing plans, studies, and data available from local, state, and federal sources. The documents reviewed and incorporated as part of the HMP planning process are shown in Table 3-10.

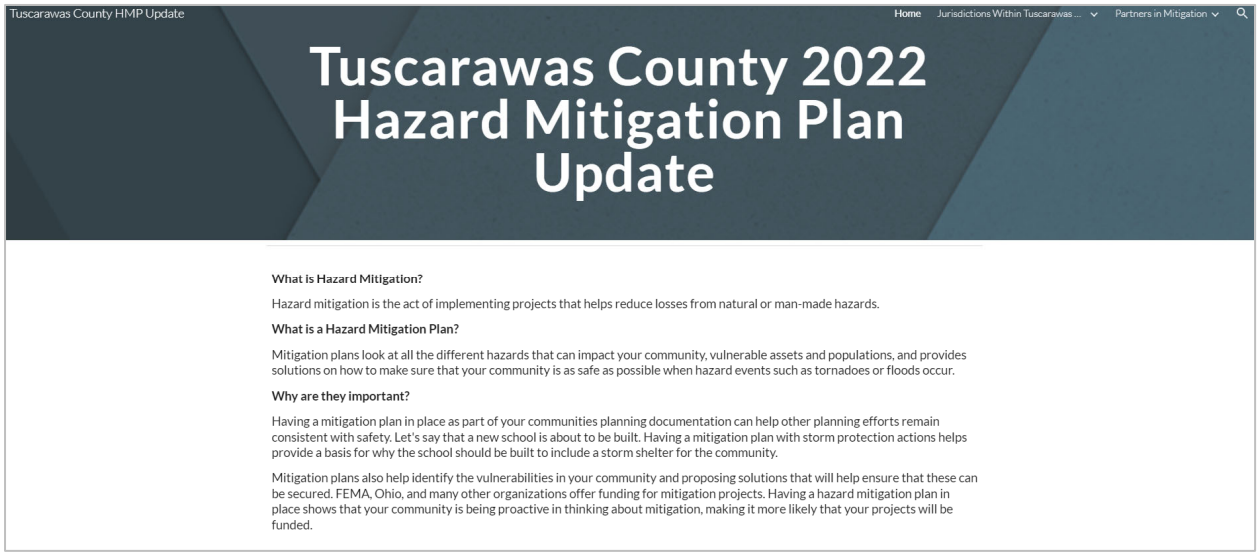
TABLE 3-10 EXISTING PLANS, STUDIES, REPORTS, AND TECHNICAL DATA

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process / Area of Document Inclusion
2017 Tuscarawas County Hazard Mitigation Plan	Used to help identify problems, mitigation goals, strategies and actions; information from the previous plan was used for past data
Ohio Enhanced Mitigation Plan	This plan was consulted for background information and hazard identification
FEMA Local Mitigation Planning Handbook	Local Plan Integration Methods
FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards, January 2013	Mitigation Strategy Development
NOAA Record Storm Events	Death and Injuries Report for past storm and disaster events
State of Ohio Mitigation Assistance Resource Guide	Referenced to identify potential funding sources and programs to assist with mitigation actions

3.4.5 TUSCARAWAS COUNTY HAZARD MITIGATION PLAN WEBSITE

A website was developed for local jurisdictions and stakeholders to provide the information needed to complete the Plan. Upon accessing the website, six forms were available for the local jurisdictions to complete; four forms were available for partners in mitigation, or stakeholders, to complete. Not only does it ensure participation that is required for jurisdictions to be able to adopt the HMPU, but the website adds to the diversity of methods used to encourage holistic involvement by each community. Previous Hazard Assessment, Vulnerability Assessment, Changes in Development, Capability Assessment, Previous Actions, and New Actions Form were provided on the website – the six required forms for each local jurisdiction to complete. Partners in mitigation, or stakeholders, were able to submit response to Previous Hazard Assessment, Vulnerability Assessment, Changes in Development, and Capability Assessment. Contact information was provided should the communities have questions, and examples and links were embedded in the introductions of each form for guidance.

FIGURE 3-11 TUSCARAWAS COUNTY HMPU WEBSITE



3.4.6 ASSESS RISKS

In accordance with FEMA requirements, the 2022 HMPC identified and prioritized the natural, technological, and man-made hazards affecting the county and assessed the county's vulnerability to each one. Results from this phase of the HMP planning process later helped the HMPC identify appropriate mitigation actions to reduce risk in specific locations. This phase of the HMP planning process is detailed in Section 4.

Identify/Profile Hazards

Based on a review of past hazards and of the existing plans, reports, and other technical studies/data/information, the 2022 HMPC developed and identified a list of hazards that could affect Tuscarawas County. The content for each hazard profile is provided in Section 4.

Assess Vulnerabilities

Hazard profiling exposes the unique characteristics of individual hazards and begins the process of determining which areas of the county are vulnerable to specific types of hazard events. Using these methodologies, the team determined vulnerable populations, infrastructure, and potential loss estimates for each hazard. Detailed information on the vulnerability assessment for each hazard is provided in Section 4.

3.4.7 DEVELOP MITIGATION PLAN

The 2022 HMP was prepared in accordance with DMA 2000 and FEMA's HMP guidance documents. It provides an explicit strategy and blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and the county's ability to expand on and improve these existing tools. Developing the mitigation plan involved identifying goals, assessing existing capabilities, and identifying mitigation actions. This step of the HMP planning process is detailed in Section 5 and summarized below.

Identify Goals
The HMPC developed goals and objectives for the 2022 HMP, based on current information. These are presented in Section 5.

Develop Capability Assessment
A Capability Assessment is a comprehensive review of the various mitigation capabilities and tools currently available to the county to apply the mitigation actions prescribed in the 2022 HMP. The HMPC identified the technical, financial, and administrative capabilities to implement mitigation actions, as detailed in Section 5.

Identify Mitigation Actions
As part of the 2022 HMP planning process, the HMPC worked to identify and develop mitigation actions with implementation elements. Mitigation actions were prioritized, and detailed implementation strategies were developed during and after the individual meetings held with the communities. A detailed approach for the review of the existing mitigation actions, the identification and prioritization of new mitigation actions, and the creation of the implementation strategy is provided in Section 5.

Draft HMP
Once the risk assessment and mitigation strategy were completed, information, data, and associated narratives were compiled into the 2022 HMP.

Plan Review and Revision
County staff and external stakeholders reviewed the plan. All comments were incorporated into the final version.

Plan Approval
FEMA Region 5 approved the plan on December 12, 2022.

Plan Maintenance
Plan maintenance procedures, found in Section 6, include the measures the county will take to ensure the HMP's continuous, long-term implementation. The procedures also include the way the HMP will be regularly monitored, reported upon, evaluated, and updated to remain a current and meaningful planning document.

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SECTION 4. HAZARD IDENTIFICATION AND RISK ASSESSMENT (HIRA)

Hazard Identification and Risk Assessment is the process of measuring the potential effects of natural, technological, and man-made hazards on life, property and the economy. The risk assessment is meant to identify, as much as practical given the existing/available data, a community's qualitative and quantitative vulnerabilities. The results of the risk assessment provide a framework for a better understanding potential impacts to the community and a foundation on which to develop and prioritize mitigation actions (see Section 5). Mitigation actions can reduce damage from all disasters. An implementation strategy can direct scarce resources to the areas of greatest vulnerability, as described in this section.

This risk assessment follows the methodology described in FEMA publication *386-2 (2002)*, *Understanding Your Risks—Identifying Hazards and Estimating Losses.* The publication outlines a four-step process:

1) Identify hazards

2) Profile hazard events

3) Inventory assets

4) Estimate losses

Information related to these four steps and gathered during the planning process is incorporated into the discussions in this chapter.

This section identifies and prioritizes the identified natural, technological, and man-made hazards that threaten Tuscarawas County. The reasoning for omitting some hazards from further consideration is also provided.

Section 4, Sub-sections 1 through 13 The Hazard Profiles describe each hazard that poses a threat to the county. They include information on the location, extent/magnitude/severity, previous occurrences, and likelihood of future occurrences.

Each hazard profile includes a Vulnerability Assessment, which presents the county's exposure to natural and man-made hazards and identifies at-risk populations and assets, including critical facilities. Where information was available, potential dollar loss estimates for facilities show a partial representation of the financial cost of a disaster.

IDENTIFYING THE HAZARDS

Per FEMA guidance, the first step in developing a Risk Assessment is to identify the hazards. The HMPC reviewed several previously prepared hazard mitigation plans and other relevant documents to determine the universe of all-hazards planning with respect to the county.

Hazards were ranked to provide structure and to prioritize the mitigation goals and actions discussed in this plan. Ranking was both quantitative and qualitative. The quantitative analysis considered all the information available, including GIS data and official government records. The qualitative approach, the Risk Factor (RF) approach, was used to rank the specific risks associated with each hazard. This process can also be used as a valuable cross-check or validation of the quantitative analysis.

The RF approach combines historical data, local knowledge, and consensus opinions to produce numerical values; they can be used to rank identified hazards against one another. During the planning process, the Steering Committee checked the results of the hazard profile with their local and historical knowledge to generate a set of ranking criteria. These criteria were used to evaluate hazards and identify the highest risk hazard.

RF values are obtained by assigning varying degrees of risk to five categories for each hazard: probability, impact, spatial extent, warning time, and duration. Each degree of risk was assigned a value from 1 to 4, and the Steering Committee agreed on a weighting factor for each category. To calculate the RF value for a given hazard, the assigned risk value for each category was multiplied by the weighting factor. The sum of all five categories is equal to the final RF value, as demonstrated in the sample equation below:

TABLE 4-1 RISK FACTOR CRITERIA

Risk Assessment Category	Level	Degree of Risk Level	Index	Weight
PROBABILITY What is the likelihood of a hazard event occurring in a given year?	**Unlikely**	Less Than 1% Annual Probability	1	30%
	Possible	Between 1 and 10% Annual Probability	2	
	Likely	Between 10 and 100% Annual Probability	3	
	Highly Likely	100% Annual Probability	4	
IMPACT *In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?*	**Minor**	Very few injuries, if any. Only minor property damage and minimal disruption of quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries only. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths/injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one week.	3	
	Catastrophic	High number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
GEOGRAPHIC LOCATION *How large of an area could be impacted by a hazard event? Are impacts localized or regional?*	**Negligible**	Less Than 1% Of Area Affected	1	20%
	Small	Between 1 and 10% Of Area Affected	2	
	Moderate	Between 10 and 50% Of Area Affected	3	
	Large	Between 50 and 100% Of Area Affected	4	
WARNING TIME *Is there usually some lead time associated with the hazard event? Have warning measures been implemented?*	**More than 24 HRS**	Self-Defined	1	10%
	12 to 24 HRS	Self-Defined	2	
	6 to 12 HRS	Self-Defined	3	
	Less than 6 HRS	Self-Defined	4	
DURATION *How long does the hazard event usually last?*	**Less than 6 HRS**	Self-Defined	1	10%
	Less than 24 HRS	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	
RF Value = [(Probability x .30) + (Impact x .30) + (Geographic Location x .20) + (Warning Time x .10) + (Duration x .10)]				

According to the default weighting scheme applied, the highest possible RF value is 4.0. The methodology illustrated above lists the categories used to calculate the variables for the RF value.

Table 4-2 provides the risk factor value for each hazard profiled in this plan, with the numerical value assigned to that hazard. The index values are averages of the values given by the committee, so they are displayed as their exact values, not whole numbers. The risk factor is developed through assessing the probability, impact, spatial extent, warning time, and duration of each hazard type.

TABLE 4-2 TUSCARAWAS COUNTY RISK FACTOR HAZARDS

Natural Hazards		Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
1	Dam/Levee Failure	1	0.3	4	1.2	4	0.8	4	0.4	4	0.4	3.1
2	Extreme Temperatures	4	1.2	2	0.6	4	0.8	2	0.2	2	0.2	3.0
3	Severe Thunderstorms	4	1.2	2	0.6	3	0.6	3	0.3	1	0.1	2.8
4	Flooding	4	1.2	2	0.6	2	0.4	2	0.2	2	0.2	2.6
5	Health Related Emergencies	2	0.6	2	0.6	4	0.8	2	0.2	4	0.4	2.6
6	Severe Winter Storms	3	0.9	2	0.6	3	0.6	2	0.2	1	0.1	2.4
7	Tornadoes	3	0.9	2	0.6	1	0.2	4	0.4	2	0.2	2.3
8	Drought	2	0.6	1	0.3	4	0.8	1	0.1	4	0.4	2.2
9	Earthquakes	1	0.3	1	0.3	2	0.4	4	0.4	1	0.1	1.5
Technological Hazards		**Probability**		**Impact**		**Spatial Extent**		**Warning Time**		**Duration**		**RF Rating**
1	Hazardous Materials Incidents	4	1.2	3	0.9	2	0.4	4	0.4	1	0.1	3.0
2	Terrorism	1	0.3	3	0.9	2	0.4	4	0.4	3	0.3	2.3
3	Mine Subsidence/Abandoned Wells	2	0.6	1	0.3	1	0.2	3	0.3	2	0.2	1.6
4	Natural Resource Extraction	1	0.3	1	0.3	1	0.2	4	0.4	2	0.2	1.4

Table 4-3 shows the hazards that are included in Ohio's State HMP and those in the previous version of the plan, implemented in 2017. In this plan update, the hazards Tuscarawas County is vulnerable to have remained the same since the previous plan was developed.

TABLE 4-3 HAZARDS INCLUDED IN THE 2022 PLAN UPDATE

Hazard Addressed	Ohio HMP	Tuscarawas 2017	Tuscarawas 2022	Notes
Flood	O	O	O	Titled "Flooding" in previous and updated HMP for Tuscarawas
Tornado	O	O	O	
Winter Storm	O	O	O	Titled "Severe Winter Storms" in previous and updated HMP for Tuscarawas
Landslide	O	X	X	Not a concern for the county
Dam/Levee Failure	O	O	O	Previous plan for Tuscarawas only had Dam Failure profiled; plan update includes Levee Failure as there is a levee located in Zoar
Wildfire	O	X	X	Not a concern for the county
Seiche/Coastal Flooding	O	X	X	There are no coasts located in Tuscarawas County
Earthquake	O	O	O	
Coastal Erosion	O	X	X	There are no coasts located in Tuscarawas County
Drought	O	O	O	
Severe Summer Storms	O	O	O	Titled "Severe Thunderstorms" in previous and updated HMP for Tuscarawas
Invasive Species	O	X	X	Not a concern for the county
Land Subsidence	O	O	O	Covered under mine subsidence
Extreme Temperatures	X	O	O	
Hazardous Material Incident	X	O	O	
Mine Subsidence/Abandoned Wells	X	O	O	
Natural Resource Extraction	X	O	O	
Health-Related Emergencies	X	X	O	Also includes a brief narrative regarding opioid usage
Terrorism	X	X	O	

Previous hazard occurrences were used to validate existing hazards and identify new hazard risks. Previous occurrences provide a historical view of hazard risk and a window into hazards that could affect Tuscarawas County and its population in the future. The information in Table 4-4 about federal and state disaster declarations in the county was compiled from FEMA and Ohio databases. According to FEMA, Tuscarawas County has been a part of 13 disaster declarations to date; seven of these received public assistance dollars and five received individual assistance.

TABLE 4-4 DECLARED DISASTERS AFFECTING TUSCARAWAS COUNTY (OEMA, FEMA)

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-266	7/15/1969	Tornadoes, Severe Storms, Flooding	-	-
EM-3029	2/2/1977	Snowstorms	-	-
EM-3055	1/26/1978	Blizzards and Snowstorms	-	-
DR-1227	6/30/1998	Severe Storms, Flooding, and Tornadoes	-	-
DR-1507	1/26/2004	Severe Storms, Flooding, Mudslides, and Landslides	$11,703,087.98*	$1,238,534.80*
DR-1519	6/3/2004	Severe Storms and Flooding	$10,648,040.68*	$19,193,921.30*
DR-1556	9/19/2004	Severe Storms and Flooding	$25,804,256.17*	$23,662,227.18*
DR-1580	2/15/2005	Severe Winter Storms, Flooding and Mudslides	$97,938,844.86*	$10,017,388.91*
EM-3250	9/13/2005	Hurricane Katrina Evacuation	$2,541,599.60*	-
DR-1805	10/24/2008	Severe Wind Storm Associated with Tropical Depression Ike	$38,841,921.56*	-
EM-3346	6/30/2012	Severe Storms	-	-
EM-3457	3/13/2020	COVID-19	-	-
DR-4507	3/31/2020	COVID-19 Pandemic	$294,417,803.70*	$85,968,094.74*

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster, not just Tuscarawas County.*

Based on the review of hazards identified in similar and relevant documents, previous incidents, historical knowledge of local events, and hazard trends, the HMPC identified 13 hazards to profile in this HMP. Nine are natural hazards: extreme temperatures, severe thunderstorms, severe winter storms, flooding, tornadoes, drought, earthquakes, dam/levee failure, and health-related emergencies. Four are technological or man-made hazards: hazardous materials incidents, mine subsidence/abandoned wells, natural resource extraction, and terrorism.

A hazard of emerging concern for Tuscarawas County is opioid usage. While there is not a full profile on this hazard in the 2022 HMP, it is a man-made hazard to continue to monitor over the lifespan of the HMP for consideration of inclusion as a hazard in future HMP updates.

Starting in the late 1990s, physicians began to prescribe opioid pain relievers to patients more often, causing an increase in patients addicted to the opioid pain relievers. Opioid pain relievers include prescribed pills, methamphetamine, heroin, and synthetic opioids, like fentanyl. In 2017, the U.S. Department of Health and Human Services declared a public health emergency regarding the opioid epidemic in the United States. The Center for Disease Control and Prevention (CDC) reports that since 1999, approximately 841,000 people have died from a drug overdose. In 2019 alone, over 70% of the drug overdose deaths were the result of opioid usage.

The Tuscarawas County Health Department has a program titled Project Dawn in response to the opioid epidemic in the county. Project Dawn identifies common opioids in the county, which are

largely prescription pain medications and heroin. The following table shows the total number of opioid overdose deaths in Tuscarawas County residents. The asterisk identifies that the data for the reporting year is not complete due to toxicology reports not yet being completed or not all data has been entered for the reporting year.

TABLE 4-5 TUSCARAWAS COUNTY OPIOID OVERDOSE DEATHS, TUSCARWAS COUNTY HEALTH DEPARTMENT

Year	Number of Overdose Deaths
2015	8
2016	12
2017	20
2018	10
2019	12
2020*	24
2021*	7

The following table displays the results of the Risk Evaluation form completed by each Tuscarawas County jurisdiction as well as stakeholders that submitted responses. The form asks respondents to evaluate how the hazards from the previous plan have changed in regards to risk to the jurisdiction. “I” indicates that the jurisdiction has seen an increase in risk to the hazard; “D” indicates that the jurisdiction has seen a decrease in risk to the hazard; and “NC” indicates the jurisdiction has seen no change in risk to the hazard.

TABLE 4-6 TUSCARAWAS COUNTY RISK EVALUATION FORM RESPONSES

	Tuscarawas County	Dover	New Philadelphia	Uhrichsville	Baltic	Barnhill	Bolivar	Dennison	Gnadenhutten	Midvale	Mineral City	Newcomerstown	Parral	Port Washington	Roswell	Stone Creek	Strasburg	Sugarcreek	Tuscarawas	Zoar	Trinity Twin City Medical Center	Tuscarawas County Regional Planning and Floodplain Office
Extreme Temperatures	NC	NC	NC	NC	I	NC	NC	I	NC	NC	NC	NC	NC	NC	NC	I	NC	NC	NC	NC	NC	I
Severe Thunderstorms	NC	NC	I	NC	I	NC	NC	I	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	I	NC	NC	I
Severe Winter Storms	I	NC	I	I	I	NC	I	I	D	I	NC	D	I	NC	NC	NC	I	NC	D	NC	NC	NC
Flooding	I	I	I	NC	NC	NC	NC	I	NC	NC	NC	I	I	NC	NC	I	NC	I	I	D	NC	I
Tornado	NC	NC	NC	NC	NC	NC	I	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	I	I
Drought	D	NC	D	NC	NC	NC	NC	NC	NC	D	NC	NC	NC	NC	NC	NC	NC	NC	I	NC	NC	I
Earthquake	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Dam/Levee Failure	D	D	I	NC	NC	NC	D	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Hazardous Materials Release/Spill	I	NC	I	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	I	NC	NC
Mine Subsidence/Abandoned Wells	NC	NC	I	NC	NC	NC	I	NC	NC	NC	NC	NC	NC	NC	NC	D	NC	NC	NC	NC	NC	NC
Natural Resource Extraction	NC	NC	NC	NC	NC	NC	I	I	NC	NC	NC	NC	NC	NC	NC	D	NC	I	NC	NC	NC	NC

HAZARD EVENT DATA

A variety of information sources were consulted to develop the hazard profiles in this plan, including data from the National Oceanic and Atmospheric Administration (NOAA), the National Climatic Data Center (NCDC), and regional National Weather Service (NWS) locations. This data is largely available at a countywide scale, but jurisdiction-level details are often available as well.

NOAA did not record data events for all of the hazards that it currently reports for beginning in 1950. From 1950-1954, the only data recorded was for tornado hazard events. Then from 1955-1992, NOAA began recorded event data for the hazards of tornado, thunderstorm wind and hail. Starting in 1996 to present day, NOAA began to record and report event data for the forty-eight hazards that users can select to view on the database's page. The hazards the NOAA reports event data for are: astronomical low tide, avalanche, blizzard, coastal flood, cold/wind chill, debris flow, dense fog, dense smoke, drought, dust devil, dust storm, excessive heat, extreme cold/wind chill, flash flood, flood, freezing fog, frost/freeze, funnel cloud, hail, heat, heavy rain, heavy snow, high surf, high wind, hurricane (typhoon), ice storm, lake-effect snow, lakeshore flood, lightning, marine hail, marine high wind, marine strong wind, marine thunderstorm wind, rip current, seiche, sleet, sneakerwave, storm surge/tide, strong wind, thunderstorm wind, tornado, tropical depression, tropical storm, tsunami, volcanic ash, waterspout, wildfire, winter storm, and winter weather.

EVENT NARRATIVES

Within the section for each hazard, a series of narratives provides greater detail on specific events that affected the county. This section (Historical Occurrences, or in some cases Hazard Events/ Historical Occurrences) is not meant to be a comprehensive list of Tuscarawas County events. Rather, it provides a context for why the plan includes this hazard.

HAZARD PROFILES

Hazards are profiled individually in this section, in order of priority based on the Risk Factor calculations. These profiles have a baseline definition and describe the hazard in relation to Tuscarawas County. Hazard profiles are used to develop a vulnerability assessment, where the community's vulnerability to each hazard deemed significant by the Planning Committee is quantified in terms of population and assets affected.

The hazards that are technological or man-made include additional details in each profile's summary that briefly discuss mitigation best practices, as these hazards are not included in standard mitigation handbooks.

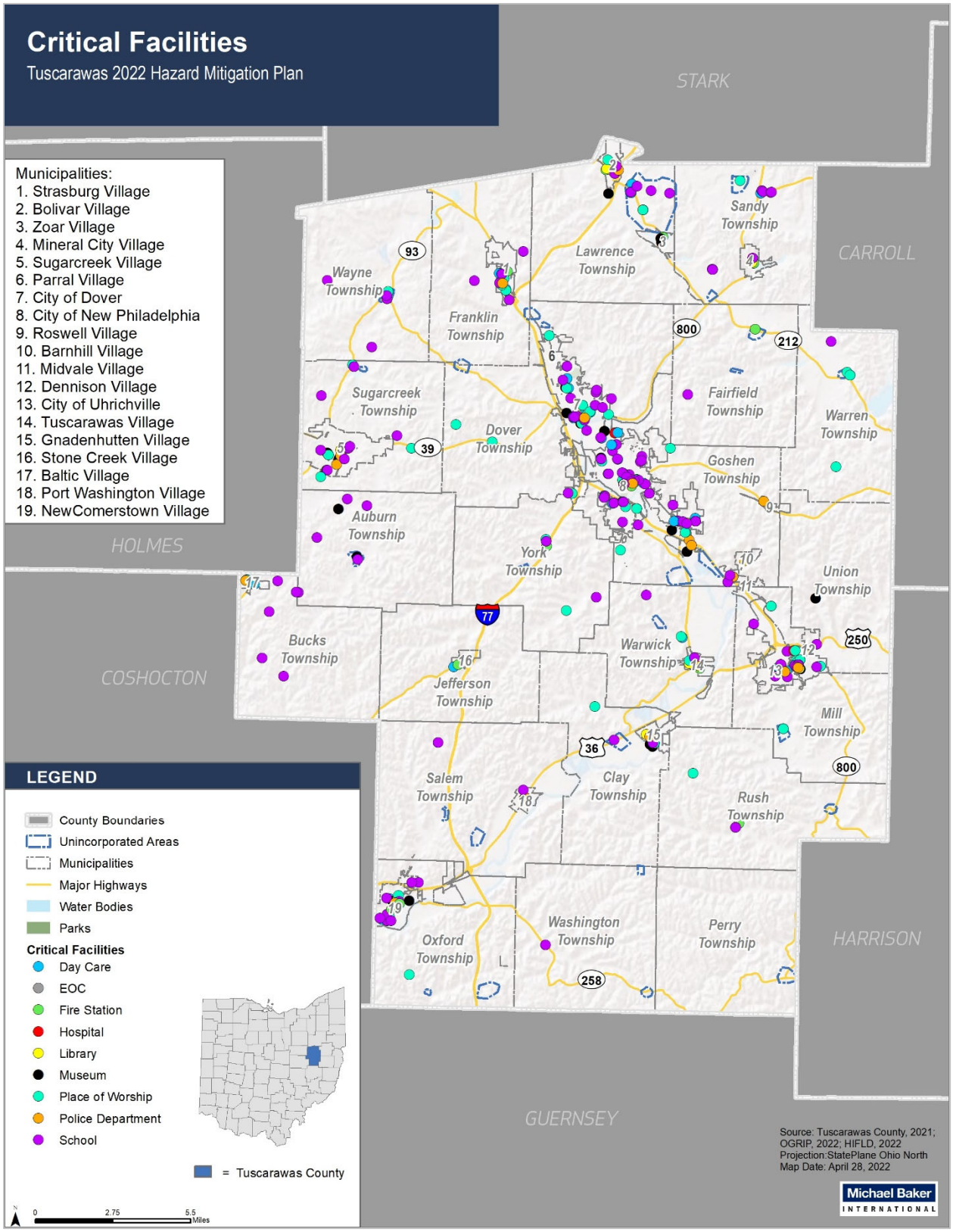
CRITICAL FACILITIES

The Planning Committee identified the types of structures they consider to be "critical" to the county's day-to-day operations. This includes day cares (38), emergency operations centers (1), fire stations (21), hospitals (2), libraries (16), museums (30), places of worship (83), police stations (18), and schools (149). Tuscarawas County has 358 critical facilities, which are mapped in Figure 4-1.

TABLE 4-7 COUNTY CRITICAL FACILITIES

Category	Number	Source
Day Cares	38	HIFLD
Emergency Operations Centers	1	Google Maps
Fire Stations	21	HIFLD
Hospitals	2	OGRIP
Libraries	16	ESRI
Museums	30	ESRI
Places of Worship	83	HIFLD
Police Stations	18	HIFLD
Schools	149	OGRIP
Grand Total	**358**	

FIGURE 4-1 TUSCARAWAS COUNTY CRITICAL FACILITIES



Natural Hazards

1. DAM/LEVEE FAILURE

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Dam/Levee Failure	**1**	0.3	**4**	1.2	**4**	0.8	**4**	0.4	**4**	0.4	**3.1**
High Risk Hazard (3.0 – 4.0)											

4.1.1 DAM/LEVEE FAILURE DESCRIPTION

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

A dam impounds water in the upstream area, referred to as the reservoir. The amount of water impounded is measured in acre-feet. An acre-foot is the volume of water that covers an acre of land to a depth of one foot. As a function of upstream topography, even a very small dam may impound or detain many acre-feet of water. Two factors influence the potential severity of a full or partial dam failure: the amount of water impounded, and the density, type, and value of development and infrastructure located downstream.

A levee, unlike a dam, is an elongated ridge constructed of fill or wall which regulates water levels. These are usually earthen hills built along a river's floodplain to prevent flooding in nearby population areas. Typically, these run parallel to a river. **According to the National Levee Inventory, there is one levee in Tuscarawas County.**

Dam and levee failures typically occur when spillway capacity is inadequate and excess flow overtops the dam, or when internal erosion (piping) through the dam or foundation occurs. Complete failure occurs if internal erosion or overtopping results in a complete structural breach, releasing a high-velocity wall of debris-laden water that rushes downstream.

Dam and levee failures can result from any one or a combination of the following causes:

- **Prolonged periods of rainfall and flooding**, which cause most failures;
- **Inadequate spillway capacity**, resulting in excess overtopping flows;
- **Internal erosion** caused by embankment or foundation leakage or piping;
- **Improper maintenance**, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational component;
- **Improper design**, including the use of improper construction materials and construction practices;
- **Negligent operation**, including the failure to remove or open gates or valves during high flow periods;
- **Failure of upstream dams** on the same waterway;
- **Landslides into reservoirs**, which cause surges that result in overtopping;

- **High winds**, which can cause significant wave action and result in substantial erosion; and
- **Earthquakes**, which typically cause longitudinal cracks at the tops of the embankments, which can weaken entire structures.

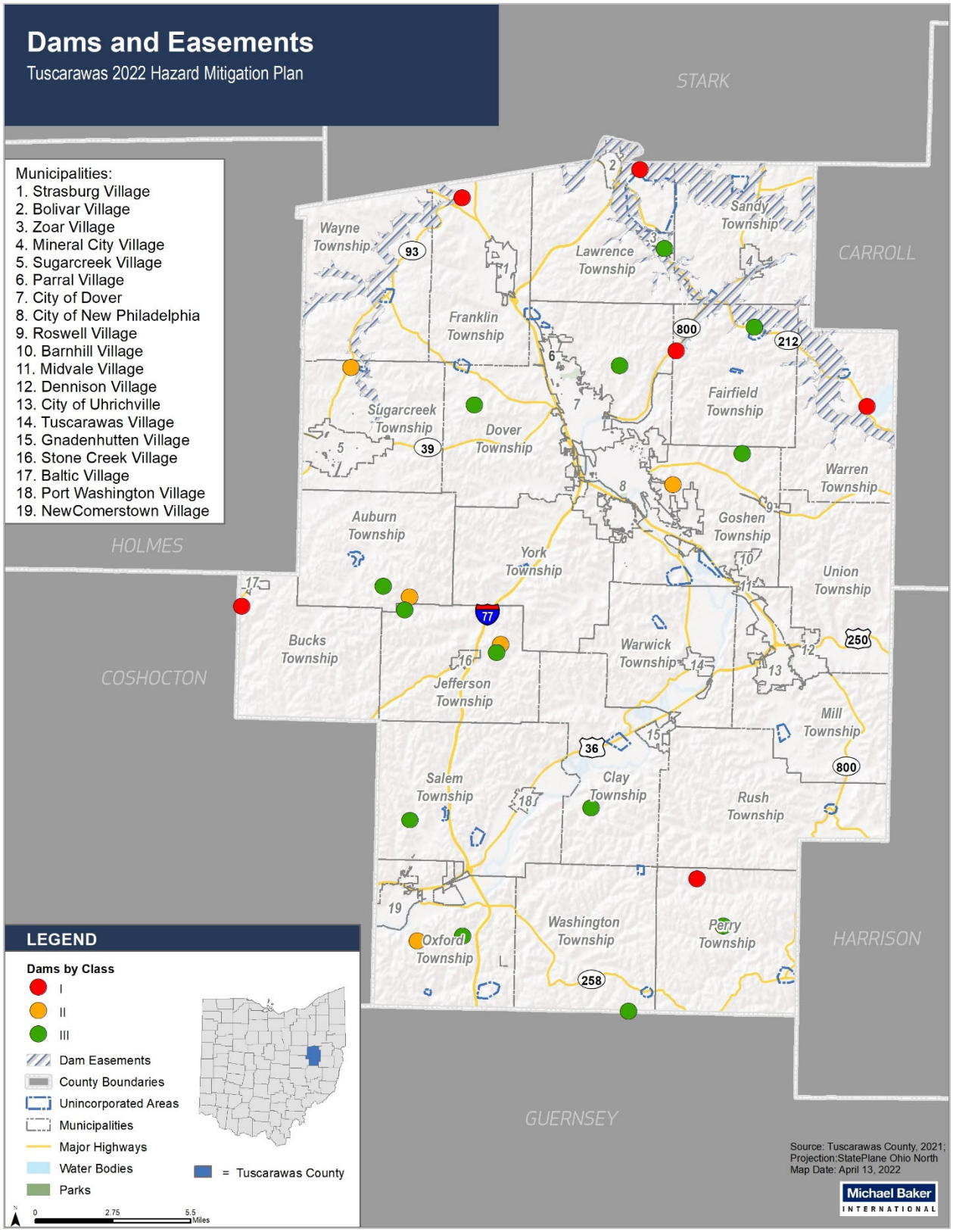
Dams are considered to be localized in the state and are most likely to affect inundation areas downstream and immediate areas around the dam or levee. Discharge from a dam breach is usually several times the 1% chance flood, and, therefore, typical flood studies are of limited use in estimating the extent of flooding.

Determining the impact of flooding is difficult to accomplish, especially for estimating loss of life. Loss of life is a function of the time of day, warning time, awareness of those affected and particular failure scenarios. Many dam safety agencies have used "population at risk", a more quantifiable measurement of the impact to human life, rather than "loss of life". Population at risk is the number of people in structures within the inundation area that would be subject to significant personal danger, if they took no action to evacuate. The impacts of a dam failure are contingent on many factors and, therefore, cannot be concisely described.

4.1.2 DAM/LEVEE FAILURE LOCATION

There are 26 dams located in Tuscarawas County according to the National Inventory of Dams database, as shown in the following figure.

FIGURE 4-2 TUSCARAWAS COUNTY DAMS



There is a levee located in Zoar, which is associated with Zoar Dam. The levee spans 0.76 miles in length and was constructed and is operated by the United States Army Corps of Engineers (USACE). The levee is an accredited levee system under the FEMA NFIP. There has not been a risk evaluation completed on the levee, according to the National Levee Database.

FIGURE 4-3 ZOAR LAKE LEVEE

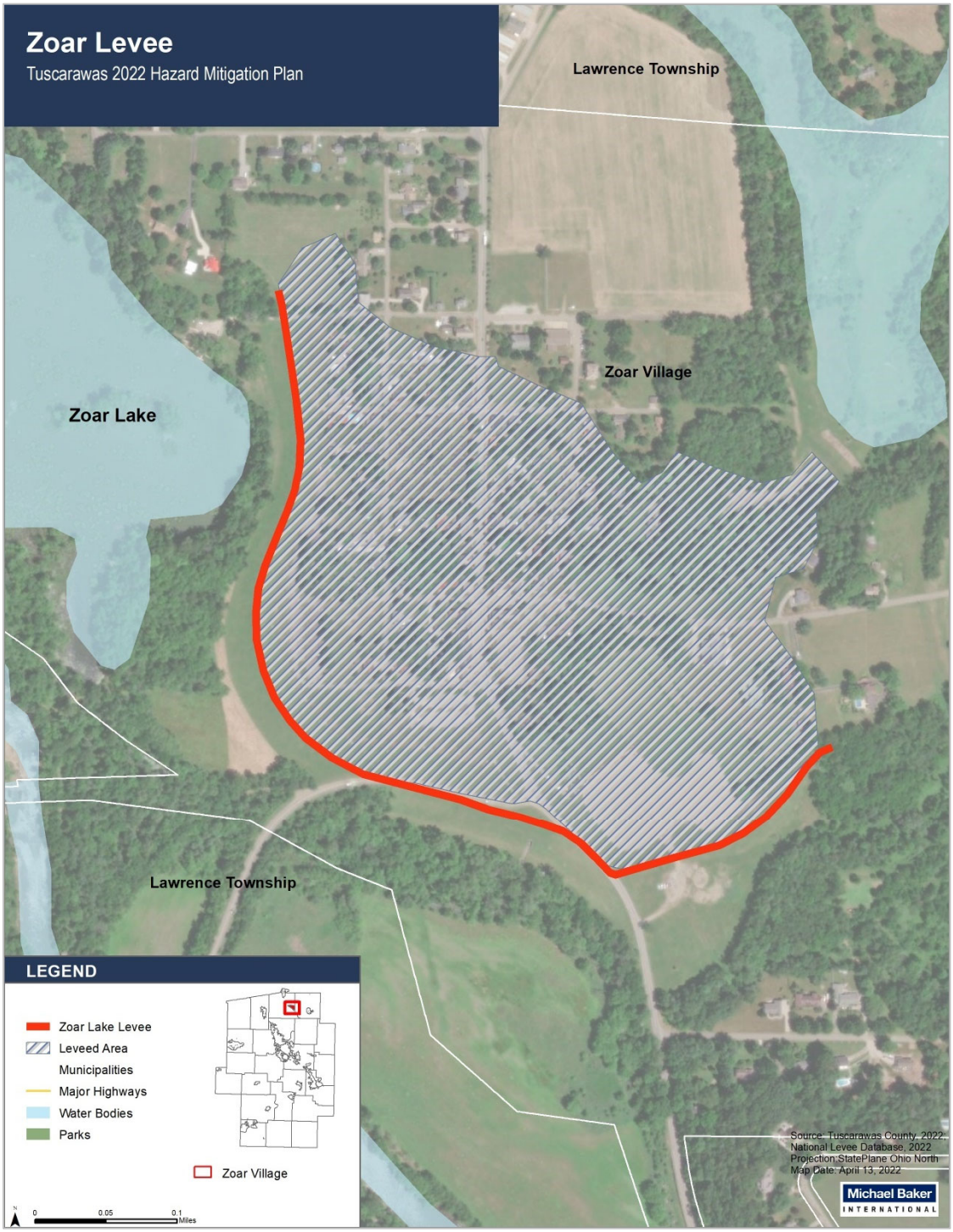
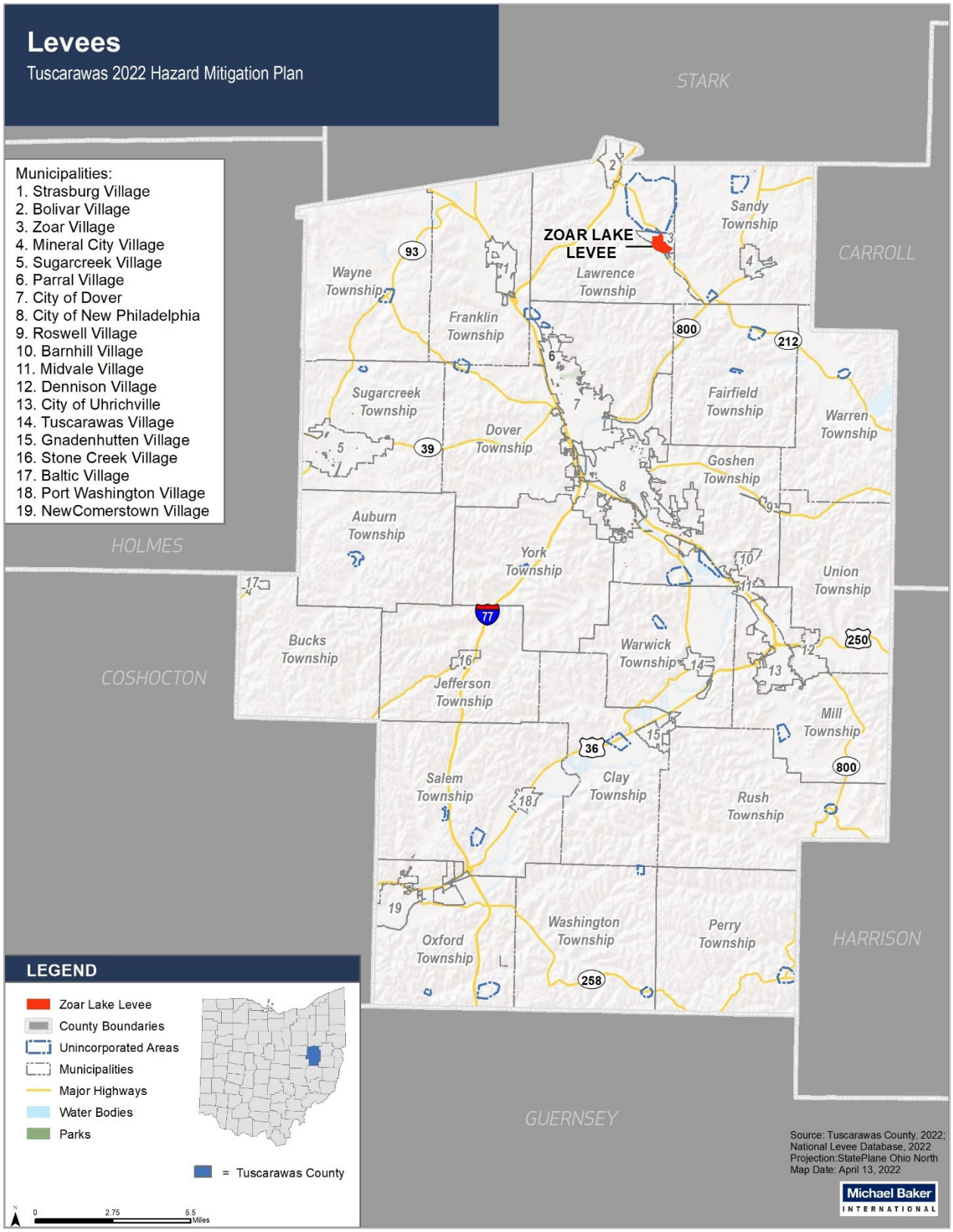


FIGURE 4-4 LEVEES IN TUSCARAWAS COUNTY



4.1.3 EXTENT

The severity of a dam failure depends mostly on what class the dam is, where it is located, and what caused it to fail. The inundation zone as defined by each Emergency Action Plan (EAP) shows what areas will be the most heavily impacted during a dam failure event. During these events, hazardous materials such as agricultural chemicals and wastes, solid wastes, raw sewage, common household chemicals, and loose mud and concrete can worsen rescue and cleanup operation. Much of the damage done during a dam failure will be downstream and within the immediate area.

Many dams throughout Ohio were created 50 years ago or more. These dams present the possibility that at some point in time they may fail. If this is the case, there will be damage to the surrounding area. According to the Ohio Department of Natural Resources, the damage predicted by a dam failure coincides with the class of the dam. The potential downstream hazard is broken into four classes.

- Class I – Probable loss of life, serious hazard to health, structural damage to high value property (i.e., homes, industries, and major public utilities.).
- Class II – Floodwater damage to homes, businesses, and industrial structures (no loss of life envisioned); damage to state and interstate highways, railroads; only access to residential areas.
- Class III – Damage to low value non-residential structures, local roads, agricultural crops and livestock.
- Class IV – Losses restricted mainly to the dam

ODNR also classifies dams by the height of dam:

- Class I – greater than 60 feet
- Class II – greater than 40 feet
- Class III – greater than 25 feet
- Class IV – less than or equal to 25 feet

Also by storage volume:

- Class I – greater than 5000 acre-feet
- Class II – greater than 500 acre-feet
- Class III – greater than 50 acre-feet
- Class IV – less than or equal to 50 acre-feet

Another way to classify dam failure in terms of extent is through FEMA's High Hazard Potential Classification. The classification has three categories of potential impacts a dam failure would create:

1. Low Hazard Potential: Dams assigned the low hazard potential classification are those where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner's property.

2. **Significant Hazard Potential:** Dams assigned the significant hazard potential classification are those dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, disruption of lifeline facilities, or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
3. **High Hazard Potential:** Dams assigned the high hazard potential classification are those where failure or mis-operation will probably cause loss of human life.

TABLE 4-8 HIGH-HAZARD DAM INFORMATION FOR TUSCARAWAS COUNTY

Dam Name	Class	Hazard Potential	EAP	Owner
Bolivar Dam	I	High	Y	USACE – Huntington District
Zoar Diversion Dam	I	High	Y	USACE – Huntington District
Dover Dam	I	High	Y	USACE – Huntington District
Beach City Dam	I	High	Y	USACE – Huntington District
Atwood Lake Dam	I	High	Y	USACE – Huntington District
Sleepy Hollow Lake Dam[1]	I	High	Y	Private
Sugarcreek Sportsman Club Lake Dam	I	High	N	Private
Marsh Lake Dam	II	Significant	Y	Private
Pine Lake No. 1 Dam	II	Significant	Y	Private
Rutledge Lake Dam	II	Significant	N	Private
Memory Lake Dam	II	Significant	N	Private
Maple Valley Lake Dam	II	Significant	N	Private
The Farm Lake Dam	III	Low	N	Private
Arnold Lake Dam	III	Low	N	Private
Lake Greenbriar Dam	III	Low	Y	Private
Devils Den Park Lake No. 2 Dam	III	Low	Y	Private
Twelve Pack Lake Dam	III	Low	N	Private
Welch Pond Dam	III	Low	N	Private
Camp Jungen Lake Dam	III	Low	Y	Private
Tall Timber Lake Dam	III	Low	N	Private
Synder's Horse Farm Pond Dam	III	Low	N	Private
Lahmers Lake Dam	III	Low	N	Private
Dover Dam – Fairfield Levee	III	Low	Y	USACE – Huntington District
Beach City Dam – Silica Sand Levee	III	Low	Y	USACE – Huntington District
Dover Dam – U.S. Brick Levee	III	Low	Y	USACE – Huntington District
Dover Dam – Corundite Levee	III	Low	Y	USACE – Huntington District

Ohio Department of Natural Resources classify levees into three different classes:

- **Class I:** probable loss of human life, structural collapse of at least one residence or one commercial or industrial business
- **Class II:** disruption of a public water supply or wastewater treatment facility, or other health hazards; flooding of residential, commercial, industrial, or publicly owned structures; flooding

[1] January of 2020 – Work on this dam was stopped by judicial order after several active projects were found to not have approval from the Chief of the Ohio Department of Natural Resources (ODNR).

of high-value property; damage or disruption to major roads including but not limited to interstate and state highways, and the only access to residential or other critical areas such as hospitals, nursing homes, or correctional facilities as determined by the chief; damage or disruption to railroads or public utilities

- Class III: a levee having a height of not more than three feet and a levee having a height of more than three feet when sudden failure of the levee would result in at least one of the following conditions: property losses including but not limited to rural buildings not otherwise described in this rule; damage or disruption to local roads including but not limited to roads not otherwise listed as major roads in this rule; property losses restricted mainly to the levee and to the owner's property or to rural lands.

4.1.4 HISTORICAL OCCURRENCES

Dam Failure

While there have not been any reported dam failure events in Tuscarawas County, unapproved construction on the Sleepy Hollow Lake Dam was halted by an Ohio judge in January 2020. The construction on the Class I dam was halted after inspectors noted that the unapproved construction modifications had created a public safety hazard. The unapproved construction included excavation along the spillway and construction of a new spillway.

Levee Failure

There have been no recorded levee failures in Tuscarawas County. However, two successive storm events that occurred in 2005 and 2008 loaded the exterior of Zoar Levee with water. This water was then impounded on the Tuscarawas River by Dover Dam. During these two events, significant under seepage was observed that is believed to have the potential to lead to stability issues at the levee.

The United States Army Corps of Engineers completed a study in 2016[2] that outlined steps to be taken to improve the strength of the Zoar Levee. Groundbreaking occurred in August 2020, with the installation of relief wells and a ponding area. The project is currently on schedule to finish by October of 2022.

There have been no levee failure events since the previous plan was developed.

4.1.5 PROBABILITY OF FUTURE OCCURRENCES

For reasons previously mentioned in this section and uncontrollable by humans, it is possible a dam or levee can fail at any time, given the right circumstances. However, the probability of future occurrence for regulated dams and levees can be reduced due to proactive preventative action in compliance with the Ohio Department of Natural Resources – Dam Safety Program. Ohio's Dam Safety Program provides for the regulation and safety of high hazard dams and reservoirs throughout the state in order to protect the health, safety, and welfare of its citizens and their property.

[2] Final Dam Safety Modification Report & Environmental Assessment (https://www.lrh.usace.army.mil/Portals/38/docs/zoar/EA/Zoar%20Environmental%20Assessment%20April%202016.pdf)

The Steering Committee, based on their own knowledge, concluded that dam/levee failure events are "Unlikely" each year. This means that there is a less than 1% chance of occurring annually.

The National Levee Database includes an Incipient Overtopping Annual Exceedance Probability (AEP). The Incipient Overtopping Annual Exceedance Probability for the Zoar Lake Levee is 0.01.

4.1.6 ASSETS EXPOSED TO DAM/LEVEE FAILURE

Potential Losses from Dam/Levee Failure

TABLE 4-9 POTENTIAL IMPACTS FROM DAM/LEVEE FAILURE

Impact	Description
People	Loss of life and injury is most likely in Class I breaches. Fatalities could be expected in the dozens or hundreds depending on population density. Communities can become isolated due to impassable roads.
Infrastructure	Entire buildings can be washed away, or otherwise flooded irreparably. Power outages from disrupted underground utilities.
Economy	Significant or catastrophic dam failures can wipe out large portions of a single small town. Residents may move away permanently, and jobs may be lost.
Natural Systems	Flooding can destroy large tracts of land. Alteration of riverbeds can occur. Debris can become stuck in place.
Transportation	Bridges, highways, and roads can be destroyed completely. Significant detours will be necessary.

Dam or levee failures can have a greater environmental impact than that associated with a flood event. Large amounts of sediment from erosion can alter the landscape changing the ecosystem. Hazardous materials can be carried away from flooded out properties and distributed throughout the floodplain. Industrial and agricultural chemicals and wastes, solid wastes, raw sewage, and common household chemicals comprise the majority of hazardous materials spread by flood waters along the flood zone, polluting the environment and contaminating private property and the community's water supply. The soil loss from erosion and scouring would be significantly greater because of a large amount of fast-moving water affecting a small, localized area, which would likely change the ecosystem.

In FEMA's Federal Guidelines for Dam Safety, the following impacts are identified:

TABLE 4-10 FEMA DAM HAZARD CLASSIFICATION IMPACTS

Hazard Potential Classification	Loss of Human Life	Economic, Environmental, Lifeline Losses
Low	None expected	Low and generally limited to owner
Significant	None expected	Yes
High	Probable. One or more expected	Yes (but not necessary for this classification)

Community Vulnerability

TABLE 4-11 DAMS IN TUSCARAWAS COUNTY

Name	Owner	Primary Purpose of Dam	Type of Impoundment	Type of Structure	Length (feet)	Height (feet)	Top of Dam Storage (Acre Ft.)
ODNR Class 1 Dams							
Bolivar Dam	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	6,300	87	149,600
Zoar Diversion Dam	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	3,893	45	575
Dover Dam	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Concrete, Gravity	824	73	203,000
Beach City Dam	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	5,600	56	71,600
Atwood Lake Dam	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	3,700	65	49,700
Sleepy Hollow Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	280	28.3	31.5
Sugarcreek Sportsman Club Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	315	19.3	24.4
ODNR Class 2 Dams							
Marsh Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	271	42.5	56.9
Pine Lake No. 1 Dam	Private	Recreation	Dam and Spillway	Earthfill	250	36.3	88
Rutledge Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	602	32.3	109
Memory Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	339	27.4	16
Maple Valley Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	280	26.8	22.9
ODNR Class 3 Dams							
The Farm Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	210	35.1	56.4
Arnold Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	350	34.6	45.6
Lake Greenbriar Dam	Private	Recreation	Dam and Spillway	Earthfill	550	30	29.8
Devils Den Park Lake No. 2 Dam	Private	Recreation	Dam and Spillway	Earthfill	350	28.7	45.5
Twelve Pack Lake Dam	Private	Tailings	Dam and Spillway	Earthfill	445	27.5	132
Welch Pond Dam	Private	Recreation	Dam and Spillway	Earthfill	400	27.6	41.1
Camp Jungen Lake Dam	Private	Recreation	Dam and Spillway	Earthfill, Zoned	325	27	24.8

Name	Owner	Primary Purpose of Dam	Type of Impoundment	Type of Structure	Length (feet)	Height (feet)	Top of Dam Storage (Acre Ft.)
Tall Timber Lake Dam	Private	Recreation	Dam and Spillway	Earthfill, Rockfill	450	26.3	28.2
Synder's Horse Farm Pond Dam	Private	Recreation	Dam and Spillway	Earthfill	480	25.4	31.3
Lahmers Lake Dam	Private	Recreation	Dam and Spillway	Earthfill	430	25.1	48
Dover Dam – Fairfield Levee	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	2,200	30	210,600
Beach City Dam – Silica Sand Levee	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	1,580	21	80,650
Dover Dam – U.S. Brick Levee	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	1,380	20	165,300
Dover Dam – Corundite Levee	USACE – Huntington District	Flood Risk Reduction	Dam and Spillway	Earthfill	2,000	15	133,200

The probability of future occurrence for regulated dams is reduced through compliance with the Ohio's Department of Natural Resources, Dam Safety Program. 86% of the High Hazard Dams in Tuscarawas County have Emergency Action Plans (EAP) in place.

According to the National Inventory of Dams, the following consequences estimate information is available for Dover Dam, Atwood Dam, Beach City Dam, and Zoar Diversion Dam. Buildings at Risk data was not available for Dover Dam or Beach City Dam, and there is not an available Consequences Estimate for Sleepy Hollow Lake Dam, Sugarcreek Sportsman Club Lake Dam, or Bolivar Dam. The Consequences Estimate for Zoar Diversion Dam has limited data available which is reflected in its table. The Consequences Estimate details the dam failure scenario that could occur, the pool elevation of the water, the number of people at risk should the scenario occur during the day, the number of people at risk should the scenario occur during the night, and the economic impact of the scenario.

FIGURE 4-5 USACE DIAGRAM FOR NON-BREACH AND BREACH SCENARIOS

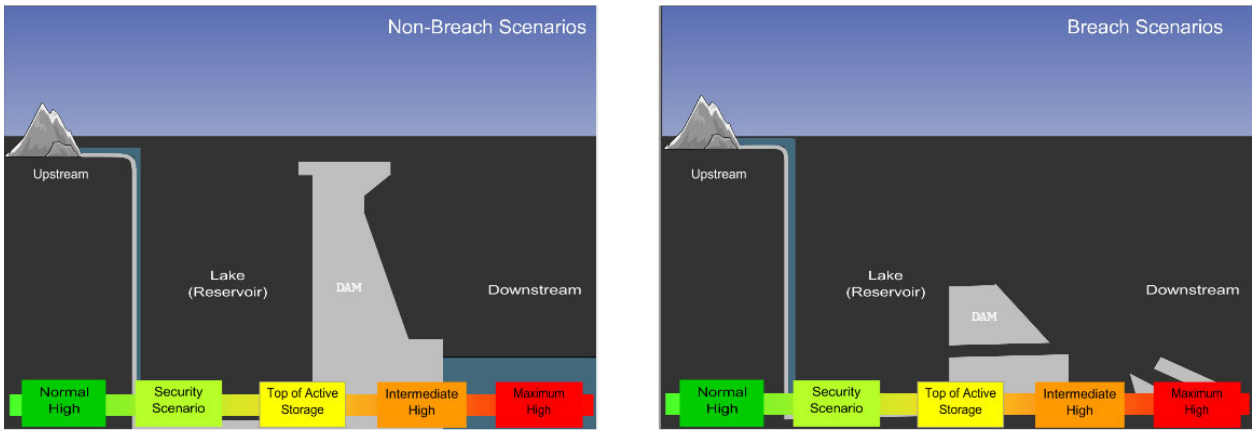


TABLE 4-12 DOVER DAM USACE CONSEQUENCES ESTIMATE

Scenario	Pool Elevation (ft)	Daytime People at Risk	Nighttime People at Risk	Economic Cost
Maximum High Pool - Breach	937.07	62,513.019	43,125.969	$3,522,332,870
Maximum High Pool – Non-Breach	937.07	43,019.4	29,482.1	$2,443,242,109
Normal High Pool - Breach	872.8	622.298	777.241	$72,022,906
Normal High Pool – Non-Breach	872.8	0	0	$0
Normal Low Pool - Breach	N/A	N/A	N/A	$20,032,099
Security Scenario Pool – Non-Breach	889.79	0	0	$580,140,177
Security Scenario Pool -Breach	889.79	3,848.617	2,179.555	$1,353,713,477
Top of Active Storage Pool - Breach	916.43	23,660	16,750.5	$866,122,669
Top of Active Storage Pool – Non-Breach	916.43	4,866.3	2,853.2	$26,769,735

TABLE 4-13 ATWOOD DAM USACE CONSEQUENCES ESTIMATE

Scenario	Pool Elevation	Daytime People at Risk	Nighttime People at Risk	Buildings at Risk	Economic Cost
Maximum High Pool – Breach	940.3	7,089	7,845	4,288	$726,603,457
Maximum High Pool – Non-Breach		6,076	6,654	3,691	$596, 458,740
Normal High Pool – Breach	928.3	371	401	225	$16,325,532
Normal High Pool – Non-Breach	940.3	0	0	0	$0
Normal Low Pool - Breach	954.1	325	334	191	$12,431,823
Normal Low Pool – Breach		0	0	0	$0
Security Scenario Pool – Breach	922.6	420	458	258	$20,437,914
Security Scenario Pool – Non-Breach		0	0	0	$0
Top of Active Storage Pool – Breach	931.8	661	688	357	$36,696,982
Top of Active Storage Pool – Non-Breach	940.3	0	0	0	$0

TABLE 4-14 BEACH CITY DAM USACE CONSEQUENCES ESTIMATE

Scenario	Pool Elevation	Daytime People at Risk	Nighttime People at Risk	Economic Cost
Maximum High Pool – Breach	995.4	17,929	21,724	$2,014,633,020
Maximum High Pool – Non-Breach	995.4	10,095	11,008	$865,18,288
Normal High Pool – Breach	950	511	693	$21,418,532
Normal High Pool – Non-Breach	950	2	4	$15,753
Normal Low Pool - Breach	947.7	511	693	$21,418,532
Normal Low Pool – Breach	947.7	1	4	$95,078
Security Scenario Pool – Breach	962	3,723	3,595	$153,621,201
Security Scenario Pool – Non-Breach	962	2	3	$14,290
Top of Active Storage Pool – Breach	975.8	5,668	5,772	$638,769,100
Top of Active Storage Pool – Non-Breach	975.8	1	4	$108,581

TABLE 4-15 ZOAR DIVERSION DAM USACE CONSEQUENCES ESTIMATE

Scenario	Pool Elevation	Daytime People at Risk	Nighttime People at Risk	Economic Cost
Top of Active Storage Pool – Breach	935.7	29	54	$16,503,077
Top of Active Storage Pool – Non-Breach	935.7	N/A	N/A	N/A

The following GIS vulnerability analysis conducted found that there are 284, or 0.6%, total structures in dam inundation areas in Tuscarawas County. Only three of the county's critical facilities are located in dam inundation areas –located in Zoar (2 critical facilities) and unincorporated Tuscarawas County (1 critical facility). Unincorporated Tuscarawas County has the highest number of structures in dam inundation areas with 98 structures. Sandy Township has the second highest number of structures with 52, and Zoar has the third highest number of structures with 49. Zoar has the highest percentage of total structures in high hazard areas with 47% of structures in high hazard areas. Mineral City and Sandy Township both have 5% of total structures located in high hazard inundation areas, and Lawrence Township and unincorporated Tuscarawas County both have 3% of total structures located in high hazard inundation areas.

TABLE 4-16 STRUCTURES AND CRITICAL FACILITIES VULNERABLE TO DAM FAILURE

Municipality	Total Structures	Total Structures in Dam Inundation Area	Percent Structures in High Hazard Area	Total Critical Facilities	Critical Facilities in Dam Inundation Area	Percent Critical Facilities in Dam Inundation Area
Auburn Township	418	0	0%	5	0	0%
Baltic Village	359	0	0%	5	0	0%
Barnhill Village	166	0	0%	1	0	0%
Bolivar Village	440	9	2%	8	0	0%
Bucks Township	489	0	0%	5	0	0%
City of Dover	6,420	0	0%	42	0	0%
City of New Philadelphia	9,081	0	0%	73	0	0%
City of Uhrichsville	2,692	0	0%	16	0	0%
Clay Township	331	0	0%	1	0	0%
Dennison Village	1,273	0	0%	25	0	0%
Dover Township	1,932	0	0%	6	0	0%
Fairfield Township	701	13	2%	1	0	0%
Franklin Township	1,044	1	0%	3	0	0%
Gnadenhutten Village	601	0	0%	9	0	0%
Goshen Township	1,730	0	0%	11	0	0%
Jefferson Township	425	0	0%	0	0	0%
Lawrence Township	852	26	3%	1	0	0%
Midvale Village	339	0	0%	2	0	0%
Mill Township	960	0	0%	3	0	0%
Mineral City Village	365	18	5%	4	0	0%
Newcomerstown Village	1,912	0	0%	23	0	0%
Oxford Township	552	0	0%	2	0	0%
Parral Village	121	0	0%	0	0	0%
Perry Township	254	0	0%	0	0	0%
Port Washington Village	249	0	0%	4	0	0%
Roswell Village	102	0	0%	1	0	0%
Rush Township	431	0	0%	4	0	0%
Salem Township	514	0	0%	1	0	0%
Sandy Township	1,004	52	5%	10	0	0%
Stone Creek Village	91	0	0%	2	0	0%
Strasburg Village	1,346	0	0%	14	0	0%
Sugarcreek Township	822	2	0%	6	0	0%
Sugarcreek Village	1,292	0	0%	22	0	0%
Tuscarawas Village	501	0	0%	5	0	0%
Unincorporated	2,946	98	3%	23	1	4%

Municipality	Total Structures	Total Structures in Dam Inundation Area	Percent Structures in High Hazard Area	Total Critical Facilities	Critical Facilities in Dam Inundation Area	Percent Critical Facilities in Dam Inundation Area
Union Township	639	0	0%	2	0	0%
Warren Township	666	4	1%	4	0	0%
Warwick Township	769	0	0%	3	0	0%
Washington Township	358	0	0%	1	0	0%
Wayne Township	801	12	1%	2	0	0%
York Township	647	0	0%	5	0	0%
Zoar Village	104	49	47%	3	2	67%
Grand Total	**46,739**	**284**	**0.6%**	**358**	**3**	**1%**

According to the National Levee Database, behind the levee in Zoar, there are 69 residents and 59 structures that would be impacted by levee failure. The property value for the structures behind the levee is valued at $39.3 million.

The following GIS vulnerability analysis conducted found 51 structures are vulnerable to levee failure in Zoar. The 51 structures that are vulnerable to levee failure accounts for 49% of the total structures located within the village, and 2 of the 3 critical facilities located in Zoar are vulnerable to levee failure.

TABLE 4-17 STRUCTURES AND CRITICAL FACILITIES VULNERABLE TO LEVEES

Municipality	Total Structures	Total Structures in Levee Area	Percent Structures in Levee Area	Total Critical Facilities	Critical Facilities in Levee Area	Percent Critical Facilities in Levee Area
Auburn Township	418	0	0%	5	0	0%
Baltic Village	359	0	0%	5	0	0%
Barnhill Village	166	0	0%	1	0	0%
Bolivar Village	440	0	0%	8	0	0%
Bucks Township	489	0	0%	5	0	0%
City of Dover	6,420	0	0%	42	0	0%
City of New Philadelphia	9,081	0	0%	73	0	0%
City of Uhrichsville	2,692	0	0%	16	0	0%
Clay Township	331	0	0%	1	0	0%
Dennison Village	1,273	0	0%	25	0	0%
Dover Township	1,932	0	0%	6	0	0%
Fairfield Township	701	0	0%	1	0	0%
Franklin Township	1,044	0	0%	3	0	0%
Gnadenhutten Village	601	0	0%	9	0	0%
Goshen Township	1,730	0	0%	11	0	0%
Jefferson Township	425	0	0%	0	0	0%

Municipality	Total Structures	Total Structures in Levee Area	Percent Structures in Levee Area	Total Critical Facilities	Critical Facilities in Levee Area	Percent Critical Facilities in Levee Area
Lawrence Township	852	0	0%	1	0	0%
Midvale Village	339	0	0%	2	0	0%
Mill Township	960	0	0%	3	0	0%
Mineral City Village	365	0	0%	4	0	0%
Newcomerstown Village	1,912	0	0%	23	0	0%
Oxford Township	552	0	0%	2	0	0%
Parral Village	121	0	0%	0	0	0%
Perry Township	254	0	0%	0	0	0%
Port Washington Village	249	0	0%	4	0	0%
Roswell Village	102	0	0%	1	0	0%
Rush Township	431	0	0%	4	0	0%
Salem Township	514	0	0%	1	0	0%
Sandy Township	1,004	0	0%	10	0	0%
Stone Creek Village	91	0	0%	2	0	0%
Strasburg Village	1,346	0	0%	14	0	0%
Sugarcreek Township	822	0	0%	6	0	0%
Sugarcreek Village	1,292	0	0%	22	0	0%
Tuscarawas Village	501	0	0%	5	0	0%
Unincorporated	2,946	0	0%	23	0	0%
Union Township	639	0	0%	2	0	0%
Warren Township	666	0	0%	4	0	0%
Warwick Township	769	0	0%	3	0	0%
Washington Township	358	0	0%	1	0	0%
Wayne Township	801	0	0%	2	0	0%
York Township	647	0	0%	5	0	0%
Zoar Village	104	51	49%	3	2	67%
Grand Total	**46,739**	**51**	**0.1%**	**358**	**2**	**1%**

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Multiple privately owned dams are in the county that are at risk of failure during extreme heavy participation events. Several class 1 dams exist within or just outside of Tuscarawas County. The failure of which would result in major flooding downriver.
Dover	City of Dover has a low-head dam located across the Tuscarawas River, on the west side of the community. The dam maintains the water level for generating the power supply for the city - built in 1945. The dam has never

Jurisdiction/Organization	Vulnerability Assessment Response
	been evaluated - driven steel sheet-piling dam. Dam had a washout on the south end of the dam in 1950s, was repaired after.
New Philadelphia	If Dover Dam were to fail, the area along the west side of the South Broadway bridge would act as a bottleneck for released floodwaters, with excess debris being deposited in this area.
Uhrichsville	There is a map that shows the inundation areas if the Dover Dam were to fail. The city is located downstream of the dam.
Baltic	Unsure on inundation impacts if Dover Dam were to fail.
Barnhill	No specific vulnerabilities.
Bolivar	USACE completed a major project on the dam located approximately 2 miles north of the Village - in direct path of extreme flooding. Parcels located to the east are prohibited to be constructed on, parcels to the south can also be restricted from construction should the buildings ever be removed.
Dennison	Nearest dam is 10 miles away and could impact us if it were to fail. The few homes located in the floodplain could be impacted.
Gnadenhutten	Dover Dam is uphill from us. There are some homes that sit in the floodplain on the outskirts of town, as well as businesses, and a bus garage.
Midvale	Dover Dam is located upstream approximately 15-20 miles. Midvale does sit at a higher elevation; vulnerable areas would include properties located along the river and creek - no residential properties in the vulnerable area.
Mineral City	West Broadway and the majority of the village would be impacted should Bolivar Dam should fail. (check Bolivar Dam)
Newcomerstown	Dover Dam is upstream from us. This is a significant dam that would require a widescale evacuation in the event that this failed. Dam Failure would cover the town. This was recently reinforced in the last 10 years to minimize this risk.
Parral	No vulnerability to this hazard
Port Washington	Dover Dam is to the north of us. They have had to open the dam to let out water.
Roswell	There are no dams located upstream of the village.
Stone Creek	We have no dams in our area, the biggest risk would be Dover dam to the north of us. We do not have any dams located in the village.
Strasburg	The Beach City Dam is to the north. The reservoir has been fairly low lately, but that is the one that is most an issue. Failure would create significant problems as there are homes and businesses along the riverfront.
Sugarcreek	Not an issue.
Tuscarawas	The Dover Dam is to the north. Failure would result in heavy flooding.
Zoar	No vulnerability.
Tuscarawas County Regional Planning and Floodplain Office	We have many small, privately-owned dams.
Trinity Twin City Medical Center	Tappan Dam holds a significant reservoir. Any failure would potentially compromise access to the hospital.

4.1.7 LAND USE & DEVELOPMENT TRENDS

Public awareness measures such as notices on final plats and public education on dam safety are proactive mitigation measures that should be implemented by local communities. Also, Emergency Action Plans that identify potential dam failure inundation areas, notification procedures, and thresholds are also prepared for response to potential dam related disaster events.

Regulatory Environment

The Ohio Department of Natural Resources classifies dams by 2 conditions: height and storage. There are 4 classes of dams, which vary, based on the height of the actual dam, and the amount of water held behind the dam.

Dam safety laws are embodied in the Dam Safety and Encroachments Act ("DSE Act") -enacted July 1, 1979 and last amended in 1985. Rules pertaining to dam safety are found in Title 25-Rules and Regulations; Part I-Department of Environmental Resources; Subpart C-Protection of Natural Resources; Article II-Water Resources; Chapter 105-Dam Safety and Waterway Management ("the Rules") -adopted.

ODNR also provides a template for EAP development. Emergency Action Plans include a description of the dam, the area at risk should the dam fail, and contact information for stakeholders. EAPs essentially identify actions that must be taken should an emergency occur. All dams regulated by Water Resources at ODNR are required by Ohio Administrative Code Rule 1501:21-15-07 to have an EAP in place.

Dams and levees have inundation maps that are very strictly controlled by the Army Corps of Engineers, who do not release this information publicly. **Appendix F** includes the Emergency Evacuation Plan for Dover Dam, with inundation maps of the dam.

4.1.8 DAM/LEVEE FAILURE SUMMARY

As dams continue to age, the likelihood for failure increases as undesirable woody vegetation on the embankment, deteriorated concrete, inoperable gates, and corroded outlet pipes become problems. Since dam failures are often exacerbated by flooding, the probability of dam failures can be associated with projected flood frequencies. Overall, the probability of a dam failure throughout the state should remain low with continued maintenance of dams. Additionally, warning plans in place for designated high hazard dams will continue to decrease the danger for those residents in potential risk areas.

Mitigation Best Practices

Tuscarawas County jurisdictions can best prevent dam failure in the future by taking it upon themselves to learn more about dam safety from both the Ohio Department of Natural Resources (ODNR) and FEMA. Best practices for dam safety include regularly inspecting and maintaining dams as they age, providing educational materials to those who either live or do business beneath a dam, and to make sure that each dam in the community has an EAP.

ODNR's website has additional information and guides that relate to Dam Safety and can be found here: http://water.ohiodnr.gov/safety/dam-safety.

2. EXTREME TEMPERATURES

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Temperature Extremes	4	1.2	2	0.6	4	0.8	2	0.2	2	0.2	3.0
High Risk Hazard (3.0 – 4.0)											

Climate change may exacerbate the impact of hazardous extreme temperatures. According to the State Hazard Mitigation Plan, extreme heat and heat waves are existing hazards that will be exacerbated by climate change. Heat, one of the leading weather-related killers in the United States, results in hundreds of fatalities each year. Extreme cold can cause hazardous driving conditions, communications and electrical power failures, and community isolation, as well as adversely affecting business continuity. This section defines and profiles the hazard of temperature extremes.

4.2.1 EXTREME TEMPERATURE DESCRIPTION

Extreme Heat

Temperatures that remain 10 degrees or more above the average high temperature for the area are defined as extreme heat. The National Weather Service (NWS) issues an Excessive Heat Warning/Advisory when an event (a "heat wave") is expected within 36 hours. The NWS bases these warnings on a "Heat Index" - a combination of heat and humidity - that is predicted to be at or above 105 degrees for two or more consecutive days. Local weather forecast offices may use different criteria for Excessive Heat Warning/Advisories, based on maximum temperatures, nighttime temperatures, and other methods.

Extreme heat is the top weather-related killer in the United States. It causes more fatalities each year than floods, lightning, tornadoes and hurricanes combined. In the Midwest, summers tend to combine high temperatures and high humidity. Heat disorders generally involve a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating, or a chemical (salt) imbalance caused by too much sweating. When the body heats up too quickly to cool itself safely, or when too much fluid is lost through dehydration or sweating, the body temperature rises, and heat-related illnesses may develop.

Extremely high temperatures cause heat stress, which can be divided into four categories (see Table 4-6). Each category is defined by apparent temperature, which is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, heat syncope, heat exhaustion, heatstroke, and death. In addition to these human risks, extreme temperatures can elevate consumers' utility costs.

Extreme Cold

Although infrequent in this county, extended periods of extreme cold could occur throughout the winter months. Heating systems compensate for the cold outside, and most people limit their time

outside during extreme cold conditions, but common complaints include pipes freezing and cars not starting. When cold temperatures are combined with wind, dangerous wind chills can develop.

Wind chill is how cold the weather "feels." It is based on the rate at which exposed skin loses heat. As the wind increases, it draws heat from the body. This drives down the skin temperature and, eventually, internal body temperature. Therefore, the wind makes the air feel much colder than its actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service)

Extreme cold is also responsible for several fatalities each year. Threats such as hypothermia and frostbite can lead to loss of fingers and toes or cause permanent kidney, pancreas and liver injury or even death. Major winter storms can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall and cold temperatures. Fifty percent of cold-related injuries happen to people over 60 years old. More than 75% of injuries happen to males, and almost 20% occur within the home.

The dangers associated with extreme cold include frostbite and hypothermia. Frostbite is damage to body tissue that is frozen. Frostbite causes a loss of feeling in extremities such as fingers, toes, ear lobes, or the tip of the nose. Hypothermia, or low body temperature, can lead to uncontrollable shivering, memory loss, disorientation, slurred speech, drowsiness, and apparent exhaustion.

4.2.2 EXTREME TEMPERATURE LOCATION

Extreme temperature events are region wide and affect all communities within Tuscarawas County.

4.2.3 EXTENT

While cold temperatures and power losses can render a structure uninhabitable for a time, they are unlikely to cause structural damages. People living in older homes are more likely to need services offered in response to extreme cold.

Extremely high temperatures cause four categories of heat stress. Each category is defined by apparent temperature, a general term for the perceived outdoor temperature caused by the combined effects of air temperature, relative humidity, and wind speed. Apparent temperature is associated with a heat index value that captures the combined effects of dry air temperature and relative humidity on humans and animals. Major human risks for these temperatures include heat cramps, fainting, heat exhaustion, heat stroke, and death. Note that while the temperatures in the following tables and figures serve as a guide for various danger categories, the impacts of high temperatures will vary from person to person, based on individual age, health, and other factors.

The National Weather Service issues temperature advisories, watches, and warnings relating to the impacts of the range of temperatures typically experienced in Ohio. Exact thresholds vary across the state, but Heat Advisories are generally issued when the heat index will be at or above 100°F, but less than 105°F. Excessive Heat Warnings are issued when heat indices will attain or exceed 105°F, and Excessive Heat Watches are issued when excessive heat warning criteria may be experienced in 12 to 48 hours.

TABLE 4-18 FOUR CATEGORIES OF HEAT STRESS

Danger Category	Heat Disorders	Apparent Temperature (°F)
I (Caution)	Fatigue possible with prolonged exposure and physical activity.	80 to 90
II (Extreme Caution)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and physical activity.	90 to 105
III (Danger)	Sunstroke, heat cramps, or heat exhaustion likely; heat stroke possible with prolonged exposure and physical activity.	105 to 130
IV (Extreme Danger)	Heatstroke or sunstroke imminent.	>130

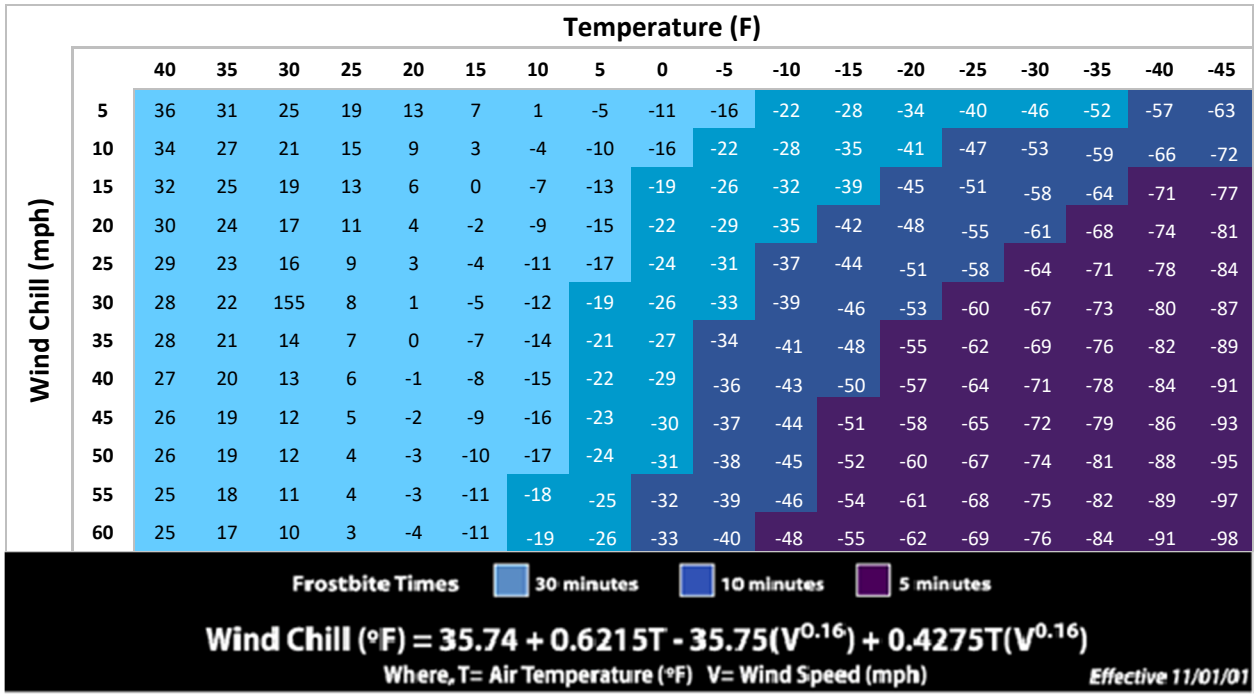
FIGURE 4-6 NWS SEVERE HEAT INDEX

Relative Humidity \ Temperature	80	82	84	86	88	90	92	94	96	98	100	102	104	106	108	110
40	80	81	83	85	88	91	94	97	101	105	109	114	119	124	130	136
45	80	82	84	87	89	93	96	100	104	109	114	119	124	130	137	
50	81	83	85	88	91	95	99	103	108	113	118	124	131	137		
55	81	84	86	89	93	97	101	106	112	117	124	130	127			
60	82	84	88	91	95	100	105	110	116	123	129	137				
65	82	85	89	93	98	103	108	114	121	126	130					
70	83	86	90	95	100	105	112	119	126	134						
75	84	88	92	97	103	109	116	124	132							
80	84	89	94	100	106	113	121	129								
85	85	91	96	102	110	117	126	135								
90	86	91	98	105	113	122	131									
95	86	93	100	108	117	127										
100	87	95	103	112	121	132										

TABLE 4-19 EXTREME COLD TEMPERATURE AND ASSOCIATED THREAT

Excessive Cold Threat Level	Threat Level Descriptions
Non-Threatening	**"No Discernable Threat to Life and Property from Excessive Cold."** Cold season weather conditions are non-threatening.
Very Low	**"A Very Low Threat to Life and Property from Excessive Cold."** It is likely that that wind chill values will drop to -10˚ to -15º F or below for 3 hours or more. Or lowest air temperature 0º to -5ºF.
Low	**"A Low Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -15º F to -20ºF or below for 3 hours or more. Or lowest air temperature -5º to -10ºF.
Moderate	**"A Moderate Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -20º to -28 ºF or below for 3 hours or more. Or lowest air temperature -10º to -15ºF.
High	**"A High Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -28º to -35ºF for 3 hours or more. Or lowest air temperature -15º to -20ºF.
Extreme	**"An Extreme Threat to Life and Property from Excessive Cold."** It is likely that wind chill values will drop to -35ºF or below for 3 hours or more. Or lowest air temperature less than or equal to -20ºF.

FIGURE 4-7 NWS WINDCHILL CHART



4.2.4 HISTORICAL OCCURRENCES

General Trends

Extreme temperatures affect areas as large as an entire state or region. As such, events for all of Tuscarawas County were looked at as previous hazard events.

According to the NCDC, Tuscarawas County has no documented cases of extreme heat. Since 1996, Tuscarawas has recorded five extreme cold events, all occurring in the past 10 years. A complete list of extreme temperature events from 1996 to current day can be found in **Appendix B.**

TABLE 4-20 SUMMARY OF EXTREME TEMPERATURE EVENTS IN TUSCARAWAS COUNTY (JANUARY 1, 2001-NOVEMBER 30, 2021)

Type	Count	Injuries	Deaths	Property Damage	Crop Damage	Avg Property Damage/Event	Avg Crop Damage/Event
Extreme Heat	0	0	0	$ -	$ -	N/A	N/A
Extreme Cold	5	0	0	$ -	$ -	N/A	N/A
Grand Total	**5**	**0**	**0**	**$ -**	**$ -**		

Event Narratives

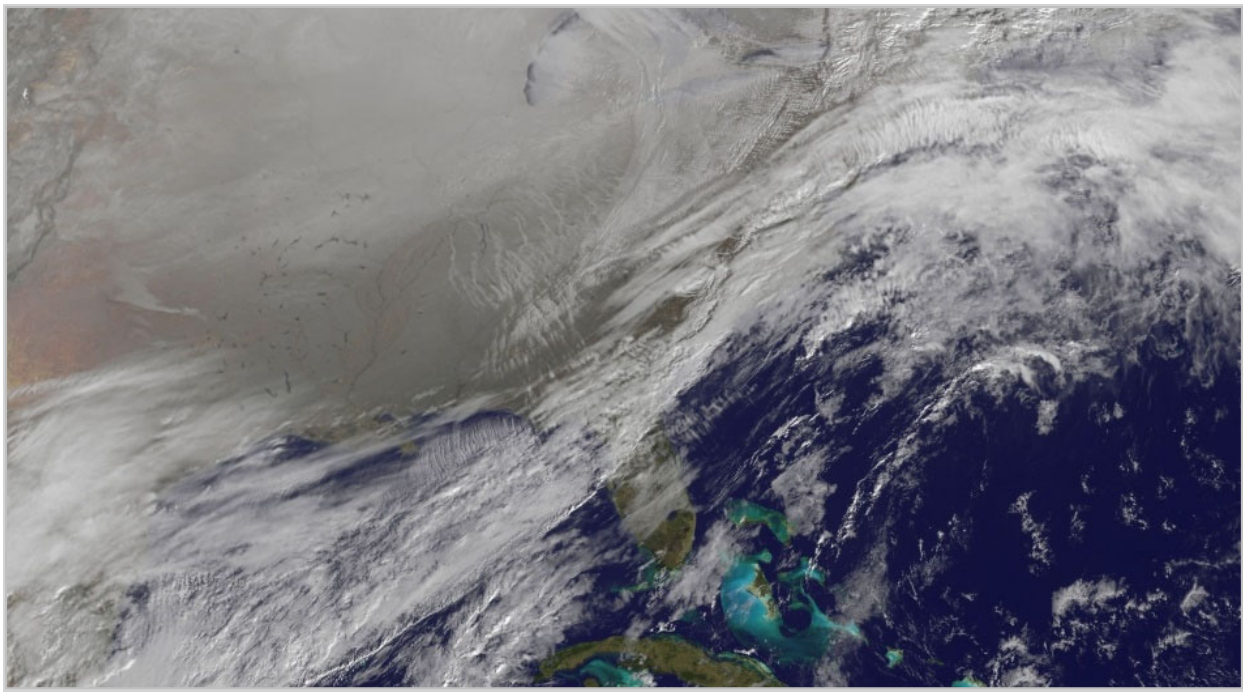
- Cold – **January 5, 2014:** An arctic cold front crossed the Upper Ohio Valley on the 6th, bringing record low temperatures and extreme wind chills the morning of the 7th. It was the coldest January 7th on record in Pittsburgh with a low temperature of 9 below zero, and a high temperature of 4 above zero. Across eastern Ohio, western Pennsylvania, northern West Virginia, and Garrett County, Maryland, low temperatures ranged from 5 to 15 degrees below zero the morning of the 7th, with the lowest wind chill readings from 25 to 55 degrees below zero. A low temperature of 11 degrees below zero with a wind chill of 37 degrees below zero was recorded near Sugarcreek the morning of the 7th.

- Cold – **February 14, 2015:** An arctic cold front crossed eastern Ohio, western Pennsylvania, northern West Virginia, and Garrett County, Maryland the afternoon of the 14th, with snow squalls reducing visibility below one quarter mile at times. Wind gusts over 40 MPH occurred with the snow squalls, and thunder-snow was reported. Behind the front from the morning of the 15th into the 16th, temperatures dropped below zero, with extreme wind chills. The lowest wind chills reported were -37 degrees in Canaan Heights, WV, -33 near Strattanville, PA, -32 at Deep Creek Lake, MD, and -24 at East Palestine, OH. A wind chill of -22 was recorded the morning of the 15th at Sugarcreek, with a low temperature of -10 at Bolivar the morning of the 16th.

- Cold – **February 24, 2015:** An arctic air mass moved across eastern Ohio, western Pennsylvania, northern West Virginia, and Garrett County, Maryland on the 24th. Temperatures were well below zero with record lows across the region. A low temperature of -19 was recorded at Sugarcreek. A record low temperature of -15 was set at New Philadelphia.

- Cold – **January 30, 2019:** A region-wide event of artic air blew into the northeast Ohio region on January 30th, lasting into the following day. Columbiana, Guernsey, Carroll, Tuscarawas, Coshocton, and Muskingum counties all reported extreme cold/wind chill events, but there were no directly related injuries, deaths, property damages, or crop damages reported from the region-wide event. Port Washington reported a wind chill of -29.0°F on January 30th.

FIGURE 4-8 JANUARY 2014 POLAR VORTEX



4.2.5 PROBABILITY OF FUTURE OCCURRENCES

The probability of Tuscarawas County experiencing an event with extreme temperatures can be difficult to quantify. Climate models suggest summer global temperatures are likely to increase, with more pronounced changes between temperature extremes. The number of days with temperatures above 100 degrees may also be significantly higher.

Reported extreme temperature events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing an extreme temperature event can be difficult to quantify, but based on the historical record of three events since 2001, it can reasonably be assumed that this type of event has occurred once every 4 years from 2001 through 2021.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (5 Events) = 4 Years Between Events

The historic frequency indicates that there is a 20% chance of this type of event occurring each year. The Steering Committee, based on their own knowledge, concluded that Extreme Temperature events are “Highly Likely” each year. This means that they have a 100% chance of happening annually.

4.2.6 ASSETS EXPOSED TO EXTREME TEMPERATURES

Potential Losses

TABLE 4-21 POTENTIAL IMPACTS FROM EXTREME TEMPERATURES

Impact	Description
People	**Heat:** Heat stroke and dehydration **Cold:** Frostbite and hypothermia
Infrastructure	**Heat:** Power outages and brownouts. Water may become scarce. **Cold:** Burst pipes from freezing temperatures.
Economy	By discouraging people from traveling and shopping, extreme temperatures can cause local economic slowdowns. Crop losses may damage the agricultural sector.
Natural Systems	**Heat:** Vegetation can die and dry out, making areas susceptible to wildfires. **Cold:** Crops may be lost if extreme cold occurs during a growing season.
Transportation	**Heat:** Hot vehicles may break down, causing delays. **Cold:** Extreme cold temperatures can cause ice on roads. Cars may not start.

Areas vulnerable to extreme heat were classified as those with a maximum average temperature over 85 degrees, according to the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) study. This range falls within the upper limits of FEMA's heat stress index, Caution Category 1. Extreme heat does not generally affect buildings; it primarily affects people. Nonetheless, facilities must be maintained to ensure that they operate in appropriate conditions to protect people.

Additionally, areas vulnerable to extreme cold were classified as those with a minimum average temperature lower than 14 degrees, according to the USDA NRCS study. Extreme cold does not generally affect buildings; it primarily affects people. Nonetheless, facilities must be maintained to ensure that they operate in appropriate conditions to protect people.

Community Vulnerability

Because extreme temperatures are dangerous and can be potentially life-threatening, it is important to understand how many people are exposed to such conditions, and how many buildings present potential problems if power is lost. Extreme cold can damage structures; for example, burst pipes will damage buildings and necessitate repairs.

All property in Tuscarawas County is susceptible to the effects of extreme temperatures. While temperature extremes are not usually thought of as damaging to structures, they can make structures unusable. The age of a structure is also important to consider when discussing temperature extremes. Older homes are more susceptible to extreme temperatures, based on the construction methods prevalent at the time.

According to the 2020 Census, Tuscarawas County had approximately 5,876 children under age 5, which is about 6.3% of the total population. An estimated 18,653 people (20.0% of the population) were above the age of 65.

TABLE 4-22 POPULATION AGE ESTIMATES, 2020 CENSUS

Total	Population	Percent
Under 5 years	5,876	6.3%
65 and up	18,653	20.0%

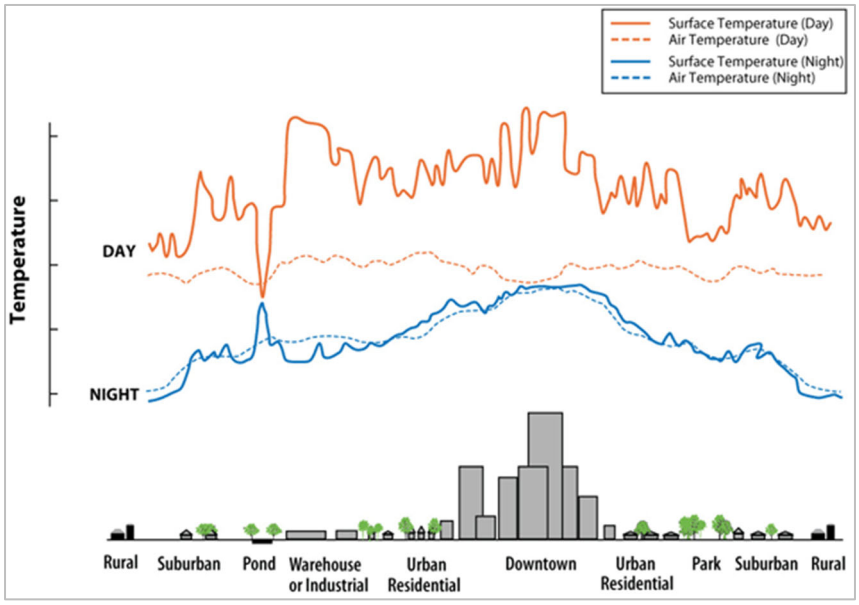
TABLE 4-23 DATE OF BUILDING CONSTRUCTION, OHIO OFFICE OF RESEARCH 2020

Year Built	Percent	Number
Built 1939 or earlier	27.2%	10,941
Built 1940 to 1949	4.3%	1,747
Built 1950 to 1959	11.1%	4,478
Built 1960 to 1969	9.2%	3,698
Built 1970 to 1979	13.3%	5,327
Built 1980 to 1989	8.8%	3,544
Built 1990 to 1999	13.3%	5,341
Built 2000 to 2009	10.9%	4,362
Built 2010 to 2013	1.1%	431
Built 2014 or later	0.8%	318
Grand Total	**100%**	**40,187**

Tuscarawas County is subject to temperature extremes. They are a countywide hazard and effect all areas of the county and its jurisdictions. The effect temperature extremes will have on the County will vary due to population density, age of population, and the age of structures. Older homes are generally less insulated than newer construction. In addition, the use of modern windows and doors can improve a structure's ability to resist extreme temperatures. Older structures and infrastructure are likely to be more susceptible to both heat waves and freezes.

For extreme heat, the urban heat island effect would impact higher populated areas within the county due to higher amounts of asphalt to accommodate transportation and parking. The urban heat island effect results from the change in surfaces. Those areas that were permeable and moist become dry. On a hot, sunny day, the sun can heat surfaces, such as roofs and pavement, to higher temperatures than the surrounding air. The heat island phenomenon is not only a daytime effect. At night, as the infrastructure releases the heat it has accumulated during the day, raising the air temperature. Tuscarawas County's most populous municipalities are New Philadelphia, Dover and Uhrichsville. That means that they are the most likely to suffer from heat island effects. Industrial complexes are also susceptible to these effects.

FIGURE 4-9 EPA URBAN HEAT ISLAND EFFECT DIAGRAM



The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Sick and older residents are more susceptible to extreme temperatures. We have some heating and cooling center capabilities, but in cases of power outages these may not be available.
Dover	We have an older population that does not have access to heating / cooling centers. The central part of town has older homes, built in early 1900s; older homes do not have A/C.
New Philadelphia	Lower income areas of New Philadelphia may not have access to any cooling equipment in times of excess heat.
Uhrichsville	We have an older population. We use the schools as a heating/cooling center. The high school has a large generator system to accommodate the vulnerable population. There could be an obstacle for transportation of residents to the heating/cooling centers, but we could partner with the schools for use of school busses.
Baltic	We have a retired population that does not have heating/cooling centers. We don't have emergency blankets, etc. if this would happen.
Barnhill	Usually not a problem for the village.
Bolivar	Elderly population within the village - aging water lines could be vulnerable to water main breaks in extreme cold weather events. Older homes that may not have air conditioning units.
Dennison	Older population of the Village is vulnerable to heat-related health problems. We have a 24-hour gas generator, but no heating/cooling centers in the village currently. Organizations do offer programs for A/C units.

Jurisdiction/Organization	Vulnerability Assessment Response
Gnadenhutten	Extreme heat can affect our water and wastewater plants. The sewers can also freeze up in the winter.
Midvale	The village uses the park pavilion and elementary schools to use as heating or cooling center. In general, Midvale has an older population.
Mineral City	We have an older population; older homes in the community that do not have air conditioning units/broken windows.
Newcomerstown	We have an older population. There are lots of people who live in houses without AC. We have an emergency squad who is contacted for extreme heat events.
Parral	We have an older population that does not have access to heating / cooling centers
Port Washington	We have an elderly population that we routinely check on during extreme weather events. They can also go to the Fire Station for heating and cooling.
Roswell	The village hall has heat and air conditioning that is a public destination for extreme temperature situations. We do not really have an older population in town.
Stone Creek	Older residents in town, residents that do not have air conditioning are vulnerable. Town Hall does not have heat or A/C. Two churches in the village that residents could go to for a heating/cooling center.
Strasburg	Housing on the east side that is lower income. These areas are stressed a bit more.
Sugarcreek	Not an issue in our community.
Tuscarawas	Water lines are very old and would be impacted by extreme cold. Our community center acts as a cooling center during extreme heat events for our older population.
Zoar	We have an older population, but no problems exist. AEP power outages have decreased due to better tree maintenance. A lot of people have home standby generators.
Tuscarawas County Regional Planning and Floodplain Office	Problem using the heating and cooling centers, if we still have COVID-19 spreading in the county, we can't pack people into the heating/cooling centers.
Trinity Twin City Medical Center	The population of the county is older, this creates a larger patient load.

4.2.7 LAND USE AND DEVELOPMENT TRENDS

Tuscarawas County as a whole is subject to temperature extremes. Because they affect entire regions, temperature extremes are a countywide hazard. However, their effects on the county will vary due to population density, age of population, and the age of structures.

The elderly and small children are more susceptible to temperature extremes. Additionally, buildings of significant age may be more susceptible. Older homes are generally less insulated than newer construction. In addition, modern windows and doors can improve a structure's ability to resist extreme temperatures. Older structures and infrastructure are likely to be more susceptible to both

heat waves and freezes. It is important to identify building stock and special needs populations, so that those who must respond to an emergency will be better prepared.

Regulatory Environment

The formal regulations that pertain to generalized extreme temperature events are neglible.

4.2.8 TEMPERATURE EXTREME SUMMARY

Temporary periods of extremely hot or cold temperatures typically do not have a significant environmental impact. However, prolonged periods of heat may be associated with drought conditions and can damage or destroy vegetation, dry up rivers and streams, and reduce water quality. Prolonged exposure to cold can kill wildlife and vegetation and poses a potentially grave danger to residents of Tuscarawas County.

3. SEVERE THUNDERSTORMS

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Severe Thunderstorms	4	1.2	2	0.6	3	0.6	3	0.3	1	0.1	2.8
Medium Risk Hazard (2.0 – 2.9)											

4.3.1 SEVERE THUNDERSTORM DESCRIPTION

Ohio can have extreme weather conditions in any season. Thunderstorms, associated with strong winds, heavy precipitation, and lightning strikes, can be hazardous under the right conditions and locations. Strong winds and tornadoes can take down trees, damage structures, tip high-profile vehicles, and create high velocity flying debris. Large hail can damage crops, dent vehicles, break windows, and injure or kill livestock, pets, and people. Even the remnants of tropical storms and hurricanes have brought severe wind damage and flooding to the state.

- **Thunderstorms** affect smaller areas than hurricanes or winter storms. The typical thunderstorm is 15 miles in diameter and lasts an average of 30 minutes. Despite their size, thunderstorms are dangerous. Of the estimated 100,000 thunderstorms that occur each year in the United States, about 10% are classified as severe. The National Weather Service considers a thunderstorm severe if it produces hail at least 3/4 inch in diameter, winds of 58 MPH or stronger, or a tornado. Every thunderstorm needs three basic components: (1) moisture to form clouds and rain; (2) unstable air, which is warm air that rises rapidly; and (3) lift, which is a cold or warm front capable of lifting air to help form thunderstorms.

- **Downburst winds** can cause more widespread damage than a tornado. They occur when air is carried into a storm's updraft, cools rapidly, and comes rushing to the ground. Cold air, being denser than warm air, falls quickly to the surface. On warm summer days, when the cold air can no longer be supported by a storm's updraft, or when an exceptional downdraft develops, the air crashes to the ground in the form of strong winds. These winds are forced to spread out horizontally when they reach the ground and can cause significant damage. This type of strong wind is also referred to as a straight-line wind. Downbursts with a diameter of less than 2.5 miles are called microbursts, and those with a larger diameter are called macrobursts. A derecho, or bow echo, is a series of downbursts associated with a line of thunderstorms. This type of phenomenon can extend for hundreds of miles and have wind speeds in excess of 100 mph.

- **Lightning**, although not defined as a severe hazard by the National Weather Service, can accompany heavy rain during thunderstorms. Lightning develops when ice particles in a cloud move around, colliding with other particles. These collisions cause electrical charges to separate. Positively charged ice particles rise to the top of the cloud, and negatively charged ones fall to the middle and lower sections. The negative charges at the base of the cloud attract positive charges at the surface of the Earth. Invisible to the human eye, the negatively

charged area of the cloud sends a charge called a stepped leader toward the ground. Once it gets close enough, a channel develops between the cloud and the ground. Lightning is the electrical transfer through this channel. The channel rapidly heats to 50,000 degrees Fahrenheit and contains approximately 100 million electrical volts. The rapid expansion of the heated air causes thunder.

- Hail develops when a super-cooled droplet collects a layer of ice and continues to grow, sustained by the updraft. Once the updraft can no longer hold up the hail stone, the stone falls to the ground. Nationally, hailstorms cause nearly $1 billion in property and crop damage annually, as peak activity coincides with peak agricultural seasons. Severe hailstorms also cause considerable damage to buildings and automobiles but rarely result in loss of life. Hailstones are usually less than 2 inches in diameter and can fall at speeds of 120 miles per hour (mph), which can be destructive to roofs, buildings, automobiles, vegetation, and crops.
- Heavy Rain is defined as rainfall amounts larger than 0.49 inches in an hour. In the winter months, heavy rain is defined as rainfall amounts greater than 0.24 inches an hour. Typically, heavy rainfalls occur between 6 PM and midnight Rain develops as air rises, cools, and the water vapor within the air condenses into droplets of water, eventually condensing enough to create a cloud of many water droplets around condensation nuclei. As the water droplets within the condensed cloud continue to grow, they begin to fall as rain drops to the earth.

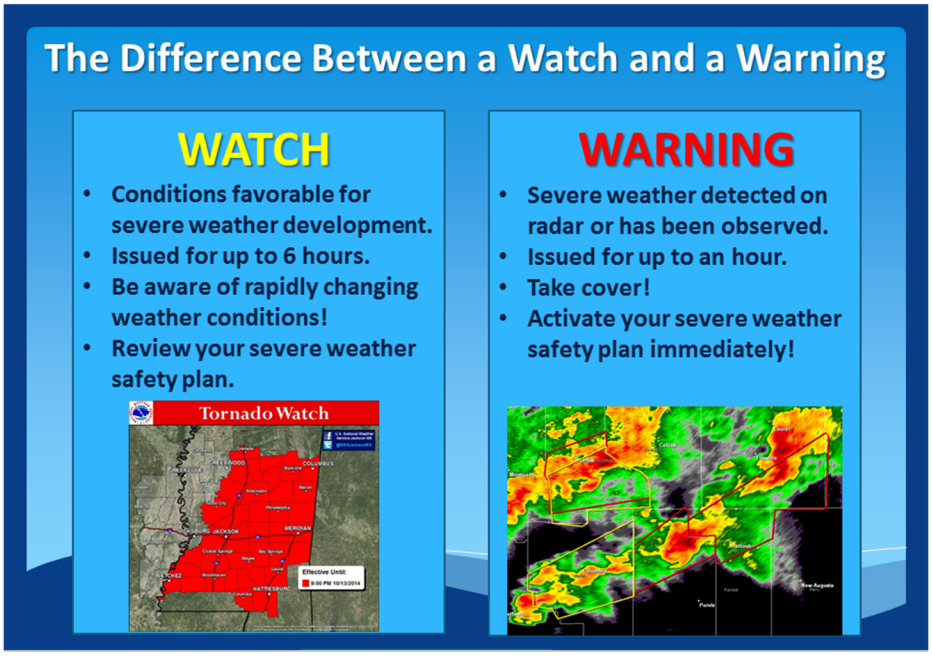
4.3.2 SEVERE THUNDERSTORM LOCATION

Severe thunderstorm events are generally county-wide or region-wide events that could affect all communities in Tuscarawas County. On occasion, only part of the county experiences the weather, due to the location in which the storm develops and the path it travels.

4.3.3 EXTENT

The National Weather Service issues thunderstorm watches and warnings. No watches or warnings apply to lightning. Figure 4-10 explains the difference between NWS watches and warnings.

FIGURE 4-10 NWS WATCH VS. WARNING



The Beaufort scale is used to measure wind speeds. It is based on observation, rather than actual measurement. It is the most widely used system to measure wind speed today. There are 12 levels, plus 0 for “no wind.”

TABLE 4-24 BEAUFORT SCALE

Beaufort Number	MPH	Description	Observation
0	<1	Calm	Calm. Smoke rises vertically.
1	1-3	Light air	Wind motion visible in smoke.
2	3-7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-17	Moderate breeze	Dust and loose paper raised. Small branches begin to move.
5	18-24	Fresh breeze	Branches of a moderate size move. Small trees begin to sway.
6	25-30	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over.
7	31-38	High wind, Moderate Gale, Near Gale	Whole trees in motion. Effort needed to walk against the wind. Swaying of skyscrapers may be felt, especially by people on upper floors.
8	39-46	Fresh Gale	Twigs broken from trees. Cars veer on road.
9	47-54	Strong Gale	Larger branches break off trees, and some small trees blow over. Construction/temporary signs and barricades blow over. Damage to circus tents and canopies.
10	55-63	Whole Gale/Storm	Trees are broken off or uprooted, saplings bent and deformed, poorly attached asphalt shingles and shingles in poor condition peel off roofs.
11	64-72	Violent storm	Widespread vegetation damage. More damage to most roofing surfaces, asphalt tiles that have curled up and/or fractured due to age may break away completely.
12	≥73	Hurricane-force	Considerable and widespread damage to vegetation, a few windows broken, structural damage to mobile homes and poorly constructed sheds and barns. Debris may be hurled about.

TABLE 4-25 HAIL SIZE COMPARISON CHART

Common Object	Size in Diameter
Pea	0.25 Inch
Penny or Dime	0.75 Inch
Quarter	1.00 Inch
Half Dollar	1.25 Inch
Golf Ball	1.75 Inch
Tennis Ball	2.50 Inch
Baseball	2.75 Inch
Grapefruit	4.00 Inch

Hail sizes can differ greatly from one storm to another, depending on the strength of the storm's updraft. Stronger updrafts can create larger hailstones, which cause more damage. This makes reporting the size of hail important for public safety. The preferred hail measurement method is to use a ruler to measure the diameter of the hail stone along its longest axis. However, various coins and balls are often used when reporting hail size.

Heavy rain can be measured by rate of accumulation within an hour or twelve-hour timeframe.

TABLE 4-26 NOAA HEAVY RAINFALL CLASSIFICATIONS

Heavy Rain in a 1-Hour Timeframe		Heavy Rain in a 12-Hour Timeframe	
Classification	Accumulation Rate	Classification	Accumulation Rate
Light	0.01-0.49 inches	Light	< 3.0 inches at two or more weather stations OR < 6.0 inches or more at one station
Heavy	> 0.49 inches	Heavy	3.0 inches or more at two or more weather stations OR 6.0 inches or more at one station

4.3.4 HISTORICAL OCCURRENCES

General Trends

Dangerous and damaging aspects of a severe storm are tornadoes, hail, lightning strikes, flash flooding, and winds associated with downbursts and microbursts. Using the severe weather events reported over the past 20 years provides an acceptable framework for determining and planning for the expected magnitude of such storms.

A complete list of severe thunderstorm events from 1955 to current day can be found in **Appendix B.**

TABLE 4-27 SUMMARY OF SEVERE THUNDERSTORMS IN TUSCARAWAS COUNTY (JANUARY 1, 2001-NOVEMBER 30, 2021)

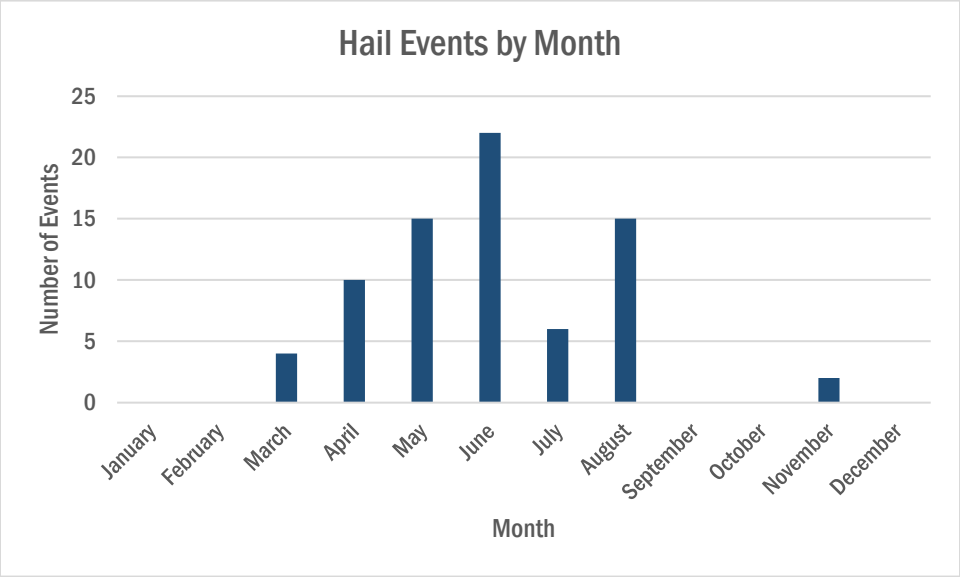
Type	Count	Injuries	Deaths	Property Damage	Crop Damage	Avg Property Damage/Event	Avg Crop Damage/Event
Hail	74	0	0	$ 5,000	$ 0	$67	$ 0
Heavy Rain	36	0	0	$ 0	$ 0	$0	$ 0
Lightning	1	1	0	$ 0	$ 0	$0	$ 0
Strong Wind	1	0	0	$ 10,000	$ 0	$10,000	$ 0
Thunderstorm Wind	207	0	0	$ 3,120,000	$ 0	$15,072	$ 0
Grand Total	**284**	**1**	**0**	**$ 3,135,000**	$ 0		

Hail Events

Large hail can damage structures, break windows, dent vehicles, ruin crops, and kill or injure people and livestock. Based on past occurrences, hail sizes greater than 1.75 inches in diameter are possible and should be included in future planning activities.

Since 2001, 74 recorded hail events associated with thunderstorms have either directly or indirectly affected the county and its immediately surrounding jurisdictions. The most recent hail event occurred in 2020. Furthermore, the historic frequency indicates that there is a 100% chance of this type of event occurring each year.

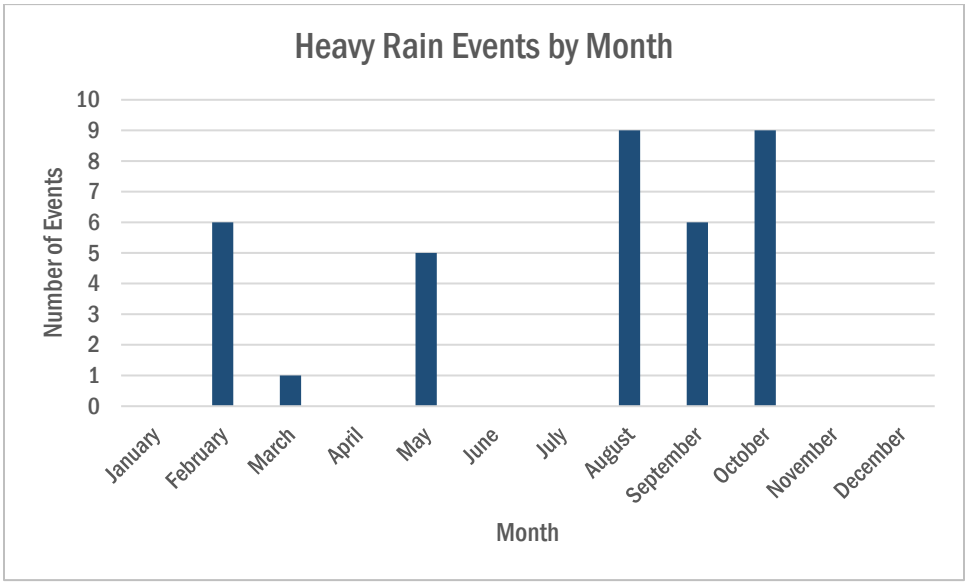
FIGURE 4-11 TUSCARAWAS COUNTY HAIL EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Heavy Rain Events

There have been 36 recorded heavy rain events associated with thunderstorms since 2001. The historic frequency calculates that there is a 100% chance of this type of event occurring each year. The most recent heavy rain event occurred in 2018.

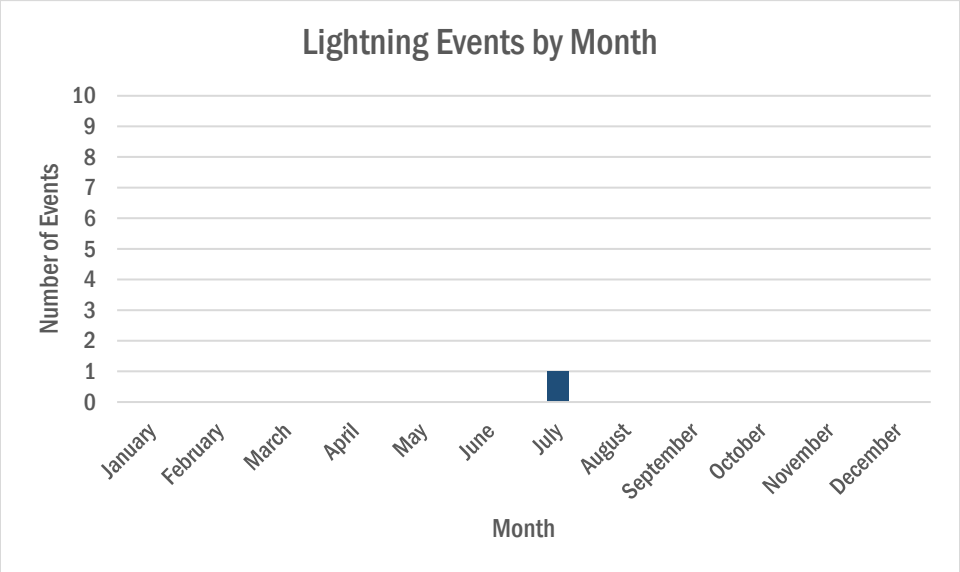
FIGURE 4-12 TUSCARAWAS COUNTY HEAVY RAIN EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Lightning Events

Except in cases where significant forest or range fires are ignited, lightning generally does not result in disasters. There has been one recorded lightning-related incident in Tuscarawas County since 2001, on July 1, 2001. The historic frequency calculates that there is a 5% chance of this type of event occurring each year.

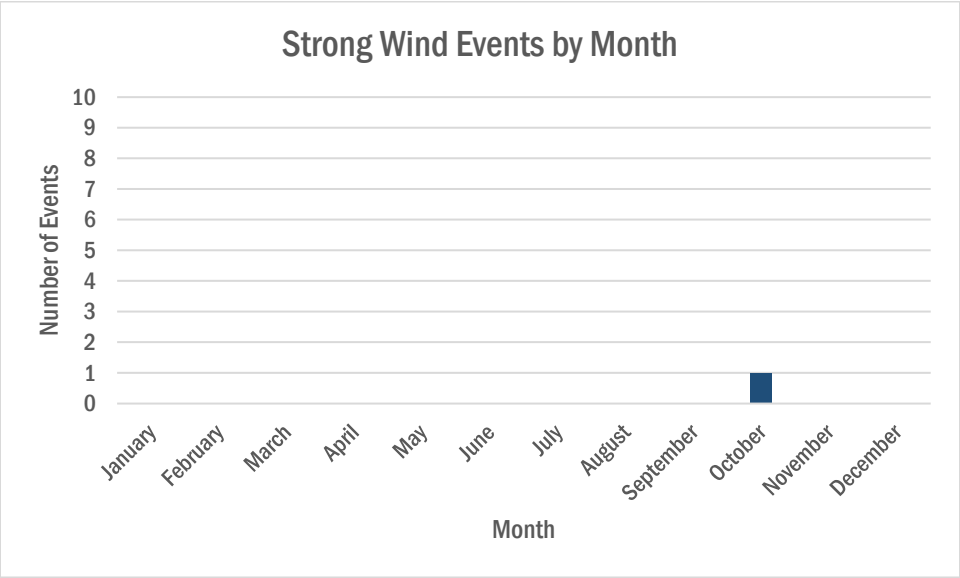
FIGURE 4-13 TUSCARAWAS COUNTY LIGHTNING EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Strong Wind Events

There has been 1 recorded strong wind event associated with thunderstorms since 2001. The historic frequency calculates that there is a 5% chance of this type of event occurring each year. The most recent heavy rain event occurred on October 29, 2012.

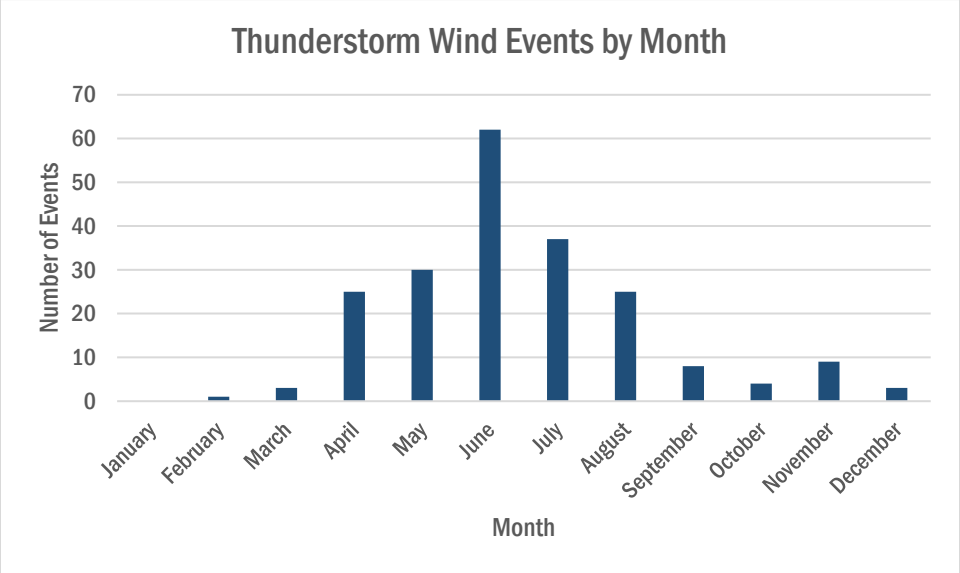
FIGURE 4-14 TUSCARAWAS COUNTY STRONG WIND EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Thunderstorm Wind Events

Non-tornadic, thunderstorm, and non-thunderstorm winds over 100 mph should also be considered in future planning initiatives. These types of winds can remove roofs, move mobile homes, topple trees, take down utility lines, and destroy poorly built or weak structures. Since 2001, there have been 207 recorded severe wind events associated with thunderstorms, with the most recent event occurring in 2021. The historic frequency calculates that there is a 100% chance of this type of event occurring each year.

FIGURE 4-15 TUSCARAWAS COUNTY THUNDERSTORM WIND EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Since 1953, eight federally or state declared severe thunderstorm weather events have occurred in Tuscarawas County, as shown in the following table. According to FEMA declarations (1953 to present), these events include tornadoes, severe storms, flooding, mudslides, landslides, hurricane evacuation, and severe windstorms.

TABLE 4-28 SEVERE STORM DISASTER DECLARATIONS

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-266	7/15/1969	Tornadoes, Severe Storms, Flooding	-	-
DR-1227	6/30/1998	Severe Storms, Flooding, and Tornadoes	-	-
DR-1507	1/26/2004	Severe Storms, Flooding, Mudslides, and Landslides	$11,703,087.98*	$1,238,534.80*
DR-1519	6/3/2004	Severe Storms and Flooding	$10,648,040.68*	$19,193,921.30*
DR-1556	9/19/2004	Severe Storms and Flooding	$25,804,256.17*	$23,662,227.18*
EM-3250	9/13/2005	Hurricane Katrina Evacuation	$2,541,599.60*	-
DR-1805	10/24/2008	Severe Wind Storm Associated with Tropical Depression Ike	$38,841,921.56*	-
EM-3346	6/30/2012	Severe Storms	-	-

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster area, not just Tuscarawas County.*

Event Narratives

- **Thunderstorm Wind – April 8, 1998:** A storm blew through Tuscarawas County. Strong winds knocked a sign over from on top of a department store in New Philadelphia, causing the roof to partially cave in. Four employees were injured, and a nearby tree was blown over onto a

vehicle. Another tree fell onto power lines, causing a power outage. Property damage was estimated at $200,000.

- **Thunderstorm Wind – June 26, 2008:** Emergency management reported damage to the roof of a school, as well as trees and power lines down near Strasburg and across the County. Property damage was estimated at $200,000.
- **Thunderstorm Wind – June 25, 2009:** Scattered thunderstorms developed ahead of and along a cold front moving across the Upper Ohio Valley. Law enforcement reported trees down countywide. Damages were estimated at $100,000.
- **Hail – March 23, 2011:** As a low-pressure system tracked along a warm front across Ohio and Pennsylvania severe thunderstorms developed just south of the front in Ohio and progressed eastward. Large hail was reported with many of the storms, with hail up to the size of golf balls reported in both Ohio and Pennsylvania. 1.75-inch sized hail was reported in Tuscarawas County. A strong supercell thunderstorm produced an EF-2 tornado that crossed through Westmoreland County in Pennsylvania during rush hour.
- **Thunderstorm Wind – July 10, 2013:** A powerful cold front and upper-level trough pushed across the Upper Ohio Valley on July 10th producing widespread severe weather and flash flooding from eastern Ohio, northern West Virginia, and western Pennsylvania. This included 3 separate tornadoes.
- **Hail – May 2, 2016:** In the early morning hours of May 2, 2016, a low-pressure center was moving east/northeast along a stalled boundary over the County Warning Area with a passing shortwave aloft. Only one severe thunderstorm (supercell) tracked along the low where greatest shear was observed and produced numerous reports of quarter size hail and larger across eastern OH thru Allegheny County in PA. Tuscarawas County reported 1.75-inch hail.
- **Hail – May 25, 2019:** Hail reaching magnitudes of 1.25 inches was spotted in Tuscarawas County during a severe thunderstorm event. No property damages, crop damages, injuries or deaths were reported from the hail event.
- **Thunderstorm Wind – June 10, 2020:** A series of thunderstorms developed over southwest Pennsylvania, moving into Tuscarawas County in the late evening. Winds reaching 50 knots in Roswell were recorded, with gusts reaching up to 80 mph. Widespread damage occurred around Roswell, totaling approximately $50,000 in property damage, and no reported crop damages.

4.3.5 PROBABILITY OF FUTURE OCCURRENCES

Reported thunderstorm events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing thunderstorm winds that cause damages or injury can be difficult to predict. However, based on the historical record of 284 thunderstorm events from 2001 through 2021 (14.2 thunderstorms per year), it can reasonably be assumed that this type of event will occur multiple times per year.

(2021 CY) - (2001 HY) = 20 Years on Record

(284 Events) / (20 Years) = 14.2 Events each Year

The Steering Committee, based on their own knowledge, concluded that Severe Thunderstorm events are "Highly Likely" each year. This means that they have a 100% chance of happening annually.

Thunderstorms have occurred regularly every year. Due to climate change, it is expected that thunderstorms will grow increasingly frequent and intensify in severity.

4.3.6 ASSETS EXPOSED TO SEVERE THUNDERSTORMS

Potential Losses

TABLE 4-29 IMPACTS FROM THUNDERSTORMS

Impact	Description
People	Loss of life or severe injuries can occur, especially to those outside. Lightning will strike outdoors. Hail can cause lacerations, concussions, and even death if large enough.
Infrastructure	Roofs and building siding can be severely damaged by high winds or hail. Power outages may result from lightning strikes or downed power lines.
Economy	Mostly localized disruptions. Large-scale storms, such as hurricanes or derechos, can temporarily affect businesses.
Natural Systems	Lightning can cause wildfires and urban fires. Wind can down trees.
Transportation	Fallen trees can hinder transportation. High winds and heavy rain can temporarily make driving conditions dangerous.

A timely forecast may not be able to mitigate property loss, but it could reduce associated casualties and injuries. It appears possible to forecast these extreme events with some skill. Further research is needed to test the existing hypothesis about the interaction between the convective storm and its environment that produces the extensive swath of high winds. There is no way to predict the specific area that will be impacted by thunderstorm winds, hailstorms or lightning strikes.

Community Vulnerability

The age, type, construction materials, and condition of inventory assets exposed to severe thunderstorms all affect the damage they may receive. Heavy wind loads can cause poorly constructed roofs to fail, and hail can damage the roofs and siding of structures, rendering the building more susceptible to water damage.

All county assets can be considered to be at risk of damage from severe thunderstorms including high winds, lightning strikes, hail, and flooding. Most structures, including critical facilities, should be able to adequately protect people from hail, but windows could get broken and exteriors dented. Facilities with back-up generators are better equipped to handle a severe weather situation if the power goes out.

Severe thunderstorms will remain a highly likely occurrence for the county, with some storms producing lightning and hail. An individual thunderstorm is unlikely to damage large numbers of structures, but its side effects (hail, winds and lightning) can damage structures and property throughout the county.

Hail is the third leading cause of crop failure in the United States and can also damage homes and vehicles. While drought was by far the leading cause of crop failures in 2012, at 79%, thunderstorms and their hazards accounted for over $1 billion in crop losses nationwide that year. A March 2017 report by Willis Re found that the average annual loss for severe storms is $11.23 billion. These losses from thunderstorms can be difficult to overcome. Insurance policies offer some relief for both homeowners and farmers.

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Most severe thunderstorm impacts include flash flooding and down trees/limbs. Most of the time these impacts are rapidly addressed but sometime debris from outlying roads is challenging.
Dover	Typical risk - no noticeable vulnerabilities.
New Philadelphia	Power does not go down very often. But if it does, large portions of the city are without power, including the largest concentration of restaurants in the county.
Uhrichsville	AEP is the local provider for electric and has put in a lot of effort to keep trees trimmed. Older structures within the city that could be subjected to damage - but vulnerability for this is not higher than any other municipality.
Baltic	We could use the school, but its small and could not help the entire community if needed.
Barnhill	Problems with storm drain due to the fact that Barnhill uses open ditches because we can't afford catch basins and culverts.
Bolivar	Older trees that are prone to losing large limbs. Roof blown off of a house during a microburst event.
Dennison	There is not a heightened risk. We have a hospital and transformer station, but AEP maintains the tree issue and electricity well - power does not go out very often.
Gnadenhutten	The power companies have cleaned up the lines. We have a lot of mature trees that can affect neighborhoods and power lines.
Midvale	Trees and power lines can blow down during severe thunderstorms. No extreme risks to the hazard; the local schools have recently been renovated and added on to.
Mineral City	Larger trees in the village, maintained, but can still fall on power lines/in vicinity of houses. Folks cannot always afford to maintain trees, resulting in trees that can be blown over on private property.
Newcomerstown	Scott Drive and Starkey Drive have older trees that tend to fall during severe wind events. In general, these do happen throughout town, as well.

Jurisdiction/Organization	Vulnerability Assessment Response
Parral	We have older trees that come down during storms.
Port Washington	We have a lot of old trees that blow down, especially in the cemetery. These trees are old and diseased.
Roswell	We have had incidents of trees falling on the power lines, but AEP annually maintains the trees and right-of-way to ensure there is minimal damage during storms. Problems occur outside of the village, and power outages only last a couple hours.
Stone Creek	Densely wooded village, a lot of trees are able to be blown over during high wind events. Abandoned property that has been neglected since the 1950s, can visually see the structure sway during high wind/thunderstorm events - could be a risk to properties located nearby.
Strasburg	No significant issues.
Sugarcreek	Not an issue in our community.
Tuscarawas	There are a few older trees that are throughout town. Many of our older trees were destroyed in previous high wind events.
Zoar	Some vulnerability from windblown trees, but we have good tree service in the area.
Tuscarawas County Regional Planning and Floodplain Office	Storm sewers and culverts are not designed to handle this heavy of rain in a short period of time causing road flooding
Trinity Twin City Medical Center	Any severe storm, power is the biggest concern. There have been no significant incidents as of yet. Extended and regional power outages pose a potential issue.

4.3.7 LAND USE AND DEVELOPMENT TRENDS

All new structures built in Tuscarawas County will likely be exposed to severe thunderstorm damage. The county needs to adhere to building codes so that new development is built to current standards.

Regulatory Environment

The formal regulations that pertain to thunderstorm events are negligible. All structures in Tuscarawas County are meant to be wind resistant, as recommended by the International Building Code.

4.3.8 THUNDERSTORM SUMMARY

Tuscarawas County is subject to severe storms, ranging from thunderstorms to tropical storms, which have the potential to cause flash flooding, tornadoes, downbursts, and debris. The Severe Thunderstorms profile primarily describes past and potential damages from high winds, lightning, and hail. Flooding is covered as a separate hazard, even if it is caused by a heavy precipitation event.

Building damage has been most successful mitigated in areas where local governments enforce strict building codes for high wind influence areas and adopt designated special flood hazard areas, and builders comply. Proven grounding techniques are also available to reduce lightning damage to buildings.

Other mitigation efforts include buyout programs, relocations, structural elevations, improved open-space preservation, and land use planning within high-risk areas. Due to the significant risk from severe storms, the county will remain proactive in its mitigation efforts to help build sustainability.

4. FLOODING

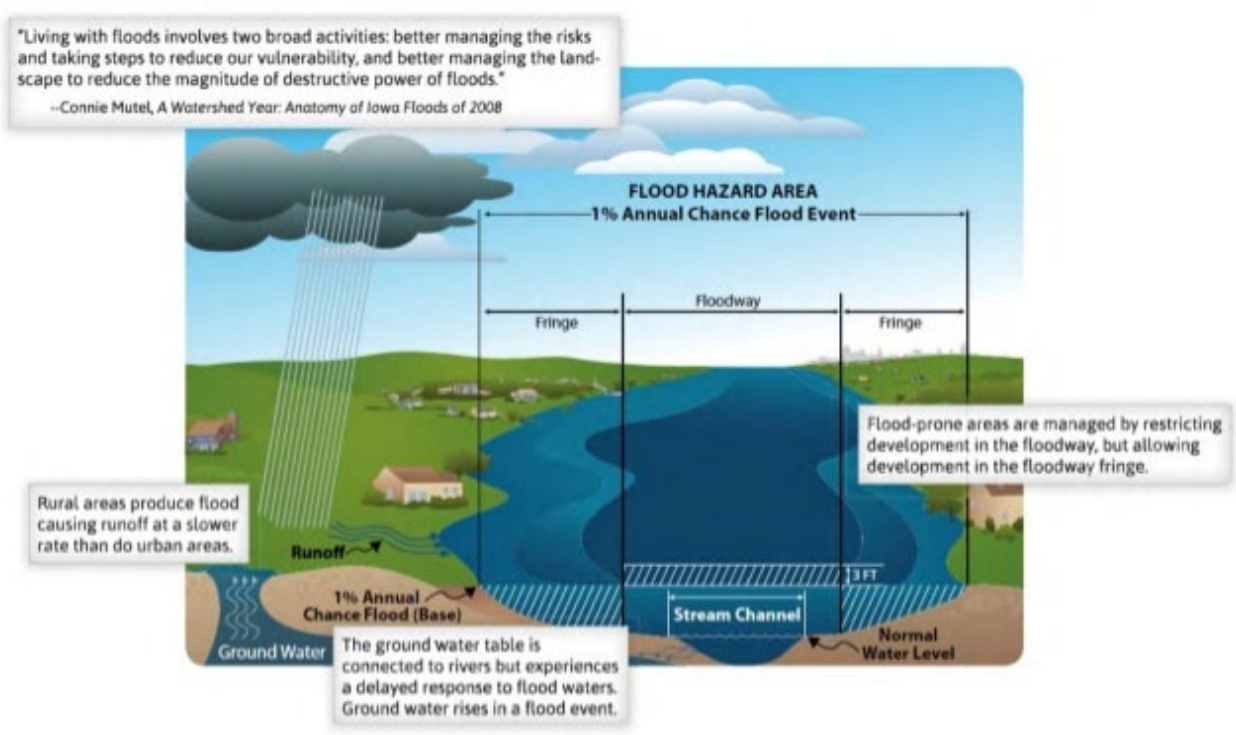
Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Flooding	4	1.2	2	0.6	2	0.4	2	0.2	2	0.2	2.6
Medium Risk Hazard (2.0 – 2.9)											

4.4.1 FLOODING DESCRIPTION

A flood is a natural event for rivers and streams. It occurs when a normally dry area is inundated with water. Excess water from snowmelt or rainfall accumulates and flows over the stream banks and into adjacent floodplains. Floodplains are lowlands adjacent to rivers, streams, and creeks that are subject to recurring floods. Flash floods usually resulting from heavy rains or rapid snowmelt. They can flood areas not typically subject to flooding, including urban areas. Extremely cold temperatures can cause streams and rivers to freeze, causing ice jams and creating flood conditions.

FEMA develops Flood Insurance Rate Maps (FIRMs) to identify the 1%-annual-chance flood zone for land use planning and the National Flood Insurance Program (NFIP). This 1%-annual-chance flood zone is used to delineate Special Flood Hazard Areas (SFHAs) and identify Base Flood Elevations. The figure below illustrates these terms. Tuscarawas County's current FIRM became effective in July 2010 and October 2018.

FIGURE 4-16 DIAGRAM IDENTIFYING THE SPECIAL HAZARD FLOOD AREA



Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making it one of the most common hazards in all states and U.S. territories. In Ohio, flooding from a variety of sources is common and can occur in any season. Most injuries and deaths from flooding happen when people are swept away by flood currents. Most property damage results from inundation by sediment-filled water. Fast-moving water can wash buildings off their foundations and sweep vehicles downstream. Pipelines, bridges, and other infrastructure can be damaged when high water combines with flood debris. Flooding can cause extensive damage, even if it only affects a basement. It also damages crop lands and kills livestock. Several factors determine the severity of floods, including rainfall intensity and duration, topography and ground cover.

- **Riverine flooding** typically originates when rising water levels from a river, creek, or stream spread onto normally dry land. Extra water from snowmelt, rainfall, freezing streams, and/or ice flows causes the river or stream to overflow into adjacent floodplains. Winter flooding usually occurs when ice creates dams or streams freeze from the bottom up during extreme cold spells. Spring flooding is usually the direct result of melting winter snowpack, heavy spring rains, or both.

- **Flash floods** can occur anywhere that a large volume of water flows or melts over a short time period. They are usually caused by slow-moving thunderstorms or rapid snowmelt. Because flash floods are so localized, their hazard areas cannot be clearly defined. They often occur with little warning and have significant impacts. Rapidly moving water only a few inches deep can lift people off their feet, and a depth of only a foot or two is needed to sweep cars away. Most flood deaths result from flash floods.

- **Urban flooding** is the result of development without adequate drainage systems, which decreases the ground's ability to absorb excess water. Typically, urban flooding occurs when fields or woodlands are changed to roads and parking lots. Urbanization can increase runoff, which is two to six times higher in urban areas than on natural terrain (National Oceanic and Atmospheric Administration, 1992). Flooding may occur in developed areas when the amount of water generated from rainfall and runoff exceeds a stormwater system's capability to remove it.

- **Stream bank erosion** is measured by the rate of the change in the position or horizontal displacement of a stream bank over a period of time. It is generally associated with riverine flooding and may be exacerbated by human activities such as bank hardening and dredging.

- **Ice jams** are stationary accumulations of ice that restrict river flow. They can be freeze-up jams, breakup jams, or a combination. Ice jams increase upstream water levels considerably, while reducing downstream levels. When an ice jam releases, the effects downstream can be similar to those of a flash flood or dam failure. Ice jam flooding generally occurs in the late winter or spring.

Flood reduction, prevention, and mitigation are major challenges to Tuscarawas County residents and its floodplain manager. Many areas of the county are at risk of flooding, especially properties

near creeks. Heavy seasonal rainfall, which typically occurs from late October through April, can make streams overflow.

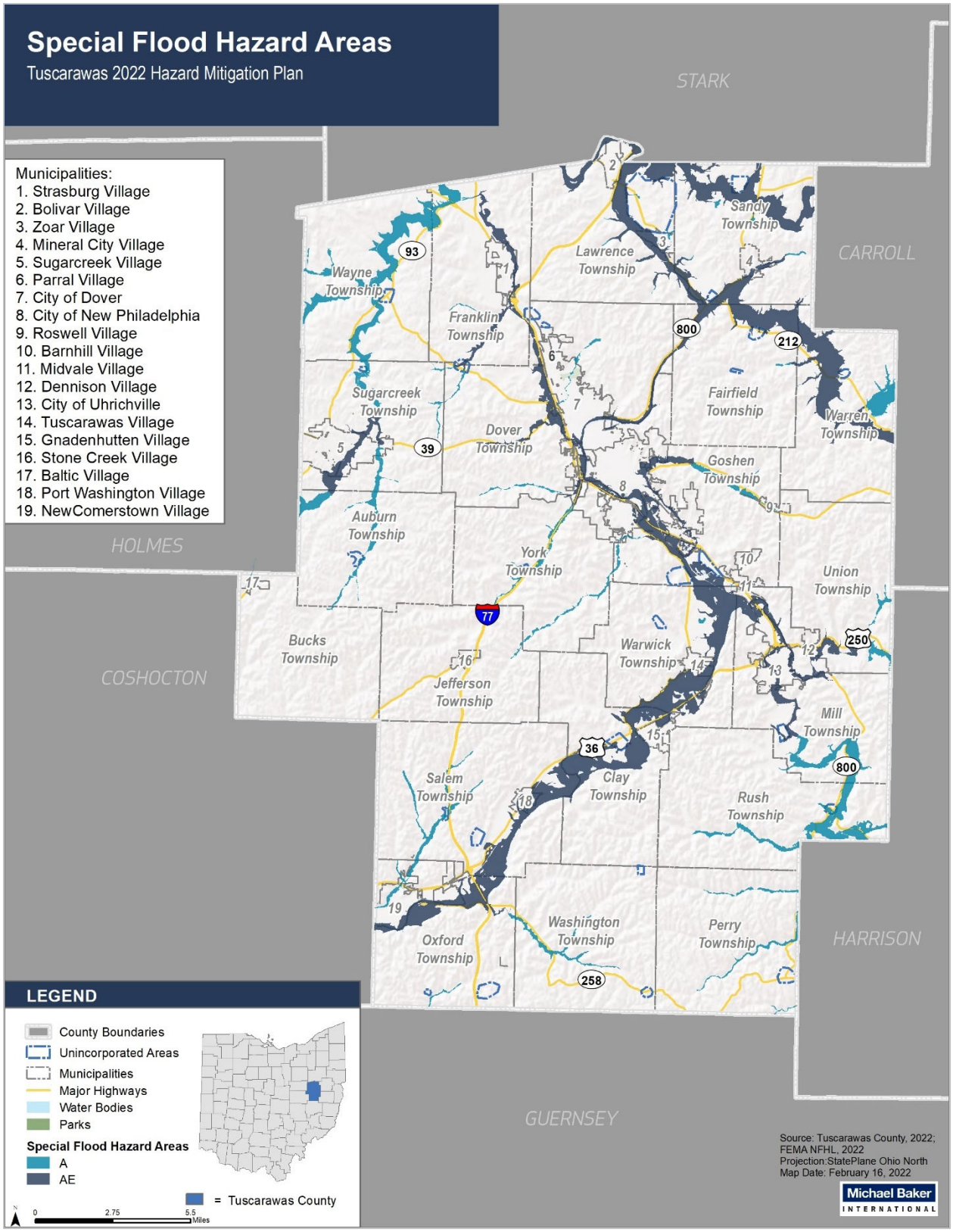
4.4.2 FLOODING LOCATION

The Flood Insurance Study (FIS) for Tuscarawas County was revised on October 19, 2018. The riverine flooding sources identified in the study are as follows:

- Beaverdam Creek
- Brandywine Creek
- Broad Run
- Little Stillwater Creek
- Sandy Creek
- South Fork Sugar Creek
- Stillwater Creek
- Sugar Creek
- Tuscarawas River

Flooding in Tuscarawas County is most likely to occur in the floodplains identified in the following figure. Smaller-scaled flooding can also occur outside of these areas.

FIGURE 4-17 FLOOD ZONES IN TUSCARAWAS COUNTY



4.4.3 FLOODING EXTENT

In Tuscarawas County, more severe flooding is generally the result of prolonged periods of heavy rainfall and high-intensity, short-duration events. Floods usually occur during the season of highest precipitation or during heavy rainfalls after long dry spells. Widespread storms over the region are common from September through April. Flooding is more severe when the ground cannot soak up the water because it is frozen or saturated. Rain on snow in the higher elevations adds snowmelt to rainfall runoff and intensifies flood conditions.

Cloudburst storms, sometimes lasting as long as 3 hours, can occur over this region from late spring to early fall. They also may occur as an extremely severe sequence within a general winter rainstorm or during unseasonable rains. The intensity of cloudburst storms is very high, and the storms can produce enough precipitation to result in significant runoff.

Surface flooding, including some street flooding, can occur during severe storms. Minor flooding to garages and outbuildings, landscape erosion, and flooded streets have been reported in and around the county. Trash and other debris can also obstruct culvert and pipe openings in smaller channels. This can lead to clogging, obstruction, and flooding of nearby properties during even moderate flows.

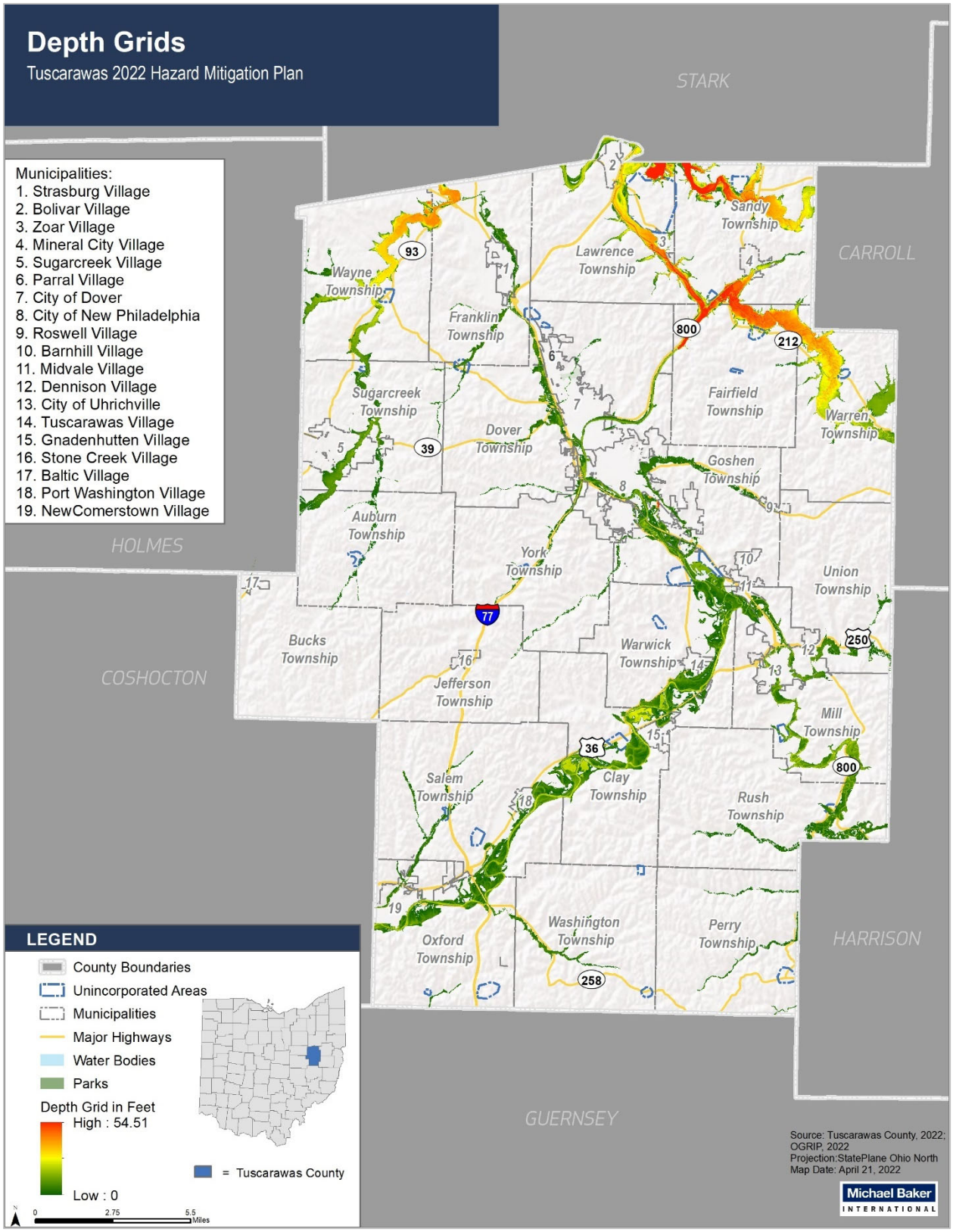
FEMA defines flood-prone areas and their associated risk through zone designation. The following table includes the different flood zone designations as well as the description of the flood zone. Tuscarawas County has flood zones A and AE.

TABLE 4-30 FEMA FLOOD ZONE DESIGNATIONS

Zone	Description
Moderate to Low Risk Areas	
B and X	Area of moderate flood hazard, usually the area between the limits of the 100- year and 500-year floods. B Zones are also used to designate base floodplains of lesser hazards, such as areas protected by levees from 100-year flood, or shallow flooding areas with average depths of less than one foot or drainage areas less than 1 square mile
C and X	Area of minimal flood hazard, usually depicted on FIRMs as above the 500-year flood level. Zone C may have ponding and local drainage problems that don't warrant a detailed study or designation as base floodplain. Zone X is the area determined to be outside the 500-year flood and protected by levee from 100- year flood
High Risk Areas	
A	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones.
AE	The base floodplain where base flood elevations are provided. AE Zones are now used on new format FIRMs instead of A1-A30 Zones.
A1-30	These are known as numbered A Zones (e.g., A7 or A14). This is the base floodplain where the FIRM shows a BFE (old format).
AH	Areas with a 1% annual chance of shallow flooding, usually in the form of a pond, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
AO	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Average flood depths derived from detailed analyses are shown within these zones.
AR	Areas with a temporarily increased flood risk due to the building or restoration of a flood control system (such as a levee or a dam). Mandatory flood insurance purchase requirements will apply, but rates will not exceed the rates for unnumbered A zones if the structure is built or restored in compliance with Zone AR floodplain management regulations.
A99	Areas with a 1% annual chance of flooding that will be protected by a Federal flood control system where construction has reached specified legal requirements. No depths or base flood elevations are shown within these zones.
High Risk – Coastal Areas	
V	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. No base flood elevations are shown within these zones.
VE, V1-30	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. These areas have a 26% chance of flooding over the life of a 30-year mortgage. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
Undetermined Risk Areas	
D	Areas with possible but undetermined flood hazards. No flood hazard analysis has been conducted. Flood insurance rates are commensurate with the uncertainty of the flood risk.

The following figure shows the flood depth grids for the identified flood sources throughout Tuscarawas County.

FIGURE 4-18 TUSCARAWAS COUNTY FLOOD DEPTH GRIDS



Flood Warning and Notification

The magnitude and severity of flood damage can be reduced with proper notification and longer warning periods before flood waters arrive. Warning times of 12 hours or more have proven adequate to prepare communities for flooding and reduce flood damages. Warning of a flood more than 12 hours in advance can reduce a community's flood damage by approximately 40% (Read Sturgess and Associates 2000). In addition, seasonal notifications about flooding can enhance the awareness of at-risk residents. When communicated effectively, advance notifications can reach target audiences on a large scale. The Tuscarawas County EMA coordinates with the National Weather Service.

Tuscarawas County River and Creek Characteristics

Large floods from the Tuscarawas River and various creeks that run throughout the county have occurred in all seasons of the year. Information on historical floods along the Tuscarawas River and Stillwater Creek was obtained from stream gauging stations maintained by the NOAA. The following tables show the flood stage categories for Tuscarawas River at the New Philadelphia stream gauge and Stillwater Creek at the Uhrichsville stream gauge as determined by the National Oceanic and Atmosphere Administration and the National Weather Service (NWS). Highest historical crests for the Tuscarawas River at the New Philadelphia stream gauge are also presented in the following table; the highest historical crests for Stillwater Creek at the Uhrichsville stream gauge are unknown.

TABLE 4-31 FLOOD CATEGORIES FOR STILLWATER CREEK AT UHRICHSVILLE

Flood Category	Crest (ft)
Action Stage	8'
Flood Stage	10'
Moderate Flood Stage	13'
Major Flood Stage	16'

TABLE 4-32 FLOOD CATEGORIES FOR TUSCARAWAS RIVER AT NEW PHILADELPHIA

Flood Category	Crest (ft)
Action Stage	4.1'
Flood Stage	7.5'
Moderate Flood Stage	9'
Major Flood Stage	11'

TABLE 4-33 HIGHEST HISTORICAL CRESTS ON THE TUSCARAWAS RIVER IN NEW PHILADELPHIA

Crest Feet	Date of Crest
8.40'	1/12/2005
7.98'	3/26/2008
7.96'	3/30/2008
7.89'	3/4/2008
7.81'	3/9/2011

According to the Flood Insurance Study for Tuscarawas County, the worst flood occurred in March 1913 on the Tuscarawas River with an estimated peak discharge rate reaching 83,000 cfs at Newcomerstown. When the Tuscarawas River floods, the river crests and remains at a flooded stage, keeping the flood waters outside of the riverbed for an extended period of time. The smaller waterways in Tuscarawas County crest faster than the Tuscarawas River.

4.4.4 HISTORICAL OCCURRENCES

General Trends

According to the NOAA Storm Events Database, Tuscarawas County has had 68 flood or flash flood events since 2001, resulting in no injuries, one death, $970,000 in property damage and $1,000 in crop damage. During Planning Committee Meeting #1, committee members stated that flooding has been the worst natural disaster since the previous hazard mitigation plan was developed. A complete list of flooding events from 1996 to current day can be found in **Appendix B.**

TABLE 4-34 SUMMARY OF FLOOD EVENTS IN TUSCARAWAS COUNTY (JANUARY 1, 2001-NOVEMBER 30, 2021)

Event	Count	Injuries	Deaths	Property Damage	Crop Damage	Avg Property Damage/Event	Avg Crop Damage/Event
Flood	34	0	1	$802,000	$0	$23,588	$0
Flash Flood	34	0	0	$168,000	$1,000	$4,941	$29
Grand Total	**68**	**0**	**1**	**$ 970,000**	**$ 1,000**		

FIGURE 4-19 TUSCARAWAS COUNTY FLASH FLOOD EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021

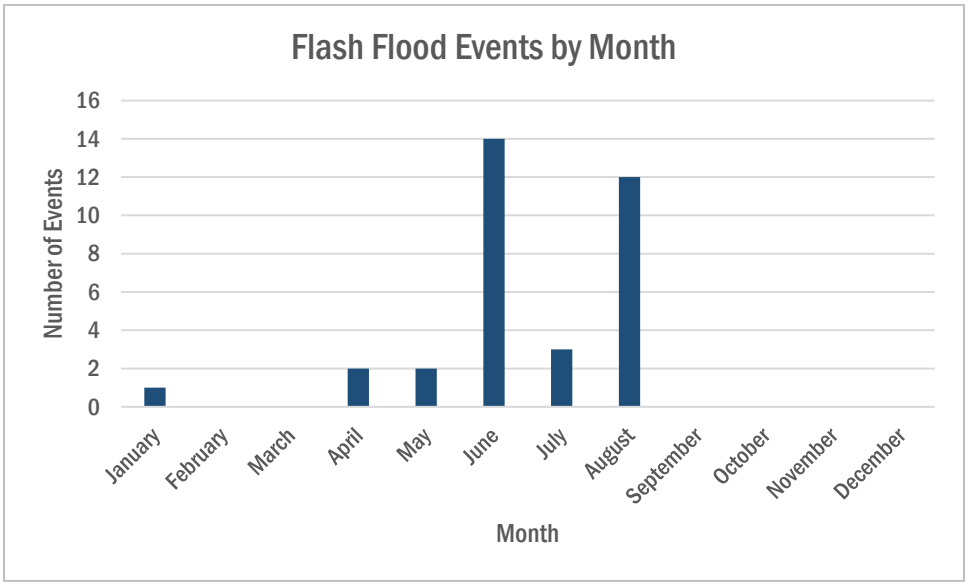
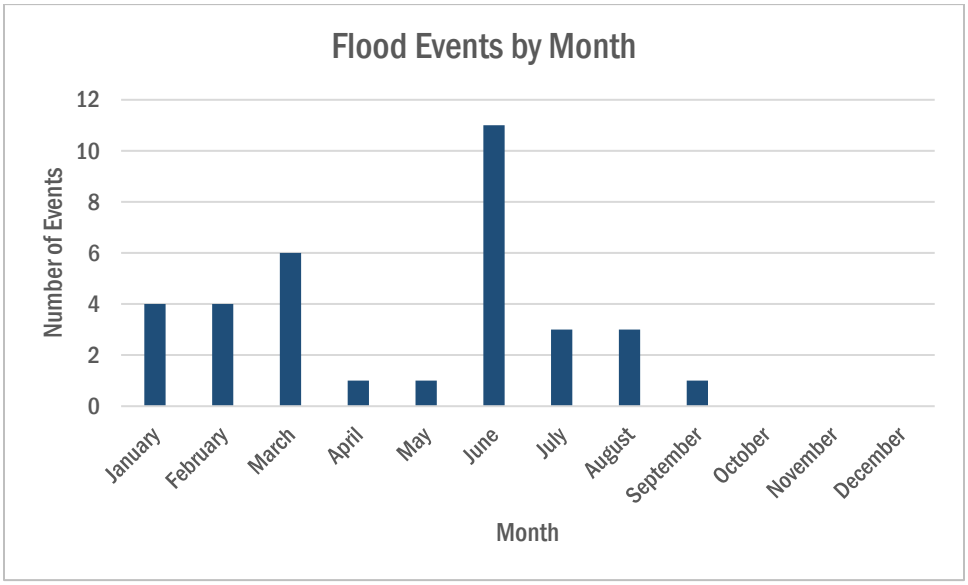


FIGURE 4-20 TUSCARAWAS COUNTY FLOOD EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Tuscarawas County has been a part of six Federal Disaster Declarations that included flooding. Four disasters resulted in both public assistance and individual assistance.

TABLE 4-35 DECLARED DISASTERS AFFECTING TUSCARAWAS COUNTY

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-266	7/15/1969	Tornadoes, Severe Storms, Flooding	-	-
DR-1227	6/30/1998	Severe Storms, Flooding, and Tornadoes	-	-
DR-1507	1/26/2004	Severe Storms, Flooding, Mudslides, and Landslides	$11,703,087.98*	$1,238,534.80*
DR-1519	6/3/2004	Severe Storms and Flooding	$10,648,040.68*	$19,193,921.30*
DR-1556	9/19/2004	Severe Storms and Flooding	$25,804,256.17*	$23,662,227.18*
DR-1580	2/15/2005	Severe Winter Storms, Flooding and Mudslides	$97,938,844.86*	$10,017,388.91*

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster area, not just Tuscarawas County.*

Event Narratives

- **June 28, 1998 – Flash Flood:** Thunderstorm moved across Tuscarawas County during the day of the 28th. By that evening, major flash flooding problems were reported countywide. The city of Uhrichsville was especially hard hit, with 300 families forced to evacuate. The west side of town was reported to be mostly under water by the early morning hours of the 30th. Flooding problems continued across the county past the end of the month, as several roads in low-lying and flood control areas remained closed well into July. The estimated impact was $20,000,000.

- **January 4, 2004 – Flooding:** Rivers began to rise on January 2nd because of snow melt and temperatures 20 degrees above normal. Two to three inches of rain fell January 3rd and 4th,

causing rivers in Eastern Ohio to rise. Numerous small streams flooded first, followed by the rivers: Muskingum River at Coshocton rose above flood stage (15 feet) 6 AM on 4th; crested 18 feet at 6 AM on 5th; fell below flood stage 7 AM on 10th. Wills Creek at Cambridge rose above flood stage (15 feet) 6 PM on 4th; crested 20.1 feet at 6 AM on 5th; fell below flood stage 1 PM on 8th. Stillwater Creek at Uhrichsville rose above flood stage (5 feet) 5:30 PM on 4th; crested 9.6 feet 9 AM on 6th; fell below flood stage 1 AM on 9th. Tuscarawas River at New Philadelphia rose above flood stage (7 feet) 930 PM on 4th; crested 7.3 feet at 2 AM on 5th; fell below flood stage at 12 noon on the 5th. The Tuscarawas River at Newcomerstown crested 10.3 feet the early evening of the 5th. Flood stage is 11 feet. The estimated damage impact was $100,000.

- **September 8, 2004 – Flooding:** By 4:45 PM on 8th, Horse Shoe Bend Rd. flooded east of Newcomerstown; a 9-year old girl was swept off the road by flood waters as she walked home from school resulting in her death. By 5 PM, Blizzard Rd. flooded in Uhrichsville. Before flooding ended, basements flooded in Uhrichsville and a few homes were evacuated in Dennison. Route 258 closed by mud slide. 14 structures suffered major damage; 19 had minor. Other roads flooded: 10, 43, 151, 331, 800. Most small stream flooding ended by 12 PM on the 9th, but flooding on Stillwater Creek at Uhrichsville continued. Stillwater Creek rose to flood stage (5 ft) at 4 AM EDT on 9th; crested 10.3 at 7 AM EDT 10th; and fell below flood stage 7 AM EDT on the 13th. Total rain: 6.2" at Gilmore; 4.8 Newcomerstown. There was a record flood on Huff Creek at Mineral City, which crested at 5.82 ft at 530 AM EDT on 9th (previous record 4.35). The estimated impact was $200,000.

- **January 26, 2005 – Flooding:** By 5:45 PM on 5th, Little Stillwater Creek flooded Route 250 near Dennison. By 9:30 PM on 5th, the following routes flooded: 39 near Dover; 93 near Dundee; 212; 258 east of Newcomerstown; 800 near Stillwater. Roads were still flooded on the 12th. On the 13th, 6,400 people, in the areas of Mineral City, Wilkshire Hills, and Zoar were asked to evacuate their homes because water was being released from Bolivar and Dover Dams. Water behind Bolivar Dam reached a record 950 feet above sea level; Dover Dam rose to a record of 909 feet, just 7 feet below the top of the dam. On Stillwater Creek, Uhrichsville was above flood stage (5 feet), from 11 PM on 5th to 11 AM on 10th; and from 6 PM on 12th to 4 PM on the 15th. Stillwater Creek crested twice: 8.9 feet 10 AM on 7th; and 5.7 11 AM on 14th. On the Tuscarawas River, New Philadelphia was above flood stage (7 feet), from 11:45 AM on 11th to 3:30 PM on 17th; and from 730 PM on 17th to 8 PM on 26th. The Tuscarawas River in New Philadelphia crested twice: 8.4 feet 11 AM on 12th; and 8.3 feet 11 AM on 19th. The estimated damage impact was $150,000.

- **February 28, 2011 – Flooding:** A strong low pressure system moved across the Upper Ohio Valley bringing heavy rain as well as a line of severe thunderstorms. Flooding of streams and creeks was widespread across eastern Ohio and western Pennsylvania. Isolated wind damage from severe thunderstorms occurred with a cold front in the morning. The estimated damage impact was $75,000.

- **July 23, 2017 – Flash Flood:** A flash flood event caused by heavy rain in New Philadelphia as well as Belmont and Guernsey Counties caused an estimated $10,000 in property damages. The heavy showers and thunderstorms from the system brought major street and road flooding throughout the region. No injuries or deaths were reported from this flash flood event.
- **June 18, 2019 – Flood:** A heavy rain storm system moved through Pennsylvania and Ohio in the late evening of June 18th, bringing 2 to 4 inches of rain to Tuscarawas County. Flooding and flash flooding occurred throughout Tuscarawas County, Coshocton County, Jefferson County, Carroll County, Belmont County, Monroe County, Harrison County, and Columbiana County. In Tuscarawas County, the 911 call center received a phone call that roads were flooded in Roswell. There were no reported injuries, deaths, property damages, or crop damages for this flood event.

4.4.5 PROBABILITY OF FUTURE OCCURRENCES

Reported flood events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of the county experiencing a flood event can be difficult to quantify, but the historical record of seven flood events since 2001 indicates that this type of event has occurred once every 0.29 years from 2001 through 2021.

(2021 CY) - (2001 HY) = 20 Years on Record

(68 Events) / (20 Years) = 3.4 Events per Year

The historic frequency calculates that the chance of this type of event occurring each year is 100%. The Steering Committee, based on their own knowledge, concluded that Flooding events are “Highly Likely” each year. This means that they have a 100% chance of happening annually.

4.4.6 ASSETS EXPOSED TO FLOODING

Potential Losses

TABLE 4-36 IMPACTS FROM FLOODING

Impact	Description
People	Severe floods can kill those caught in their way. Injuries may also result. Illnesses from water-borne viruses, bacteria, or parasites if contact is made with floodwaters.
Infrastructure	Buildings can be severely damaged or destroyed. Mold can occur after flooding.
Economy	Local economies can sustain the most damage. If damage or transportation shortages cause enough disruption, effects may be felt at a larger scale.
Natural Systems	Land may be waterlogged, destroying crops. Vegetation may be uprooted and displaced. Animals can lose habitats.
Transportation	Roadways may become impassable. Affected railways can halt movement of goods.

Community Vulnerability

In Tuscarawas County, there are 1,432 total structures located in the Special Flood Hazard Area (SFHA); 9 of the county's critical facilities are located in the SFHA. New Philadelphia has the highest number of structures in the SFHA with 528 structures, Uhrichsville has the second highest with 313 structures, and Dover has the third highest with 146 structures. Uhrichsville has the highest percent of structures in the SFHA with 12% of total structures located in the SFHA, Warwick Township has 8% of its total structures located in the SFHA, and New Philadelphia has 6% of its total structures located in the SFHA. Goshen Township has the highest number of critical facilities located in the SFHA with 3 critical facilities, Sugarcreek has 2 critical facilities located in the SFHA, and New Philadelphia, Uhrichsville, Franklin Township, and Newcomerstown all have 1 critical facility located in the SFHA.

TABLE 4-37 COMMUNITY FLOOD VULNERABILITY IN TUSCARAWAS COUNTY

Municipality	Total Structures	Structures in SFHA	Percent Structures in SFHA	Total Critical Facilities	Critical Facilities in SFHA	Percent Critical Facilities in SFHA
Auburn Township	418	5	1%	5	0	0%
Baltic Village	359	4	1%	5	0	0%
Barnhill Village	166	0	0%	1	0	0%
Bolivar Village	440	0	0%	8	0	0%
Bucks Township	489	1	0%	5	0	0%
City of Dover	6,420	146	2%	42	0	0%
City of New Philadelphia	9,081	528	6%	73	1	1%
City of Uhrichsville	2,692	313	12%	16	1	6%
Clay Township	331	9	3%	1	0	0%
Dennison Village	1,273	6	0%	25	0	0%
Dover Township	1,932	68	4%	6	0	0%
Fairfield Township	701	5	1%	1	0	0%
Franklin Township	1,044	15	1%	3	1	33%
Gnadenhutten Village	601	5	1%	9	0	0%
Goshen Township	1,730	57	3%	11	3	27%
Jefferson Township	425	0	0%	0	0	0%
Lawrence Township	852	12	1%	1	0	0%
Midvale Village	339	6	2%	2	0	0%
Mill Township	960	8	1%	3	0	0%
Mineral City Village	365	2	1%	4	0	0%
Newcomerstown Village	1,912	40	2%	23	1	4%
Oxford Township	552	26	5%	2	0	0%
Parral Village	121	0	0%	0	0	0%
Perry Township	254	0	0%	0	0	0%
Port Washington Village	249	12	5%	4	0	0%
Roswell Village	102	1	1%	1	0	0%
Rush Township	431	3	1%	4	0	0%

Municipality	Total Structures	Structures in SFHA	Percent Structures in SFHA	Total Critical Facilities	Critical Facilities in SFHA	Percent Critical Facilities in SFHA
Salem Township	514	13	3%	1	0	0%
Sandy Township	1,004	3	0%	10	0	0%
Stone Creek Village	91	0	0%	2	0	0%
Strasburg Village	1,346	0	0%	14	0	0%
Sugarcreek Township	822	4	0%	6	0	0%
Sugarcreek Village	1,292	34	3%	22	2	9%
Tuscarawas Village	501	2	0%	5	0	0%
Unincorporated	2,946	16	1%	23	0	0%
Union Township	639	8	1%	2	0	0%
Warren Township	666	2	0%	4	0	0%
Warwick Township	769	61	8%	3	0	0%
Washington Township	358	1	0%	1	0	0%
Wayne Township	801	10	1%	2	0	0%
York Township	647	4	1%	5	0	0%
Zoar Village	104	2	2%	3	0	0%
Grand Total	**46,739**	**1,432**	**3%**	**358**	**9**	**3%**

In Tuscarawas County, there are 850 mobile homes. Out of the 850 mobile homes, 248, or 29.2%, are located in the SFHA. The 248 mobile homes located in the SFHA are in both New Philadelphia and Dover. New Philadelphia has 234 mobile homes located in the SFHA, or 3% of their total structures. Dover has 14 mobile homes located in the SFHA, or less than 1% of their total structures.

TABLE 4-38 MOBILE HOME FLOOD VULNERABILITY IN TUSCARAWAS COUNTY

Municipality	Total Structures	Structures on mobile home parcels	Total Mobile Homes in SFHA	Percent Mobile Homes in SFHA
Auburn Township	418	0	0	0%
Baltic Village	359	0	0	0%
Barnhill Village	166	0	0	0%
Bolivar Village	440	0	0	0%
Bucks Township	489	0	0	0%
City of Dover	6,420	48	14	0%
City of New Philadelphia	9,081	453	234	3%
City of Uhrichsville	2,692	69	0	0%
Clay Township	331	0	0	0%
Dennison Village	1,273	0	0	0%
Dover Township	1,932	0	0	0%
Fairfield Township	701	0	0	0%
Franklin Township	1,044	0	0	0%

Municipality	Total Structures	Structures on mobile home parcels	Total Mobile Homes in SFHA	Percent Mobile Homes in SFHA
Gnadenhutten Village	601	0	0	0%
Goshen Township	1,730	0	0	0%
Jefferson Township	425	0	0	0%
Lawrence Township	852	0	0	0%
Midvale Village	339	6	0	0%
Mill Township	960	0	0	0%
Mineral City Village	365	0	0	0%
Newcomerstown Village	1,912	0	0	0%
Oxford Township	552	0	0	0%
Parral Village	121	0	0	0%
Perry Township	254	0	0	0%
Port Washington Village	249	0	0	0%
Roswell Village	102	0	0	0%
Rush Township	431	0	0	0%
Salem Township	514	0	0	0%
Sandy Township	1,004	245	0	0%
Stone Creek Village	91	0	0	0%
Strasburg Village	1,346	0	0	0%
Sugarcreek Township	822	0	0	0%
Sugarcreek Village	1,292	0	0	0%
Tuscarawas Village	501	27	0	0%
Unincorporated	2,946	0	0	0%
Union Township	639	0	0	0%
Warren Township	666	0	0	0%
Warwick Township	769	2	0	0%
Washington Township	358	0	0	0%
Wayne Township	801	0	0	0%
York Township	647	0	0	0%
Zoar Village	104	0	0	0%
Grand Total	**46,739**	**850**	**248**	**1%**

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

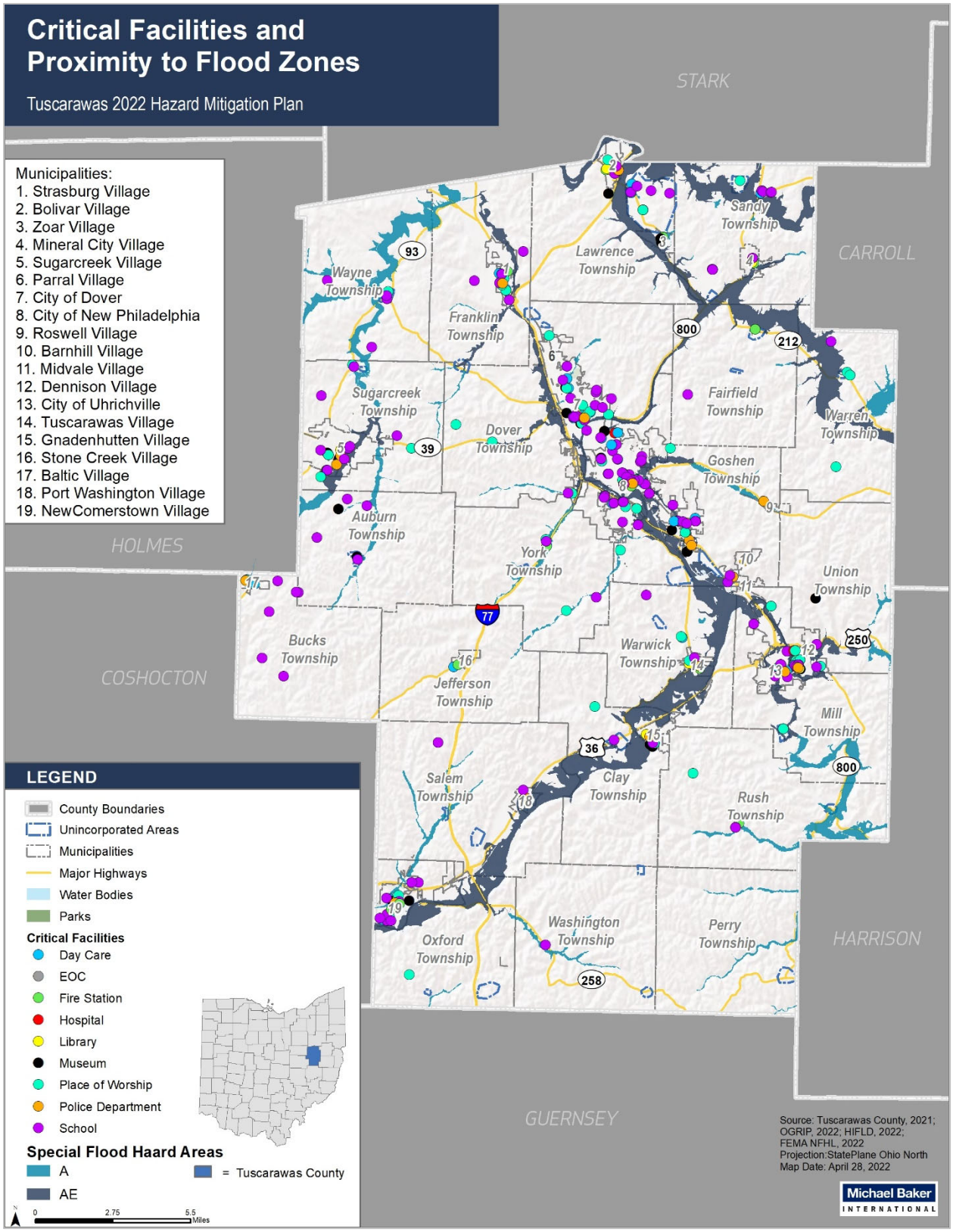
Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	We have many lower income residents living near low lying areas who may be under insured or have no insurance at all.
Dover	Vulnerable areas located in township - moderate risk of flash flooding. State Route 39 is vulnerable to flash flooding. Trailer park located off of

Jurisdiction/Organization	Vulnerability Assessment Response
	Sugarcreek is located in a low-lying area, has not flooded, but has come close.
New Philadelphia	Most areas of New Philadelphia are not subject to periodic flooding, except for the Beaverdam Creek area. This area needs more flood control/flood protection. Also, city does get intermittent flooding with heavy rains due to inadequately sized storm water system.
Uhrichsville	Flooding occurs pretty often. We have a very good handle on the locations that flood. We had a flooding event over a month ago, but residents are able to adapt quickly.
Baltic	Unknown vulnerabilities to this hazard at this time. No memory of flooding in the village to date.
Barnhill	No issues with flooding in the village.
Bolivar	When Muskingum Watershed backs up, east of the village is constantly flooding. Flooding easement located on the east end. Canal Street vulnerable to flooding. Flooding cuts village off from the freeway and the grocery store.
Dennison	A few homes in village were built in floodplains. There are a lot of parks that border creeks located in the village and become flooded. Work has been done by homeowners to mitigate flooding.
Gnadenhutten	The village itself sits above the river. There are some homes that sit in the floodplain on the outskirts of town, as well as businesses, and a bus garage.
Midvale	Midvale has a State Route 250 that intersects the village - Stillwater River and a creek is on either side. Several businesses are near the creek and can flood. Near the river, there is a wedding venue and golf course that often flood. The Fire Department has had to do multiple water rescues for canoers and kayakers that get swept away in the Stillwater River floodwaters.
Mineral City	We have a couple of roads that can flood - West Broadway and Linden Tree Road. County Road 90 also vulnerable to flooding.
Newcomerstown	Parks Hill, Neighbor Street, Cross Street, Old Canal Road, W. Church Street, Creekside Drive, and Beech Street tend to be affected by stream and river flooding. There are homes here that are affected. It tends to flood the other side first but can affect us at stronger storms with more precipitation.
Parral	No vulnerabilities to this hazard.
Port Washington	The Tuscarawas River runs through the town. While there are no immediate issues, it is viewed with caution.
Roswell	There is a creek that runs through the village and floods when heavy rain. The flooding can just be over the riverbed or be as extreme as flooding yards. Barnhill Road can become covered with floodwater. Extreme flooding events from the creek can occur up to 3 times a year. When Barnhill Road becomes flooded, it cuts of the one of three entrances to the Village of Roswell.
Stone Creek	Town is named after Stone Creek, flooding from the waterway in low-lying areas. Volunteer fire department helps people get flood waters out of basements. Stone Creek has not been cleaned out or excavated in a long time to help alleviate flooding.

Jurisdiction/Organization	Vulnerability Assessment Response
Strasburg	Wooster Ave. floods during heavy rain events, but usually dissipates fairly quickly. Side streets along railroad tracks have issues with standing water beyond the usual hour or so.
Sugarcreek	We have several areas that flood regularly, but they are mostly farm land, no homes are endangered.
Tuscarawas	Heritage Drive is respectively affected by flooding. No buildings are at risk.
Zoar	The Army Corps has installed new monitoring on Lime Kiln Lake/Goose Run to alert of any flooding. They are also completing the final phase of modifying the Zoar Levee to provide better future flood control.
Tuscarawas County Regional Planning and Floodplain Office	The Jobs and Family Service building has been flooded.
Trinity Twin City Medical Center	No significant concerns.

The following image shows the proximity of the critical facilities in Tuscarawas County to the mapped floodplains within the county.

FIGURE 4-21 TUSCARAWAS COUNTY'S CRITICAL FACILITIES VULNERABLE TO FLOODING



Hazus-MH 100-Year Flood Scenario

The method used in determining the types and numbers of potential assets exposed to flooding was conducted using a loss estimation model called HAZUS-MH. HAZUS-MH is a regional multi-hazard loss estimation model that was developed by the FEMA and the National Institute of Building Sciences (NIBS). For this Plan, a 100- year flood scenario was modeled, and the results are presented below.

The geographical size of the region is approximately 571 square miles and contains 6,681 census blocks. The region contains over 37 thousand households and has a total population of 92,582 people (2010 Census Bureau data).

There are an estimated 41,111 buildings in the region with a total building replacement value (excluding contents) of 10,492 million dollars. Approximately 89.01% of the buildings (and 69.59% of the building value) are associated with residential housing.

For essential facilities, there are 6 hospitals in the region with total bed capacity of 380. There are 147 schools, 20 fire stations, 69 police stations, and 1 emergency operation center.

TABLE 4-39 BUILDING EXPOSURE BY OCCUPANCY TYPE FOR THE SCENARIO

Occupancy	Exposure ($1000)	Percent of Total
Residential	2,057,665	66.7%
Commercial	498,511	16.2%
Industrial	337,506	10.9%
Agricultural	32,156	1.0%
Religion	56,161	1.8%
Government	23,033	0.7%
Education	79,423	2.6%
Total	**3,084,455**	**100%**

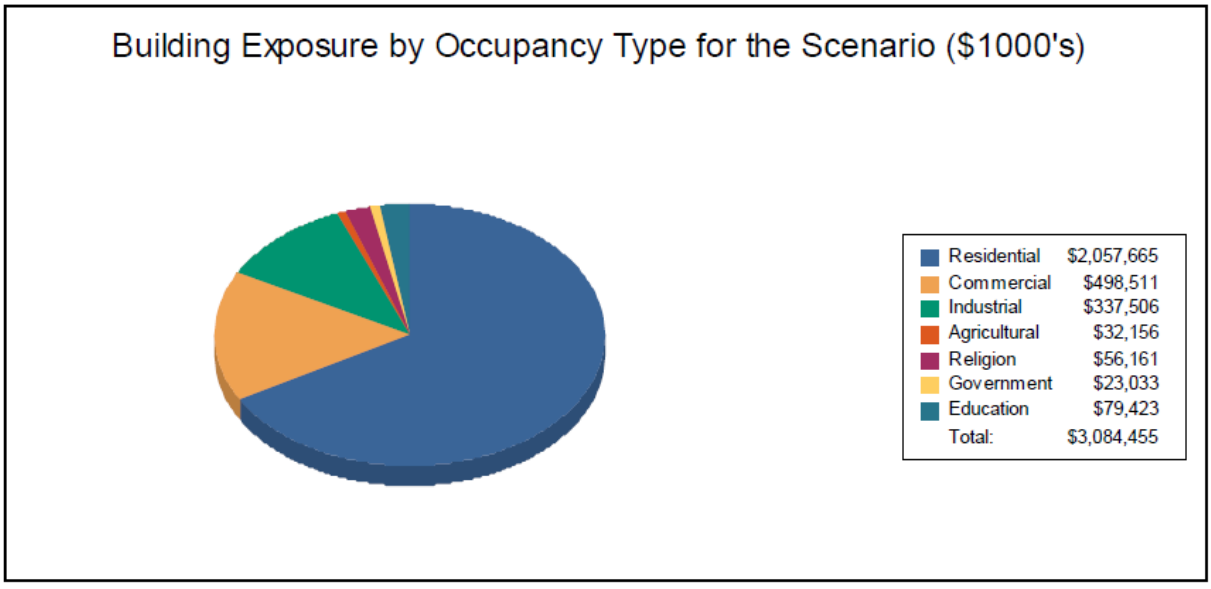
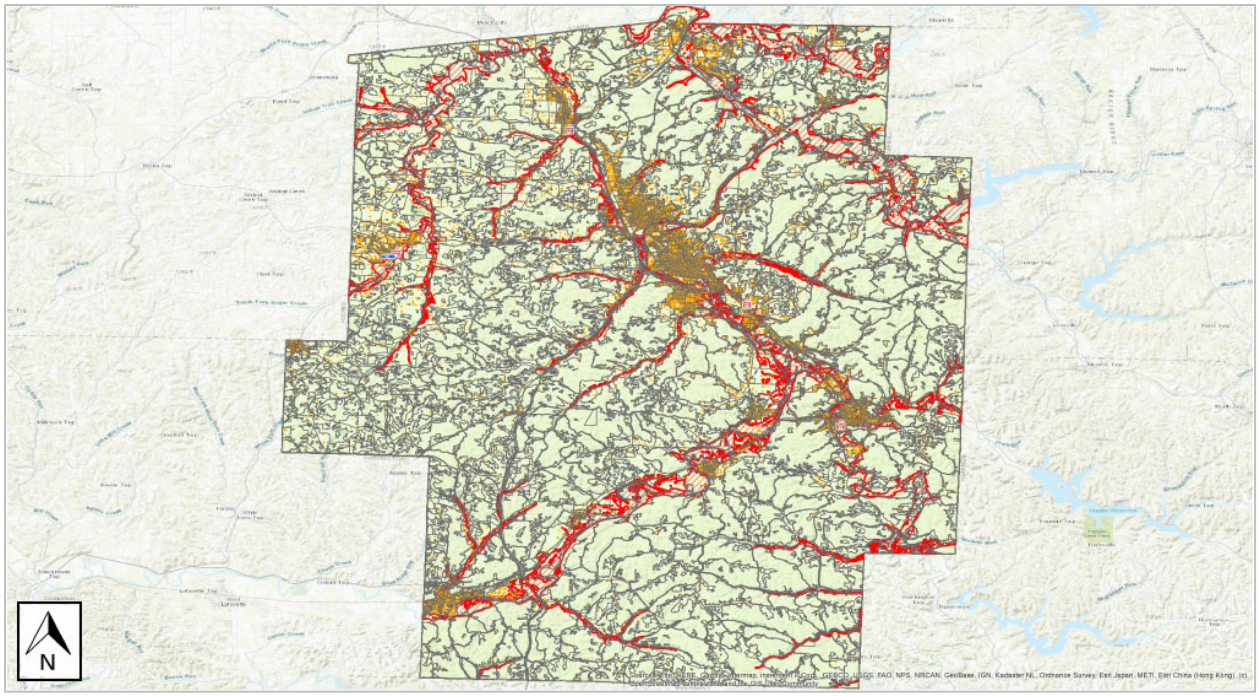


TABLE 4-40 MODELED FLOOD EXTENT IN STUDY REGION



General Building Stock Damage

Hazus estimates that about 302 buildings will be at least moderately damaged. This is over 60% of the buildings in the scenario. An estimated 63 buildings will be completely destroyed. The Hazus Flood Technical Manual defines the various states of damage. The first table below summarizes the expected damage by general occupancy for the buildings in the region. The second table summarizes the expected damage by general building type. The last table summarizes the expected damage to essential facilities.

TABLE 4-41 EXPECTED BUILDING DAMAGE BY OCCUPANCY

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**	**Count**	**(%)**
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	3	50	3	50	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	124	29	165	39	42	10	16	4	13	3	63	15
Total	**127**		**168**		**42**		**16**		**13**		**63**	

TABLE 4-42 EXPECTED BUILDING DAMAGE BY BUILDING TYPE

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	0	0	0	0	0	0	0	0	0	0	0	0
ManufHousing	3	12	1	4	0	0	0	0	0	0	21	84
Masonry	10	22	21	47	3	7	3	7	1	2	7	16
Steel	1	50	1	50	0	0	0	0	0	0	0	0
Wood	113	32	145	41	39	11	13	4	12	3	35	10

TABLE 4-43 EXPECTED DAMAGE TO ESSENTIAL FACILITIES

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	1	0	0	0
Fire Stations	20	0	0	0
Hospitals	6	0	0	0
Police Stations	36	2	0	2
Schools	147	4	0	4

Shelter Requirements

Hazus estimates the number of households that would be displaced from their homes by the flood and the associated potential evacuation. It also estimates how many displaced people will require accommodations in temporary public shelters. In this case, the model estimates 1,565 households (or 4,696 people) will be displaced (households evacuated from within or very near to the inundated area). Of these, 138 people (from a Hazus-estimated total population of 92,582) will seek temporary shelter in public shelters.

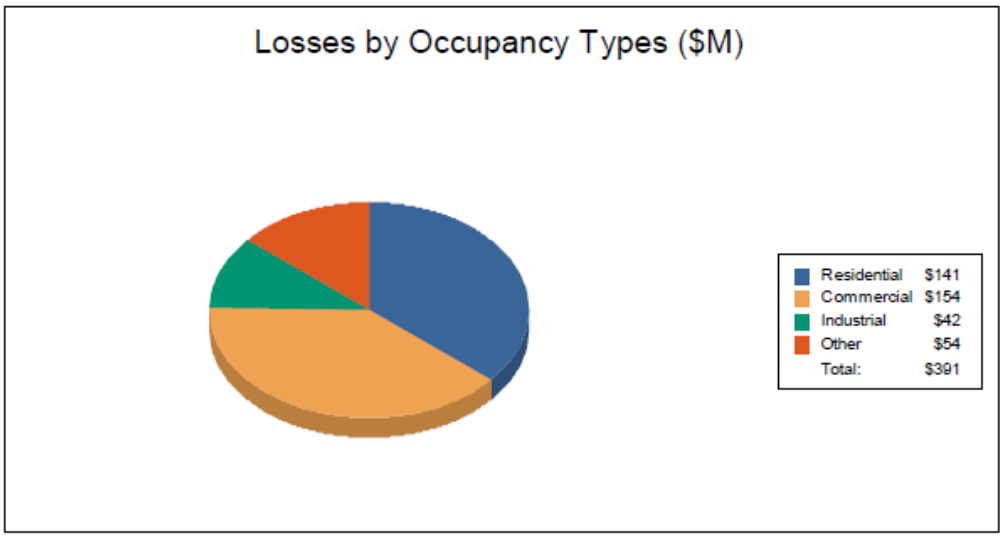
Building-Related Losses

As noted, building losses are broken into two categories: direct and business interruption. Direct building losses are the estimated costs to repair the damage or replace the building and its contents. Business interruption losses are those associated with the inability to operate a business because of the flood. Business interruption losses also include temporary living expenses for people displaced from their homes by the flood. The total building-related losses were $221.94 million, with 43% of the estimated losses related to the region's business interruption. Residential properties made up 35.98% of the total loss. The following table summarizes the losses associated with building damage. The total economic loss estimated for the flood is 390.68 million dollars, which represents 12.67% of the total replacement value of the scenario buildings.

TABLE 4-44 BUILDING-RELATED ECONOMIC LOSS ESTIMATES

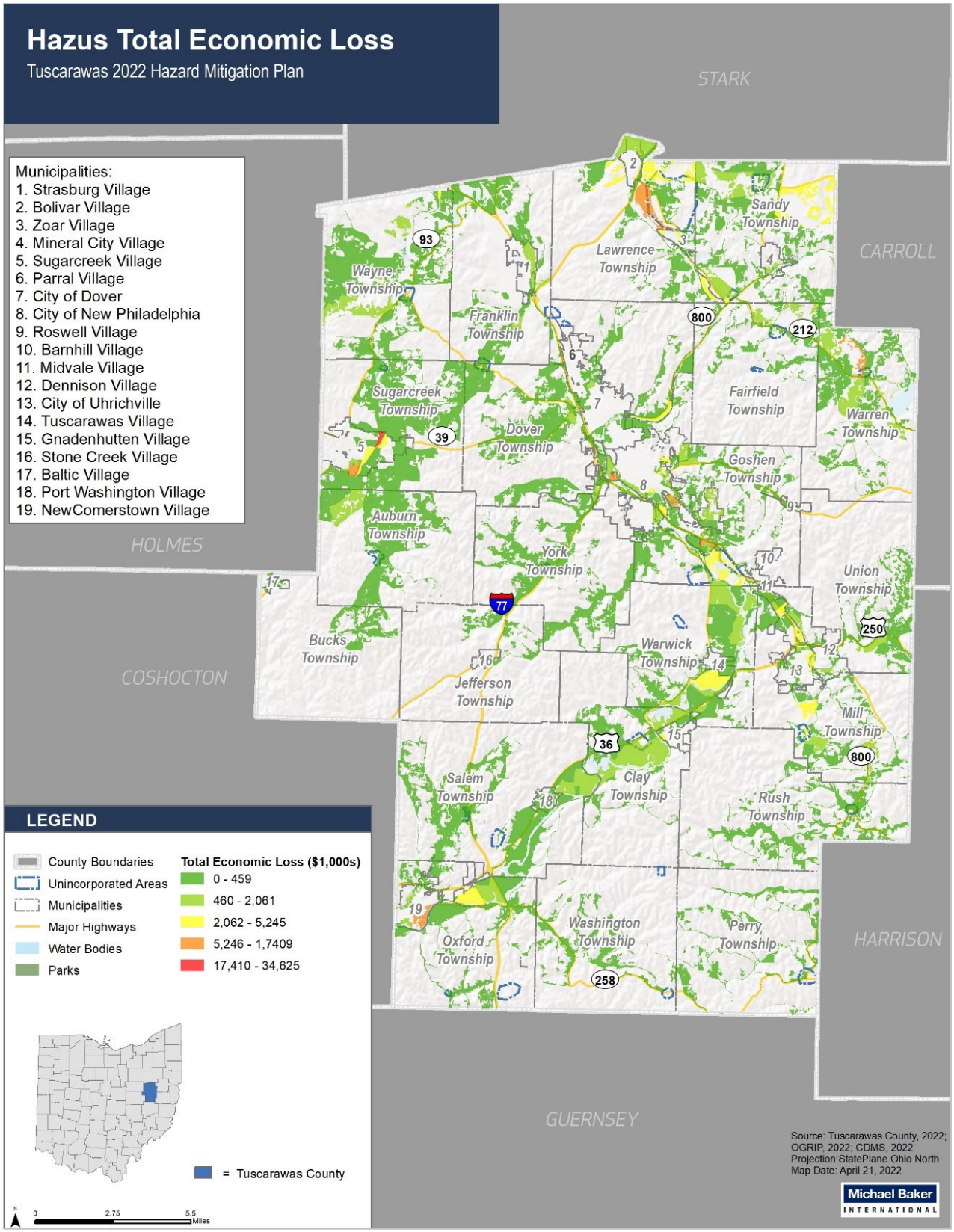
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss						
	Building	70.23	15.40	9.29	4.16	99.08
	Content	32.63	44.92	25.22	14.33	117.10
	Inventory	0.00	1.40	4.10	0.25	5.76
	Subtotal	**102.86**	**61.73**	**38.61**	**18.74**	**221.94**
Business Interruption						
	Income	2.56	37.63	0.99	6.50	47.68
	Relocation	20.01	8.89	0.96	2.35	32.21
	Rental Income	9.07	6.57	0.22	0.36	16.22
	Wage	6.05	39.13	1.29	26.16	72.63
	Subtotal	**37.70**	**92.22**	**3.45**	**35.37**	**168.73**
ALL	**Total**	**140.56**	**153.96**	**42.05**	**54.11**	**390.68**



The entire county is susceptible to flooding, either directly or through cleanup efforts and lasting economic impacts. Those closest to the Tuscarawas River and larger creeks and the numerous small streams throughout the county are vulnerable to river waters. Those areas and the rest of the county may also be affected by localized flash flooding.

FIGURE 4-22 TUSCARAWAS COUNTY TOTAL ECONOMIC LOSS



4.4.7 LAND USE AND DEVELOPMENT TRENDS

Tuscarawas County is largely rural, with 9.05% of the total county land lower-intensity developed and 1.67% of the total county land higher-intensity developed. Much of the existing development and trends are in the cities, larger villages, and existing industrial areas. Localized flooding remains a possibility throughout the county, especially in the many low-lying areas. It is essential that land use plans consider not only the dollar amount of damage that buildings near waterways could incur, but also the danger of increasing flood risk by building close to the rivers, which adds flood debris and narrows the floodplains.

Regulatory Environment

Numerous laws at the federal, state, and local levels relate to floodplain management. Tuscarawas County continues to work to enforce the local floodplain management ordinance requirements for all flooding programs, including the National Flood Insurance Program.

Tuscarawas County Flood Damage Reduction Regulations

These regulations authorize a Floodplain Manager/Administrator. This individual's duties include, but are not limited to, routine monitoring of the floodplains, enforcing floodplain regulations, and providing community assistance, such as encouraging owners to maintain flood insurance. Flood regulations are codified in the Flood Damage Reduction Regulations, adopted on October 1, 2007, and revised on May 13, 2010.

Risk Mapping, Assessment and Planning

Tuscarawas County had a Flood Insurance Study (FIS) revised on October 19, 2018. The county's FIRMs were updated on July 22, 2010, and October 19, 2018.

National Flood Insurance Program

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. As a participating member of the NFIP, Tuscarawas County is dedicated to protecting homes, with 262 NFIP policies currently in force. Barnhill, Parral, and Stone Creek do not have any identified special flood hazard areas, so they do not participate in the NFIP.

TABLE 4-45 TUSCARAWAS COUNTY NFIP STATUS SUMMARY

Community	Initial FHBM	Initial FIRM	Current Effective Map Date	Reg-Emerg Date
Baltic	-	6/15/1988	7/22/2010	8/19/1988
Dennison	3/15/1974	12/18/19866	7/22/2010	12/18/1986
Dover	3/1/1974	7/16/1987	7/22/2010	7/16/1987
Gnadenhutten	7/30/1976	12/18/1986	7/22/2010	12/18/1986
Midvale	2/21/1975	7/22/2010	7/22/2010	11/15/1985
Mineral City	10/6/1978	7/22/2010	10/19/2018	7/22/2010
New Philadelphia	3/15/1974	3/15/1974	7/22/2010	1/2/1987
Newcomerstown	5/17/1974	1/2/1987	7/22/2010	1/2/1987
Port Washington	4/5/1974	1/15/1988	7/22/2010	1/15/1988
Roswell	3/10/1978	8/1/1987	7/22/2010(M)	8/1/1987
Strasburg	4/5/1974	8/4/1987	7/22/2010	8/4/1987
Sugarcreek	5/31/1974	8/4/1987	7/22/2010	8/4/1987
Tuscarawas	4/5/1974	7/22/2010	7/22/2010	7/22/2010
Tuscarawas County	2/24/1978	9/30/1987	10/19/2018	9/30/1987
Uhrichsville	11/9/1973	1/2/1987	7/22/2010	1/2/1987
Zoar	4/18/1975	9/4/1987	7/22/2010	9/4/1987

Tuscarawas County entered the NFIP on February 24, 1978, after the majority of its incorporated cities and villages joined in the 1973-1976 timeframe. As participants in the NFIP, the county and communities are dedicated to regulating development in the FEMA floodplain areas in accordance with NFIP criteria. Structures permitted or built in the county before the NFIP regulatory requirements were incorporated into the ordinances (before the effective date of the county's FIRM) and are called "pre-FIRM" structures.

TABLE 4-46 TUSCARAWAS COUNTY NFIP POLICIES AND CLAIM INFORMATION

CID	Community	Number of Policies	Total Coverage	Total Premiums	Total Claims Since 1978	Total Paid Since 1978	V-Zone Policies	A-Zone Policies
390886	Baltic	1	$750,000	$2,829	0	0	0	0
390947	Barnhill	0	0	0	0	0	0	0
390643	Bolivar	0	0	0	0	0	0	0
390542	Dennison	3	$195,400	$4,067	11	$53,631	0	2
390543	Dover	13	$3,520,000	$10,598	11	$94,483	0	3
390613	Gnadenhutten	1	$16,000	$239	0	$0	0	1
390715	Midvale	3	$505,100	$5,731	2	$0	0	3
390842	Mineral City	0	$0	$0	2	$16,389	0	0
390545	New Philadelphia	88	$17,301,100	$122,511	66	$270,626	0	67
390544	Newcomerstown	12	$3,512,500	$15,566	4	$7,671	0	7
390946	Parral	0	$0	$0	0	$0	0	0
390664	Port Washington	5	$432,500	$3,857	0	$0	0	3
390813	Roswell	2	$304,000	$1,865	1	$30,907	0	1
390945	Stone Creek	0	$0	$0	0	$0	0	0
390631	Strasburg	0	$0	$0	0	$0	0	0
390546	Sugarcreek	3	$840,200	$28,982	0	$0	0	2
390666	Tuscarawas	1	$280,000	$460	0	$0	0	0
390547	Uhrichsville	55	$7,362,500	$57,012	40	$268,064	0	32
390752	Zoar	1	$350,000	$494	1	$0	0	0
390782	Tuscarawas County	74	$14,314,300	$90,127	57	$431,306	0	30

Bolivar is currently sanctioned by the NFIP, starting with a sanction date on 12/29/1977. Bolivar has been sanctioned due to lack of participation in the NFIP although the village has identified special flood hazard areas. To become compliant with the NFIP, Bolivar has developed actions, located in the mitigation strategy.

FEMA designates any insured property that has made two or more claims of more than $1,000 in any rolling 10-year period since 1978 as a Repetitive Loss (RL) property. The term “rolling 10-year period” means that a claim of $1,000 can be made in 1991 and another claim for $2,500 in 2000; or one claim in 2001 and another in 2007, as long as both qualifying claims are within 10 years of each other. Claims must be at least 10 days apart but within 10 years of each other. RL properties may be classified as Severe Repetitive Loss (SRL) under certain conditions. SRL properties are those with four or more claims of at least $5,000, or at least two claims that cumulatively exceed the building’s reported value. A property that sustains repetitive flooding may or may not be on the county’s RL property list for a number of reasons:

- Not everyone is required to carry flood insurance. Structures that carry federally backed mortgages and are in an SFHA are required to carry flood insurance in the county;
- Owners who have completed the terms of the mortgage or who purchased their property outright may choose not to carry flood insurance and instead bear the costs of recovery on their own;
- The owner of a flooded property that does carry flood insurance may choose not to file a claim;
- Some insured properties that are flooded regularly and filed claims may not meet the $1,000 minimum threshold to be recognized as an RL property; or
- The owner adopted mitigation measures that reduce the impact of flooding on the structure, removing it from the RL threat and the RL list (in accordance with FEMA's mitigation reporting requirements).

The following table breaks down the repetitive losses in Tuscarawas County. The data provided by the State of Ohio is the most recent data available for use as it is from 12/24/2020. There are 17 repetitive loss properties in Tuscarawas County, with a total of $333,564.19 in building payments, $49,304.12 in contents payments, and 45 losses.

TABLE 4-47 REPETITIVE LOSS PROPERTIES

Community	Type	Building Payment	Contents Payment	Losses	# of RL Properties
Dennison	Single Family	$14,647.64	$733.90	3	1
Dover	Single Family	$40,504.43	$4,438.96	2	1
New Philadelphia	Single Family	$104,922.80	$30,901.82	15	5
Roswell	Single Family	$32,850.69	$3,097.19	2	1
Unincorporated Tuscarawas County	Single Family	$109,771.65	$6,072.41	16	6
Uhrichsville	Single Family	$30,866.99	$4,059.84	7	3

Extensive FEMA NFIP databases are used to track claims for every participating community. Because they maintain all, NFIP claims, FEMA databases allow users to examine single-loss (SL) and RL properties. The data provided by the State of Ohio shows that Tuscarawas County does not have any SRL properties.

NFIP Community Rating System (CRS)

The NFIP Community Rating System is an additional step in the NFIP that local communities can participate in to lower their residents' flood insurance premiums through a percentage amount based off of the credit points the community accumulates. CRS is a voluntary incentive program that recognizes and rewards communities to go above and beyond the minimum requirements of the NFIP. Communities that participate in CRS abide by the three goals of the program:

- Reduce and avoid flood damage to insurable property,
- Strengthen and support the insurance aspects of the National Flood Insurance Program, and
- Foster comprehensive floodplain management.

A participating community in CRS can have different degrees of participation, which is calculated through the credit points the community receives. Communities can earn credit points through the nineteen different of activities completed in the categories of Public Information, Mapping & Regulations, Flood Damage Reduction, and Flood Preparedness. Additional credit points can also be earned by regulating development outside the SFHA, future flood condition assessments, state-based credit, and other activities listed in the CRS Coordinator's Manual. The table below displays the different rate classes, the corresponding discounts, and the credit points required to achieve the rate class.

TABLE 4-48 CRS CREDIT POINT SYSTEM

Rate Class	Discount for SFHA	Discount for Non-SFHA	Credit Points Required
1	45%	10%	4,500+
2	40%	10%	4,000-4,499
3	35%	10%	3,500-3,999
4	30%	10%	3,000-3,499
5	25%	10%	2,500-2,999
6	20%	10%	2,000-2,499
7	15%	5%	1,500-1,999
8	10%	5%	1,000-1,499
9	5%	5%	500-999
10	0	0	0-499

In Tuscarawas County, there are no communities that participate in the NFIP CRS program as of April 2022.

4.4.8 FLOODING SUMMARY

Severe flooding has the potential to cause significant damage along the rivers and small creeks throughout the county. Assessing flood damage requires county residents to remain alert and notify local officials of potentially flood prone areas near infrastructure such as roads, bridges, and buildings. Flooding remains a highly likely occurrence in the county. Smaller floods caused by heavy rains and inadequate drainage capacity will be more frequent, but not as costly as the large-scale floods that could occur at less frequent intervals.

5. HEALTH RELATED EMERGENCIES

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Health Related Emergency	2	0.6	2	0.6	4	0.8	2	0.2	4	0.4	2.6
Medium Risk Hazard (2.0 – 2.9)											

4.5.1 HEALTH RELATED EMERGENCY DESCRIPTION

Pandemic

Pandemic is defined as a disease affecting or attacking the population of an extensive region which may include several countries and/or continents. It is further described as extensively epidemic. Generally, pandemic events cause sudden, pervasive illness in all age groups on a global scale, though some age groups may be more at risk. As such, pandemic events cover a wide geographic area and can affect large populations, depending on the disease. The exact size and extent of the infected population is dependent upon how easily the illness is spread, the mode of transmission, and the amount of contact between infected and non-infected persons. Three recent pandemics that have affected Tuscarawas County are West Nile Virus, Influenza, and COVID-19.

- West Nile Virus is a vector-borne disease that can cause headache, high fever, neck stiffness, disorientation, tremors, convulsions, muscle weakness, paralysis, and, in its most serious form, death. The virus spreads via mosquito bite and is aided by warm temperatures and wet climates conducive to mosquito breeding.

- Influenza, also known as “the flu,” is a contagious disease that is caused by the influenza virus and typically presents with fever, headache, sore throat, cough, and muscle aches. Influenza is considered to have pandemic potential if it is novel, meaning that people have no immunity to it, virulent, it causes deaths in normally healthy individuals, and it is easily transmittable from person-to-person. Influenza spreads via the air in crowded populations in enclosed spaces, and it may persist on surfaces and in the air. Individuals are communicable for 3-5 days after clinical onset. Pandemic influenza planning began in response to the H5N1 (avian) flu outbreak in Asia, Africa, Europe, the Pacific, and the Near East in the late 1990s and early 2000s. In 2009, the US experienced a pandemic of H1N1. Continuing to prepare and plan for future pandemics needs to continue. As stated in the Ohio Department of Health Pandemic Influenza Preparedness and Response Plan, “The impact of an influenza pandemic on the health care system could be devastating. The CDC estimates in the United States a moderate pandemic could result in 90 million people becoming ill; 45 million outpatient visits; 865,000 hospitalizations; and 209,000 deaths.” This underscores the importance of planning for this hazard (Ohio Department of Health, 2006).

- COVID-19, also known as Coronavirus, is a respiratory disease that spreads from person-to-person contact. This specific coronavirus, COVID-19, comes from a large group of viruses that infect people and different species of animals. Only a few strains of animal coronaviruses

can infect people, but SARS-CoV-2, the virus behind the pandemic, is one of the three that can infect and spread between people. The virus has its origin from bats. The first cases of the pandemic originated in Wuhan, China. Symptoms of the virus can appear as early as two days or as late as fourteen days after exposure. Fever, cough, and shortness of breath are associated with the virus, and they can range from mild to severe to death. The severity of the illness can also increase in patients who older in age, have chronic medical conditions such as heart disease, diabetes, or lung disease, and those who have compromised immune systems. Since the initial spread of COVID-19, the virus has mutated to create new variants. Variants of SARS-CoV-2 are similar to the original strain of the virus, but they may spread easier or prove to be more resilient against the vaccines that were developed to combat SARS-CoV-2. Currently, there are six variants of SARS-CoV-2 in the United States, all of which have been a concern according to the CDC. The vaccines that were developed in response to the COVID-19 pandemic protect the vaccinated people against the variants. Vaccinated people can still contract the virus variants, but the vaccine can fight against severe illness, hospitalization, and death.

- **B.1.1.7 (Alpha)** – detected in the United States in December 2020, originated in the United Kingdom. This variant spreads much faster than other variants, but treatments are effective against the variant. The Alpha variant may cause a more severe sickness in those who contract the virus variant.
- **B.1.351 (Beta) –** detected in the United States in January 2021, originated in South Africa. The Beta variant may spread faster than other variants, and some monoclonal antibody treatments are less effective against the variant.
- **P.1 (Gamma) –** detected in the United States in January 2021, originated in Brazil but was detected in Japan. The Gamma variant spreads faster than other variants, and certain monoclonal antibody treatments are not as effective against the variant.
- **B.1.427 and B1.429 (Epsilon) –** originated and detected in California in February 2021. This variant is not identified as a variant of concern at this time.
- **B.1.617.2 (Delta) –** detected in the United States in March 2021, originated in India. Spreads much faster than other variants, and certain monoclonal antibody treatments are not as effective. The Delta variant may cause more severe sickness in the patient who contracts the variant than the original strain of SARS-CoV-2.
- **B.1.1.529 (Omicron)** – first identified in South Africa. Omicron spreads more easily than the original virus that caused COVID-19. However, Omicron is generally less severe than the other variants.

Epidemic

Epidemic is defined as something affecting many persons at the same time and spreading from person to person in a locality where the disease is not permanently prevalent. The amount of a particular disease that is usually present in a community is referred to as the baseline or endemic level of the disease. This level is not necessarily the desired level, which may in fact be zero, but rather is the observed level. In the absence of intervention and assuming that the level is not high enough to deplete the pool of susceptible persons, the disease may continue to occur at this level indefinitely. Thus, the baseline level is often regarded as the expected level of the disease.

While some diseases are so rare in a given population that a single case warrants an epidemiologic investigation (e.g., rabies, plague, polio), other diseases occur more commonly so that only deviations from the norm warrant investigation. Sporadic refers to a disease that occurs infrequently

and irregularly. Endemic refers to the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area. Hyperendemic refers to persistent, high levels of disease occurrence.

Occasionally, the amount of disease in a community rises above the expected level. Epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that area. Outbreak carries the same definition of epidemic but is often used for a more limited geographic area. Cluster refers to an aggregation of cases grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known. Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people.

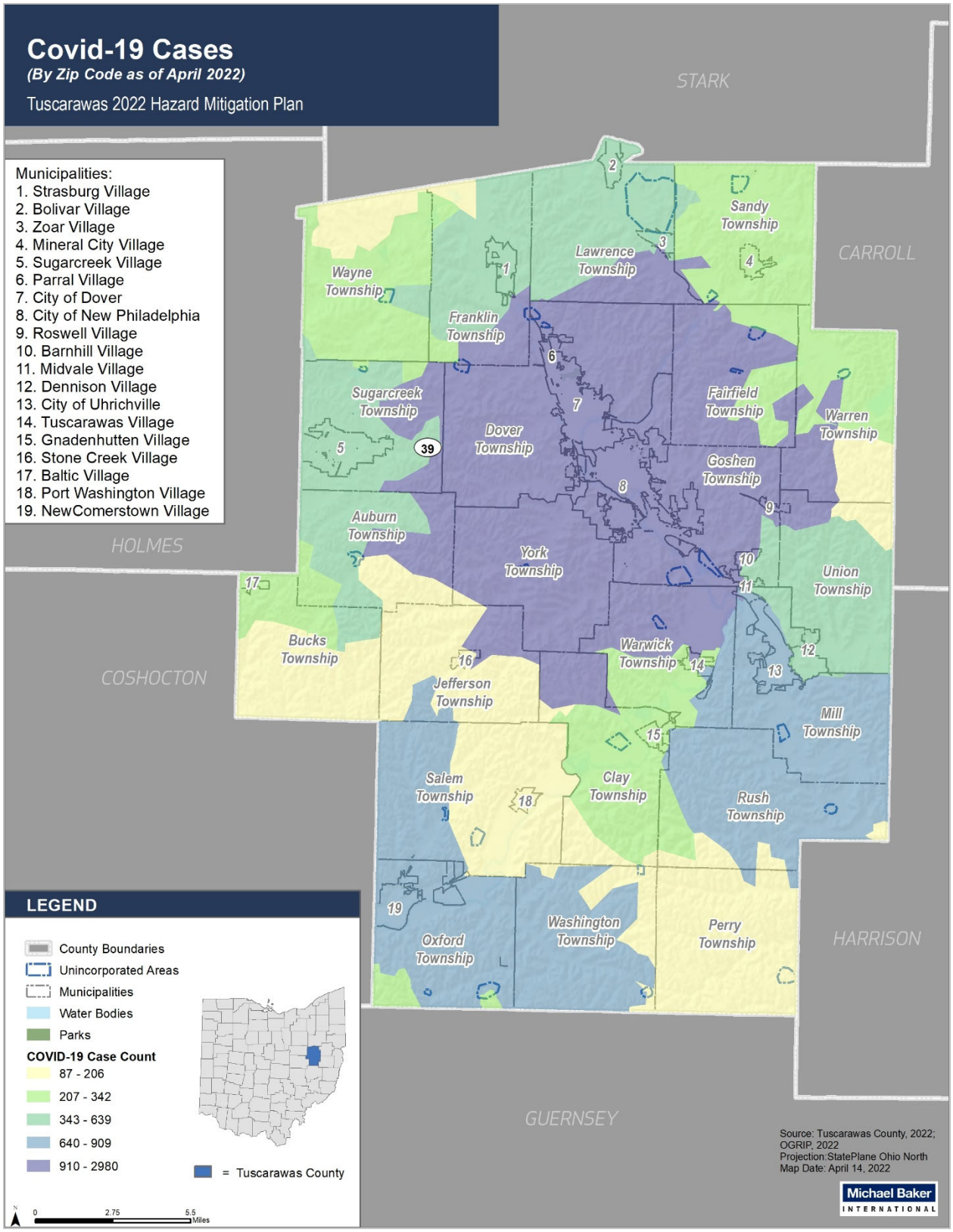
Epidemics occur when an agent and susceptible hosts are present in adequate numbers, and the agent can be effectively conveyed from a source to the susceptible hosts. More specifically, an epidemic may result from:

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

4.5.2 HEALTH RELATED EMERGENCY LOCATION

As this hazard initially affects humans, the location of the hazard is the entire County. Due to community spread, each jurisdiction within Tuscarawas County is susceptible to a public health emergency. The figure below depicts the severity of COVID-19 cases by zip code throughout the County as of April 2022.

FIGURE 4-23 COVID-19 CASES IN TUSCARAWAS COUNTY BY ZIP CODE



4.5.3 EXTENT

The magnitude of a health-related emergency will range significantly depending on the aggressiveness of the virus in question and the ease of transmission. Pandemic influenza is more easily transmitted from person-to-person and is more easily transmitted than West Nile, but advances in medical technologies have greatly reduced the number of deaths caused by influenza over time. In terms of lives lost, the impact various pandemic influenza outbreaks have had globally over the last century has declined. The 1918 Spanish flu pandemic remains the worst-case pandemic event on record.

In contrast, the severity of illness from the 2009 H1N1 influenza flu virus has varied, with the gravest cases occurring mainly among those considered at high risk. High risk populations considered more vulnerable include children, the elderly, pregnant women, and chronic disease patients with reduced immune system capacity. Most people infected with H1N1 in 2009 have recovered without needing medical treatment. According to the CDC, about 70% of those who have been hospitalized with the 2009 H1N1 flu virus in the United States have belonged to a high-risk group (CDC, 2009).

COVID-19 has brought an unprecedented time upon Tuscarawas County, Ohio, the United States of America, and the entire globe. The extent of the virus has changed the way of life for Ohioans. According to Ohio's COVID-19 Dashboard, the overall hospitalization rate for confirmed cases of the virus in Ohio is 4.27% with 11.71% of the cases requiring ICU admission. When Ohio was experiencing extremely high cases per day – approximately November 2020 through January 2021, the hospitalization rate was 17.9%, with 26.9% of cases requiring ICU admission. The community spread aspect of COVID-19 not only sparked a shutdown of the entire State's economy except for essential businesses for approximately a month and a half, but it has also set forth guidelines for Ohioans to follow as businesses begin to open back up. Wearing masks while having a six-foot distance between consumers when possible was required for approximately fifteen months, with all state-mandated orders ending on June 2, 2021. Increased surveillance employee and consumer health is also a best-practice guideline.

The magnitude of a health-related emergency may be exacerbated by the fact that outbreaks across the United States could limit the ability to transfer assistance from one jurisdiction to another. Additionally, effective preventative and therapeutic measures, including vaccines and other medications, will likely be in short supply or will not be available. There are no true environmental impacts in pandemic disease outbreaks, but there may be significant economic and social costs beyond the possibility of deaths. Widespread illness may increase the likelihood of shortages of personnel to perform essential community services. In addition, high rates of illness and worker absenteeism occur within the business community, and these contribute to social and economic disruption. Social and economic disruptions could be temporary but may be amplified in today's closely interrelated and interdependent systems of trade and commerce. Social disruption may be greatest when rates of absenteeism impair essential services, such as power, transportation, and communications.

4.5.4 HISTORICAL OCCURRENCES

General Trends

Since 2001, there has been 3 health related emergency events in Tuscarawas County. Tuscarawas County has been a part of 2 Federal Disaster Declarations that included public health emergencies. One has resulted in Public Assistance and Individual Assistance.

TABLE 4-49 DECLARED DISASTERS AFFECTING TUSCARAWAS COUNTY

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
EM-3457	3/13/2020	COVID-19	-	-
DR-4507	3/31/2020	COVID-19 Pandemic	$294,417,803.70*	$85,968,094.74*

**Indicates data from FEMA's Disaster Declarations website. Totals provided on the webpage are for total funds delegated to all counties within the declared disaster rather than just for Tuscarawas County.*

Event Narratives

2009: The 2009 H1N1 influenza (flu) pandemic occurred against a backdrop of pandemic response planning at all levels of government including years of developing, refining and regularly exercising response plans at the international, federal, state, local, and community levels. At the time, experts believed that avian influenza A (H5N1) viruses posed the greatest pandemic threat. H5N1 viruses were endemic in poultry in parts of the world and were infecting people sporadically, often with deadly results. Given that reality, pandemic preparedness efforts were largely based on a scenario of severe human illness caused by an H5N1 virus. Despite differences in planning scenarios and the actual 2009 H1N1 pandemic, many of the systems established through pandemic planning were used and useful for the 2009 H1N1 pandemic response.

H1N1 was first detected in the United States in April 2009. This virus was a unique combination of influenza virus genes never previously identified in either animals or people. The virus genes were a combination of genes most closely related to North American swine-lineage H1N1 and Eurasian lineage swine-origin H1N1 influenza viruses. Because of this, initial reports referred to the virus as a swine origin influenza virus. However, investigations of initial human cases did not identify exposures to pigs and quickly it became apparent that this new virus was circulating among humans and not among U.S. pig herds.

Infection with this new influenza A virus (then referred to as 'swine origin influenza A virus') was first detected in a 10-year-old patient in California on April 15, 2009, who was tested for influenza as part of a clinical study. Laboratory testing at Centers for Disease Control (CDC) confirmed that this virus was new to humans. Two days later, CDC laboratory testing confirmed a second infection with this virus in another patient, an 8-year-old living in California about 130 miles away from the first patient who was tested as part of an influenza surveillance project. There was no known connection between the two patients. Laboratory analysis at CDC determined that the viruses obtained from these two patients were very similar to each other, and different from any other influenza viruses previously seen either in humans or animals.

2014/2015: The 2014 Ebola epidemic is the largest in history, affecting multiple countries in West Africa. There were a small number of cases reported in Nigeria and Mali and a single case reported in Senegal; however, these cases were contained, with no further spread in these countries. Two imported cases, including one death, and two locally acquired cases in healthcare workers were reported in the United States. CDC and its partners are taking precautions to prevent additional Ebola cases in the United States. CDC is working with other U.S. government agencies, the World Health Organization (WHO), and other domestic and international partners and has activated its Emergency Operations Center to help coordinate technical assistance and control activities with partners. CDC has also deployed teams of public health experts to West Africa and will continue to send experts to the affected countries. At the time, the general public and media feared that the epidemic would spread to Ohio after a nurse from Texas traveled to the Akron, Ohio area in advance of a wedding.

2020/2021: On March 11, 2020, the outbreak of COVID-19 was characterized as a pandemic by the World Health Organization. Originating from the Hubei Province in China, the virus reached the United States on January 22, 2020. As of April 2022, there have been over 80 million confirmed cases in all fifty states. Community spread remains to be the biggest culprit of infection. In order to slow the spread in Ohio, Governor Mike DeWine placed a Stay at Home order on March 23 at 11:59 P.M. for two weeks. A new order was put into place on April 6 as a continuation of the Stay at Home order which was later extended until May 29th. Many other health orders, guidelines, and curfews have been implemented to slow the spread of COVID over 2020 and into the beginning of 2022. As of April 21, 2022, Ohio has recorded 2,688,327 cases, 114,871 hospitalizations with 13,445 requiring ICU admission, and 38,360 deaths resulting from the illness. Tuscarawas County has had 20,612 confirmed cases, 1,356 people have been hospitalized, and 500 people have passed away due to the virus. The shortage of testing available for the state, and nation, at the beginning of the pandemic made it difficult to test all those who are reporting symptoms. Tests were reserved for those who are showing the most severe symptoms, so the numbers reported may not reflect the totality of the infected.

Vaccines were rapidly developed and received emergency approval from the Food and Drug Administration (FDA) for distribution. Pfizer-BioNTech is a two-shot vaccination that is approved for people 12 years and older, with the vaccines given 21 days apart. Moderna is a two-shot vaccine that is approved for people 18 years and older, with the vaccines given 28 days apart. Johnson & Johnson's Janssen is a one-shot vaccination that is approved for people 18 years and older. All three vaccines require a two-week waiting period to become considered "fully vaccinated." Vaccines were made available to the general public, without priority other than being over the age of 12 years old, on March 29, 2021. Children aged 12-17 years old are only able to receive the Pfizer vaccination at this time.

Ohio Department of Health lists the following phases for the vaccine distribution in the state:

- Phase 1A: began December 14, 2020

  - Healthcare workers and personnel who are routinely involved n the care of COVID-19 patients
  - Residents and staff in nursing homes.
  - Residents and staff in assisted living facilities.
  - Patients and staff at state psychiatric hospitals.
  - People with developmental disabilities and those with mental health disorders, including substance-use disorders, who live in group homes, residential facilities, or centers, and staff at those locations.
  - Residents and staff at our two state-run homes for Ohio veterans.
  - EMS responders
- Phase 1B: began January 19, 2021
  - Ohioans, age 65 and up.
  - Ohioans born with or who have early childhood conditions that are carried into adulthood, which put them at a higher risk for adverse outcomes due to COVID-19.
    - Sickle cell anemia.
    - Down syndrome.
    - Cystic fibrosis.
    - Muscular dystrophy.
    - Cerebral palsy.
    - Spina bifida.
    - People born with severe heart defects, requiring regular specialized medical care.
    - People with severe type 1 diabetes, who have been hospitalized for this in the past year.
    - Phenylketonuria (PKU), Tay-Sachs, and other rare, inherited metabolic disorders.
    - Epilepsy with continuing seizures; hydrocephaly; microcephaly, and other severe neurological disorders.
    - Turner syndrome, fragile X syndrome, Prader-Willi syndrome, and other severe genetic disorders.
    - People with severe asthma, who have been hospitalized for this in the past year.
    - Alpha and beta thalassemia.
    - Solid organ transplant candidates and recipients
  - Adults/employees in K-12 schools that want to go back to, or to remain with, in-person or hybrid learning models.
- Phase 1C: began March 4, 2021
  - Individuals who have additional medical conditions that may increase their risk of severe illness and death from COVID-19. The new qualifying conditions are not already covered through Ohio's age-based approach to vaccine eligibility.

        - People with amyotrophic lateral sclerosis (ALS), bone marrow transplant recipients, people with type 1 diabetes, pregnant women
    - Ohioans who work in certain occupations, including childcare services, funeral services, and law enforcement and correction services.
    - Eligible individuals can receive a vaccine from the provider of their choice. Individuals may be asked to confirm during the registration or screening process that they are eligible to receive the vaccine based on a qualifying medical condition or based on their occupation.
- Phase 1D: began March 11, 2021
    - Individuals who have the specified medical conditions listed below that may increase their risk of severe illness and death from COVID-19.
        - People with type 2 diabetes, people with end-stage renal disease
    - These individuals are not already eligible through Ohio's age-based approach to vaccine eligibility.
    - Eligible individuals can receive a vaccine from the provider of their choice. Individuals may be asked to confirm during the registration or screening process that they are eligible to receive the vaccine based on a qualifying medical condition.
- Phase 1E: began March 19, 2021
    - Individuals who have the specified medical conditions listed below that may increase their risk of severe illness and death from COVID-19.
        - Cancer, chronic kidney disease (CKD), chronic obstructive pulmonary disease (COPD), heart disease, obesity
    - These individuals are not already eligible through Ohio's age-based approach to vaccine eligibility.
    - Eligible individuals can receive a vaccine from the provider of their choice. Individuals may be asked to confirm during the registration or screening process that they are eligible to receive the vaccine based on a qualifying medical condition.
- Phase 2A: began March 4, 2021
    - Individuals age 60 and older
- Phase 2B: began March 11, 2021
    - Individuals age 50 and older
- Phase 2C: began March 19, 2021
    - Individuals age 40 and older
- Phase 2D: began March 29, 2021
    - Individuals age 16 and older

4.5.5 PROBABILITY OF FUTURE OCCURRENCE

The precise timing of a health-related emergency is uncertain. Pandemic occurrences are most likely when the Influenza Type A virus makes a dramatic change, or antigenic shift, that results in a new or "novel" virus to which the population has no immunity. Epidemic occurrences are more likely when there are ecological changes, the pathogen mutates, or the pathogen is introduced into an unprepared host population.

Reported health related emergency events over the past 20 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of the County experiencing a health related emergency event can be difficult to quantify but based on historical record of 3 events since 2001, this type of event has occurred once every 6.67 years from 2001 through 2021.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (3 Events) = 6.67 Years Between Events

Furthermore, the historic frequency calculates that there is an 15% chance of this type of event occurring each year. The Steering Committee, based on their knowledge, determined that health related emergency events are "Possible," meaning that there is between 1% and 10% annual chance of occurring.

4.5.6 ASSETS EXPOSED TO HEALTH RELATED EMERGENCIES

Potential Losses

Health-related emergencies are unlikely to directly impact buildings and infrastructure. However, losses can be measured in lost productivity from employees unable to perform their job duties and students not able to attend classes. In Ohio alone, three months after the declaration of the pandemic, 1.5 million people had filed for unemployment in the state. As of June 2021, the unemployment rate for the state is 5.2%. In the United States, over 57.4 million people had filed for unemployment benefits from the start of state shutdowns in mid-March 2020 to mid-August 2020, according to Forbes. According to an article The Century Foundation from March 2021, one in four workers relied on unemployment aid during the pandemic.

TABLE 4-50 POTENTIAL LOSSES FROM HEALTH-RELATED EMERGENCIES

Impact	Description
People	People are likely to bear the brunt of a health-related emergency, as they are the ones who will be impacted by diseases. They can become extremely sick and possibly die depending on the illness.
Infrastructure	There are no expected impacts on Infrastructure from this hazard.
Economy	The economy can be damaged due to drops in productivity due to illness.
Natural Systems	There are no expected impacts on Natural Systems from this hazard.
Transportation	There are no expected impacts on Transportation from this hazard.

Community Vulnerability

Certain population groups are at higher risk of pandemic infection. This population group includes people 65 years and older, children younger than 5 years old, pregnant women, and people of any age with certain chronic medical conditions. Such conditions include but are not limited to diabetes, heart disease, asthma and kidney disease (CDC, 2015). Schools, colleges, convalescent centers, and other institutions serving those younger than 5 years old and older than 65 years old, are

locations conducive to faster transmission of viruses, bacterial infections, and other diseases since populations identified as being at high risk are concentrated at these facilities or because of a large number of people living in close quarters. The hospital system would be the most likely point of introduction for an epidemic or pandemic to enter the County's area.

TABLE 4-51 POPULAGE AGE ESTIMATES, 2020 CENSUS

Age Group	Population	Percent
Under 5 years	5,876	6.3%
65 and up	18,653	20.0%

4.5.7 LAND USE AND DEVELOPMENT TRENDS

Denser areas are more susceptible to the spread of diseases as people tend to live closer to one another. Because of this, Dover, New Philadelphia, Uhrichsville, and Newcomerstown, who all have populations over 3,000 people, are the most vulnerable to a rapidly spready disease.

Regulatory Environment

There are a variety of regulations which drive the health industry, and as a result, the treatment of pandemics and epidemics. The Ohio Revised Code, Chapter 3701-59 specifically deals with hospitals. Cleveland Clinic and Trinity Health have been accredited by The Joint Commission with its Gold Seal of Approval for demonstrating compliance with their national standard for health care quality. The Joint Commission is an independent, not-for-profit organization. The Joint Commission accredits and certifies nearly 21,000 health care organizations and programs in the United States. Joint Commission accreditation and certification is recognized nationwide as a symbol of quality that reflects an organization's commitment to meeting certain performance standards.

Tuscarawas County, according to the Ohio Office of Research County Profiles 2020 Edition, has 98 physicians, 2 registered hospitals with 181 beds, 10 licensed nursing homes with 852 beds, and 7 licensed residential care facilities with 569 beds. As for persons covered with health insurance within Tuscarawas County, 90.7% of people ages 0-64 have health insurance. 89.4%% of adults aged 18-64 are insured, and 93.8% of persons under 19 years old are insured.

4.5.8 HEALTH RELATED EMERGENCIES SUMMARY

Pandemic and infectious disease events cover a wide geographical area and can affect large populations. The exact size and extent of an infected population is dependent upon how easily the illness is spread, the mode of transmission and the amount of contact between infected and uninfected individuals. The transmission rates of pandemic illnesses are often higher in denser areas where there are large concentrations of people. The transmission rate of infectious disease will depend on the mode of transmission of a given illness.

6. SEVERE WINTER STORMS

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Severe Winter Storms	3	0.9	2	0.6	3	0.6	2	0.2	1	0.1	2.4
Medium Risk Hazard (2.0 – 2.9)											

4.6.1 SEVERE WINTER STORM DESCRIPTION

Tuscarawas County has been affected by winter storms of varying degrees over the last century, but severe winter storms are relatively infrequent. These can cause hazardous driving conditions, communications and electrical power failure, and community isolation, and they can disrupt business continuity. A severe winter storm may include one or more of the following factors:

Blizzards, as defined by the National Weather Service, combine sustained winds or frequent gusts of 35 mph or greater with visibilities of less than a quarter mile from falling or blowing snow, for 3 hours or more. A blizzard does not, by definition, indicate heavy amounts of snow, but heavy snow may happen at the same time. The strong winds usually create large drifts from the falling or blowing snow. The reduced visibility makes travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills. Ground blizzards can develop when strong winds lift snow off the ground and severely reduce visibility.

Heavy snow, in large quantities, may fall during winter storms. Six inches or more in 12 hours or 8 inches or more in 24 hours may significantly hamper travel or create hazardous conditions. The National Weather Service issues warnings for such events. Smaller amounts can also make travel hazardous but mainly causes minor inconveniences. Heavy wet snow before the leaves fall from the trees in the fall or after the trees have leafed out in the spring may break tree branches and damage power lines.

Ice storms develop when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into the warm layer of air, it melts to rain, and then freezes when it hits the frozen ground or other cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Sleet occurs when the rain in the warm layer freezes into pellets while falling through a cold layer of air at or near the Earth's surface. Extended periods of freezing rain can lead to accumulations of ice on roadways, walkways, power lines, trees, and buildings. Almost any accumulation can make driving and walking hazardous. Thick accumulations can bring down trees and power lines.

Heavy snowstorms can immobilize a region and paralyze the county. These events can strand commuters, close airports, stop supplies from reaching their destinations and disrupt emergency and medical services. Accumulating snow can cause roofs to collapse and knock down trees and power lines. Homes and farms may be isolated and unprotected, and livestock may be lost. The cost of snow removal, repairing damages, and the loss of business can affect cities and towns economically.

Extreme cold, over extended periods can occur throughout the winter months in Tuscarawas County, though it is infrequent. While heating systems can usually compensate for the cold, people limit their time outside during extremely cold conditions. Common complaints usually include pipes freezing and cars not starting. Cold temperatures combined with wind can create dangerous wind chills.

Wind chill is how cold the weather "feels." It is based on the rate at which exposed skin loses heat. As the wind increases, it draws heat from the body. This drives down the skin temperature and, eventually, internal body temperature. Therefore, the wind makes the air feel much colder than its actual temperature. For example, if the temperature is 0°F and the wind is blowing at 15 mph, the wind chill is -19°F. At this wind chill, exposed skin can freeze in 30 minutes. Wind chill does not affect inanimate objects. (National Weather Service)

The science of meteorology and records of severe winter storms are not quite sophisticated enough to identify what areas of the county have a greater risk of damage. Therefore, all areas of the county are assumed to have the same winter storm risk.

Severe winter storms can result in the closing of roads (particularly in rural locations), loss of utility services, and depletion of heating supplies. Environmental impacts often include shrubbery and tree damage due to snow loading, ice build-up, and/or high winds, which can break limbs or even bring down large trees. Gradual melting of snow and ice provides excellent groundwater recharge; however, high temperatures after heavy snow can cause rapid surface water runoff and severe flash flooding.

Ohio has an extensive history of severe winter storms. In the winter of 2005, the state was hit by a series of winter storms. These included ice storms followed by unseasonably high temperatures and high rainfall totals, all of which resulted in extensive flooding and mudslides. This series of storms resulted in Presidential Declaration FEMA-DR-1580-OH, which provided over $140 million in recovery funds via Individual Assistance, Public Assistance, Hazard Mitigation Grant funds, and a state match to the federal hazard mitigation funds.

4.6.2 LOCATION

Severe winter storm events are region-wide events that affect the entirety of Tuscarawas County. All communities can be affected during these occurrences.

4.6.3 WINTER STORM EXTENT

The National Weather Service uses different terminology for winter storm events, depending on the situation.

- **Outlook** - Winter weather that may cause significant impact in the 3- to 7-day forecast period and eventually lead to a Watch or Warning is contained in a Hazardous Weather Outlook. More scientific discussion on the event can be found in the Area Forecast Discussion. Forecasts in the 3- to 7-day period typically have a lot of uncertainty (in the 30% to 50% range) about whether the event will occur and reach warning criteria. It is intended to provide information to those who need lead time to prepare for the event.

- **Watch** - A Watch is generally issued in the 24- to 72-hour forecast timeframe, when the risk of a hazardous winter storm event has increased (50 to 80% certainty that warning thresholds will be met). It is intended to provide enough lead time for those who need it to set their plans in motion. A Watch is issued using the WSW Winter Weather Message product and will appear as a headline in some text products, such as the Zone Forecast. It will change the color, as shown in the table below, of the counties on the NWS front page map according to the type of watch that has been issued.

TABLE 4-52 WINTER STORM WATCH DEFINITIONS

Watch Type	Description
Blizzard Watch	Conditions are favorable for a blizzard event in the next 24 to 72 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for 3 or more hours.
Lake Effect Snow Watch	Conditions are favorable for a lake effect snow event to meet or exceed local lake effect snow warning criteria in the next 24 to 72 hours. Widespread or localized lake-induced snow squalls or heavy snow showers may produce snowfall accumulation to 7 or more inches in 12 hours or less. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger a watch (i.e., 5 to 8 inches of snow = watch).
Wind Chill Watch	Conditions are favorable for wind chill temperatures to meet or exceed local wind chill warning criteria in the next 24 to 72 hours. Wind chill temperatures may reach or exceed -25°F.
Winter Storm Watch	Conditions are favorable for a winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) to meet or exceed local winter storm warning criteria in the next 24 to 72 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours, covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger a watch (i.e. 5 to 8 inches of snow = watch). Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.

- **Advisory** - Advisories are issued when a hazardous winter storm event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). An advisory is for less serious conditions that cause significant inconvenience and, if caution is not exercised, could lead to situations that may threaten life and/or property. Advisories are issued using the WSW Winter Weather Message product and will appear as a headline in some text products such as the Zone Forecast. The table below shows the different type of winter weather advisories and the conditions that it takes for them to be met.

TABLE 4-53 WINTER WEATHER ADVISORY DEFINITIONS

Advisory Type	Description
Winter Weather Advisory	A winter storm event (sleet, snow, freezing rain, snow and blowing snow, or a combination of events) is expected to meet or exceed local winter weather advisory criteria in the next 12 to 36 hours but stay below warning criteria. Criteria for snow is 4 inches or more in 12 hours or less, covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger advisory (i.e., 2 to 5 inches of snow = advisory). Criteria for ice is any ice accumulation less than 1/2 inch over at least 50% of the zone or encompassing most of the population. Winter Weather Advisory can also be issued for black ice. This is optional.
Freezing Rain Advisory	Any accumulation of freezing rain is expected in the next 12 to 36 hours (but will remain below 1/2 inch) for at least 50% of the zone or encompassing most of the population.
Lake Effect Snow Advisory	A lake effect snow event is expected to meet or exceed local lake effect snow advisory criteria in the next 12 to 36 hours. Widespread or localized lake induced snow squalls or heavy snow showers which produce snowfall accumulating to 4 or more inches in 12 hours or less but remain less than 7 inches. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger advisory (i.e., 2 to 5 inches of snow = advisory).
Wind Chill Advisory	Wind chill temperatures are expected to meet or exceed local wind chill advisory criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -15°F.

- **Warning** - Warnings are issued when a hazardous winter storm event is occurring, is imminent, or has a very high probability of occurrence (generally greater than 80%). A warning is used for conditions posing a threat to life or property. Warnings are issued using the WSW Winter Weather Message product and will appear as a headline in some text products such as the Zone Forecast. The table below discusses the various winter storm warnings that can occur and the conditions of each that are required for them to be posted.

TABLE 4-54 WINTER WEATHER WARNING DEFINITIONS

Warning Type	Description
Blizzard Warning	Blizzard event is imminent or expected in the next 12 to 36 hours. Sustained wind or frequent gusts greater than or equal to 35 mph will accompany falling and/or blowing snow to frequently reduce visibility to less than 1/4 mile for three or more hours.
Ice Storm Warning	An ice storm event is expected to meet or exceed local ice storm warning criteria in the next 12 to 36 hours. Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.
Lake Effect Snow Warning	A lake effect snow event is expected to meet or exceed local lake effect snow warning criteria in the next 12 to 36 hours. Widespread or localized lake induced snow squalls or heavy snow showers which produce snowfall accumulation to 7 or more inches in 12 hours or less. Lake effect snow usually develops in narrow bands and impacts a limited area within a county or forecast zone. Use "mid-point" of snowfall range to trigger warning (i.e., 5 to 8 inches of snow = warning).
Wind Chill Warning	Wind chill temperatures are expected to meet or exceed local wind chill warning criteria in the next 12 to 36 hours. Wind chill temperatures may reach or exceed -25°F.
Winter Storm Warning	A winter storm event (heavy sleet, heavy snow, ice storm, heavy snow and blowing snow or a combination of events) is expected to meet or exceed local winter storm warning criteria in the next 12 to 36 hours. Criteria for snow is 7 inches or more in 12 hours or less; or 9 inches or more in 24 hours covering at least 50% of the zone or encompassing most of the population. Use "mid-point" of snowfall range to trigger warning (i.e. 5 to 8 inches of snow = warning). Criteria for ice is 1/2 inch or more over at least 50% of the zone or encompassing most of the population.

4.6.4 HISTORICAL OCCURRENCES

General Trends

According to NOAA, Tuscarawas County has had **25 winter storm events** since 2001, resulting in no reported injuries, deaths, property damage, or crop damage. A complete list of severe winter storm events from 1996 to current day can be found in **Appendix B.**

TABLE 4-55 SUMMARY OF WINTER STORM EVENTS IN TUSCARAWAS COUNTY (JANUARY 1, 2001-NOVEMBER 30, 2021)

Event	Count	Injuries	Deaths	Property Damage	Crop Damage	Avg Property Damage/Event	Avg Crop Damage/Event
Blizzard	0	0	0	$ 0	$ 0	$0	$0
Heavy Snow	9	0	0	$ 0	$ 0	$0	$0
Ice Storm	3	0	0	$ 0	$ 0	$0	$0
Winter Storm	8	0	0	$ 0	$ 0	$0	$0
Extreme Cold/Wind Chill	5	0	0	$ 0	$ 0	$0	$0
Grand Total	**25**	**0**	**0**	**$ 0**	**$ 0**		

FIGURE 4-24 TUSCARAWAS COUNTY BLIZZARD EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021

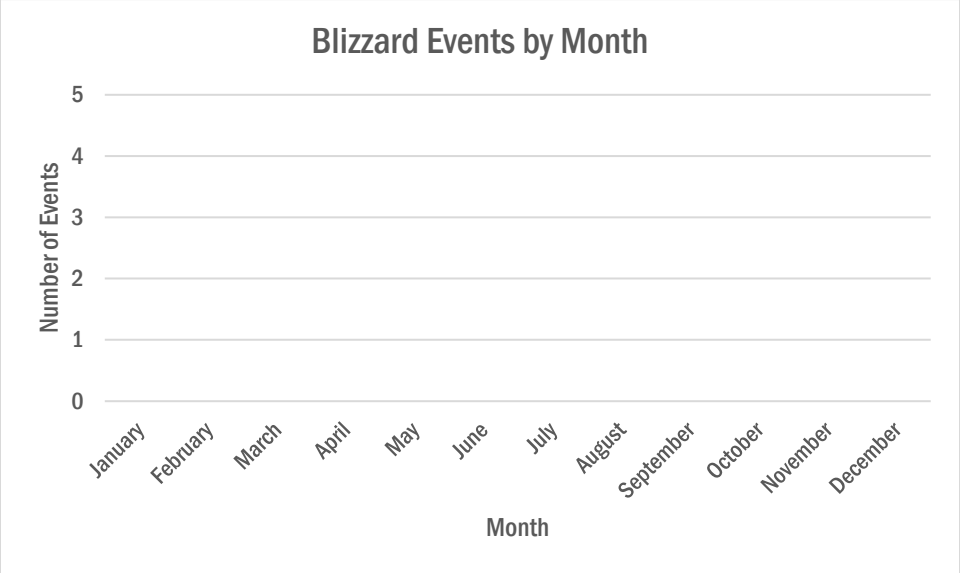


FIGURE 4-25 TUSCARAWAS COUNTY HEAVY SNOW EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021

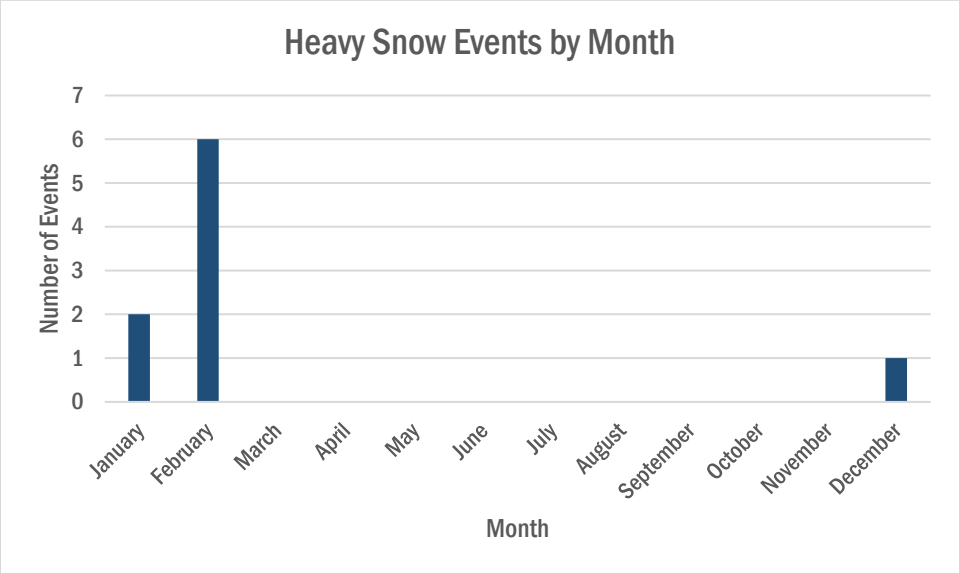


FIGURE 4-26 TUSCARAWAS COUNTY ICE STORM EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021

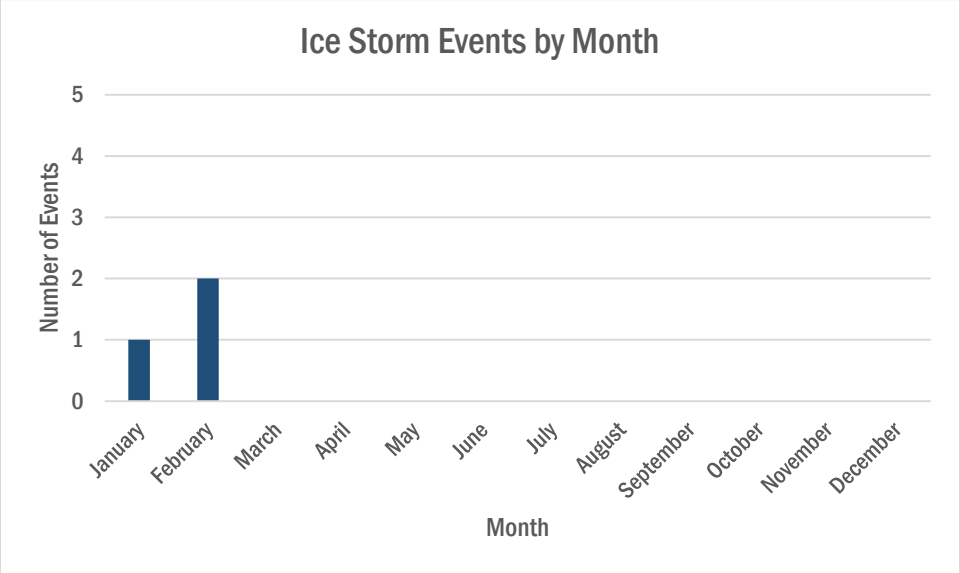


FIGURE 4-27 TUSCARAWAS COUNTY WINTER STORM EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021

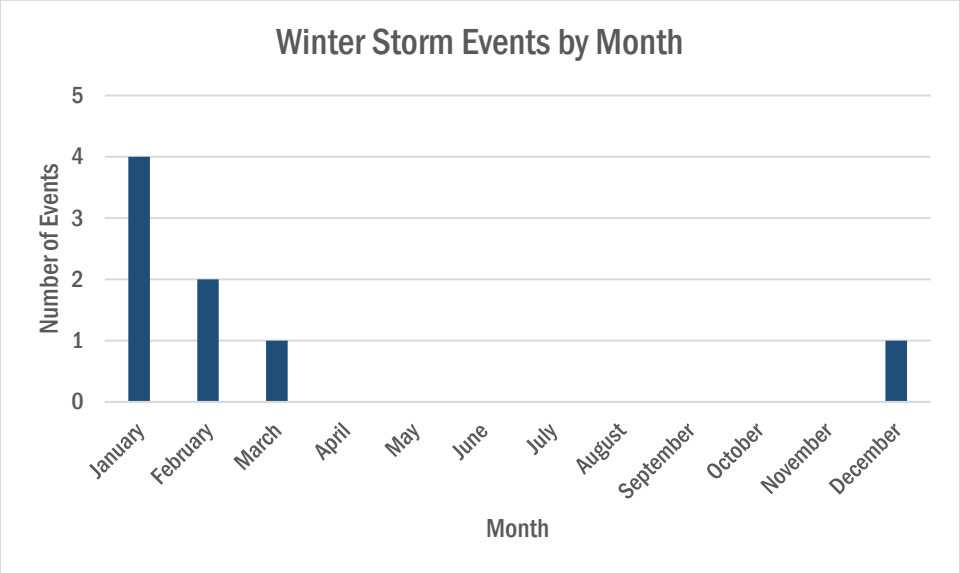
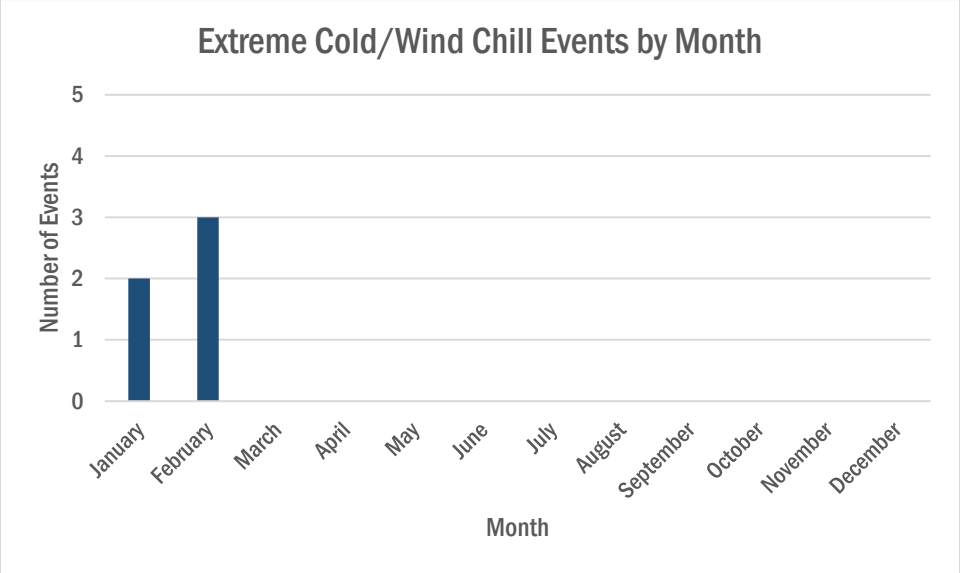


FIGURE 4-28 TUSCARAWAS COUNTY EXTREME COLD/WIND CHILL EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Since 1953, three federally or state-declared severe winter storm events have affected Tuscarawas County, as shown in the following table. According to FEMA Declarations and Ohio Emergency and Disaster Proclamations (1953 to present), the events have included snowstorms, blizzards, and severe winter storms.

TABLE 4-56 DECLARED WINTER DISASTERS

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
EM-3029	2/2/1977	Snowstorms	-	-
EM-3055	1/26/1978	Blizzards and Snowstorms	-	-
DR-1580	2/15/2005	Severe Winter Storms, Flooding and Mudslides	$97,938,844.86*	$10,017,388.91*

**Indicates data from FEMA's Disaster Declarations website. The dollar amounts refer to total funds delegated to all counties within the declared disaster area, not just Tuscarawas County.*

Event Narratives

- **January 13, 1999:** A powerful winter storm brought another combination of snow and freezing rain to all of east central Ohio. The precipitation began as snow, with between 1 and 3 inches of accumulation reported before the snow turned to freezing rain. All portions of east central Ohio reported at least 1/4 inch of ice accumulation, with some areas in Belmont and Harrison counties reporting over 1 inch of ice. The ice accumulation brought numerous power lines and large tree branches down, resulting in power outages to over 10,000 homes across the area.

- **January 20, 2012:** A low pressure system moved across the Appalachians southeast of the Upper Ohio Valley and produced a mixed bag of heavy freezing rain, sleet, and heavy snow across parts of the region. Freezing rain accumulations from one quarter to over one-half

inch occurred across eastern Ohio along Interstate 70 to southwest Pennsylvania, and extended south to the Mason Dixon line, and into Garrett County Maryland. North of this band heavy snow of 6 to 7 inches fell from New Philadelphia, Oh to Pittsburgh. Lighter snows of 3 to 6 inches fell from north of Pittsburgh to Interstate 80, and a small amount of freezing rain fell across portions of northern West Virginia.

- **April 2, 2016:** Very cold air for early April followed low pressure across the region. This produced widespread snow showers, with light snow accumulations across much of eastern Ohio, western Pennsylvania, northern West Virginia, and Garret County, Maryland. In lower elevations a trace to 2 inches of snow fell. In the Laurel Ridges of western Pennsylvania 2 to 5 inches of snow fell, and in the higher elevations of northern West Virginia and Garrett County, Maryland 2 to 6 inches of snow fell, with isolated reports over 6 inches. The Ohio Department of Highways reported 2.5 inches of snow near New Philadelphia.
- **February 7, 2018:** Heavy snow fell in Tuscarawas County starting in the morning of February 7th, accumulating around 6 inches of snow. While northern West Virginia and southwestern Pennsylvania counties saw warm air change the precipitation from snow to a wintry mix, the eastern Ohio counties were under cold air, keeping the precipitation as a heavy snowfall. No property damages, crop damages, injuries, or deaths were reported for this heavy snow event.
- **February 15-16, 2021:** A winter storm developed in the Ohio River Valley in the afternoon of February 15th and lasted through the following day. Snow, sleet, and freezing rain fell throughout the Ohio River Valley. Tuscarawas County reported a quarter inch of ice along with 1.5 to 2.6 inches of snow from the winter storm.

4.6.5 PROBABILITY OF FUTURE OCCURRENCES

Winter events reported over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. 25 winter storm events have been recorded since 2001, a frequency of 1.25 events per year.

(2021 CY) - (2001 HY) = 20 Years on Record

(25 Events) / (20 Years) = 1.25 Events per Year

The historic frequency indicates a 100% chance of this type of event occurring each year. The Steering Committee, based on their own knowledge, concluded that Severe Winter Storm events are "Likely" each year. This means that they have between at 10% and 100% chance of happening annually.

4.6.6 ASSETS EXPOSED TO SEVERE WINTER STORMS

Potential Losses

TABLE 4-57 POTENTIAL IMPACTS FROM WINTER STORMS

Impact	Description
People	Winter storms can bring severely cold temperatures, which can cause frostbite. Slips and falls resulting from ice can cause injuries, particularly to older populations. Communities may become isolated with little power, water, or food.
Infrastructure	Power outages can result from heavy snow on power lines. Roof collapses may also occur. Burst pipes may damage homes and businesses.
Economy	As transportation becomes dangerous, local shops lose customers. Some must close during storms.
Natural Systems	Rivers may freeze and cause flooding. Trees and other vegetation may be killed by ice or brought down by high winds.
Transportation	Roads can become either dangerous or completely impassable.

Community Vulnerability

All Tuscarawas County assets can be considered at risk from severe winter storms. This includes 100% of the county population and all buildings and infrastructure. Damages are primarily the result of cold temperatures, heavy snow or ice, and sometimes strong winds. Due to their regular occurrence, these storms are considered hazards only when they result in damage to specific structures or disrupt traffic, communications, electric power, or other utilities.

A winter storm can adversely affect roadways, utilities, and business activities. They can cause loss of life, frostbite and freezing conditions and can result in the closing of secondary roads, particularly in rural locations, loss of utility services and depletion of heating supplies. Most structures, including the county's critical facilities, could suffer damage from snow load on rooftops and large deposits of ice. Facilities with back-up generators are better equipped to handle a severe storm if the power goes out, even if that generator only powers certain systems.

Winter storms do not generally have a negative impact on structures. While low temperatures and power losses can render a structure uninhabitable for a time, they are unlikely to cause structural damage. However, snow and ice accumulation can affect structures and infrastructure. Older structures are more susceptible to the impacts of winter storms due to their methods of construction and insulation.

In addition to protecting its infrastructure, the county must consider population needs. Tuscarawas County is home to an estimated 93,263 people. At particular risk are elderly individuals. The U.S. Census Bureau estimates that approximately 20.0% of the county's population, or more than 18,600 individuals, are above the age of 65 and at risk from severe winter storms.

A timely forecast may not allow the county to mitigate property loss, but it could reduce casualties and injuries. In severe winter storm events, buildings are vulnerable to widespread utility disruptions (including the loss of heat and electricity), as well as building collapse or damage from downed trees.

Tuscarwas County is also subject to outages resulting from damage to the electrical grid in other parts of Ohio.

Winter storms affect all of Tuscarawas County, all communities and jurisdictions, and all above-ground structures and infrastructure. Although structural losses are typically minimal and covered by insurance, they can cause lost time, maintenance costs, and contents losses.

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Same vulnerabilities as extreme temperatures. Snow removal can be challenging, especially in sparsely populated areas.
Dover	Typical risk - no particular vulnerabilities.
New Philadelphia	No vulnerabilities to this hazard at this time.
Uhrichsville	Older population in the city. Areas that older population live in are frequently checked - people call if they need assistance.
Baltic	We do not have the resources or manpower to help during a severe winter storm event.
Barnhill	No specific vulnerabilities to this hazard.
Bolivar	Population having a hard time to getting around during winter weather events - keeping roads clear.
Dennison	Older population struggles to get around during severe winter storms. Village has an aggressive plan for treating public roads after snowstorms, and trees are maintained. People communicate with the Village if they need help to get mobile.
Gnadenhutten	The power companies have cleaned up the lines. We have a lot of mature trees that can affect neighborhoods and power lines.
Midvale	The older population has difficulty getting around, and this has increased in recent years due to the increase in severe winter storm events. Trees near power lines can collapse and cause power outages due to the heavy weight of snow and ice.
Mineral City	Village is hilly, ice and snow accumulates; older population struggles to stay mobile (sidewalks/roads). Senior Center comes to the fire station, have to maintain a clear sidewalk for people to walk. Primary school as well (maintaining clear sidewalks/roads).
Newcomerstown	There are two hills that are difficult to plow: Keiser Hill and Crestview Manor.
Parral	We have older trees that come down during storms.
Port Washington	There are no particular issue with winter storms in our community.
Roswell	We have a plan in place to plow Main Street and Barnhill Road first, and then we address the secondary streets.
Stone Creek	Densely wooded area. Significant elderly population as well. Public Works department helps elderly population during winter events, but still at risk.
Strasburg	Freezing rain makes the roads difficult for people to leave.

Jurisdiction/Organization	Vulnerability Assessment Response
Sugarcreek	Not an issue.
Tuscarawas	No specific vulnerabilities.
Zoar	Severe winter storms have not been a problem for the village to date.
Tuscarawas County Regional Planning and Floodplain Office	Maybe a lack of snowplow drivers to keep roads clear.
Trinity Twin City Medical Center	Any severe storm, power is the biggest concern. There have been no significant incidents as of yet. Extended and regional power outages pose a potential issue.

LAND USE AND DEVELOPMENT TRENDS

In severe winter storm events, buildings are vulnerable to widespread utility disruptions (including loss of heat and electricity) and may collapse or be damaged by downed trees. Environmental impacts often include damage to shrubbery and trees from heavy snow loading, ice build-up and/or high winds, which can break limbs or even bring down large trees. Winter storms have an indirect effect on the environment through the treatment of roadway surfaces with salt, chemicals, and other de-icing materials, which can impair adjacent surface and ground waters. This is particularly a concern in urban areas. Another important secondary impact of winter storms is collapsing structures; the weight of snow may cause building damage or even a collapse during a heavy snowfall or a significant accumulation over time.

Winter storms have a positive environmental impact as well; gradual melting of snow and ice provides excellent groundwater recharge. However, abruptly high temperatures following a heavy snowfall can cause rapid surface water runoff and severe flooding.

4.6.7 WINTER STORM SUMMARY

Tuscarawas County is subject to severe winter storms, which have the potential to become a hazard via cold temperatures, heavy snow or ice, and strong winds. The range of damage to structures depends on the magnitude and duration of the storm event. Losses may be as small as lost productivity and wages, when workers are unable to travel, or as large as roof damage or building collapse. The profile for severe winter storms primarily covers past and future damages from cold temperatures, heavy snow or ice, and sometimes strong winds.

7. TORNADO

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Tornado	3	0.9	2	0.6	1	0.2	4	0.4	2	0.2	2.3
Medium Risk Hazard (2.0 – 2.9)											

4.7.1 TORNADO DISCRIPTION

A **tornado** is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by thunderstorm activity (but sometimes result from hurricanes or tropical storms), when cool, dry air intersects and overrides a layer of warm, moist air and forces the warm air to rise rapidly. The damage caused by a tornado is a result of high wind velocities and wind-blown debris. According to the National Weather Service, tornado wind speeds can range from 30 to more than 300 miles per hour.

FIGURE 4-29 EXAMPLE OF A TORNADO

Tornadoes are more likely to occur during the spring and early summer months of March through June and are most likely to form in the late afternoon and early evening. Most tornadoes are a few dozen yards wide and touch down briefly, but even small, short-lived tornadoes can inflict tremendous damage. Destruction ranges from minor to catastrophic, depending on the intensity, size, and duration of the storm. Structures made of light materials, such as mobile homes, are most susceptible to damage. Each year, an average of over 800 tornadoes is reported nationwide, resulting in an average of 80 deaths and 1,500 injuries.

Strong winds not associated with tornadoes, severe thunderstorms, and winter storms can also occur. These winds typically develop with strong pressure gradients and gusty frontal passages. The closer and stronger two systems are (one high pressure, one low pressure), the stronger the pressure gradient and, therefore, the stronger the winds.

4.7.2 LOCATION

All communities in Tuscarawas County are affected by these occurrences. Tornadoes can touch down in any location, without any way to predict where they will occur. Generally, an entire county or region is under a tornado warning or watch.

4.7.3 TORNADO EXTENT

The Enhanced Fujita Scale, also known as the “EF-Scale,” measures tornado strength and associated damages. The EF-Scale (Table 4-36) updates the Fujita scale, the following table, which was published in 1971. Both scales classify U.S. tornadoes into six intensity categories, based on the estimated maximum winds within the wind vortex. Since it was applied by the National Weather

Service in 2007, the EF-Scale has become the definitive metric for estimating tornado wind speeds based on the damage done to buildings and structures.

TABLE 4-58 FUJITA SCALE AND ASSOCIATED DAMAGE

F-Scale Number	Wind Speed (MPH)	Type of Damage Possible
0	< 73	**Light damage.** Chimney damage; branches broken off trees; smaller trees/shallow-rooted trees pushed over; damage to sign boards.
1	73-112	**Moderate Damage.** Surface-layer of roofs pulled off; mobile homes pushed off foundations or pushed over; cars pushed off roads.
2	113-157	**Considerable Damage.** Entire roofs torn off homes; mobile homes destroyed; train cars pushed over; large trees uprooted; cars lifted off the ground; lighter objects become flying debris.
3	158-206	**Severe damage.** Roofs and walls torn off homes; complete trains overturned; entire forests destroyed with uprooted trees; heavy automobiles lifted off the ground and thrown.
4	207-260	**Devastating damage.** Homes completely leveled; buildings with weaker structure destroyed and turned into flying debris; cars turned into flying debris.
5	261-318	**Incredible damage.** All structures leveled; cars that are turned into flying debris traveling through the air for over 100 meters; trees debarked.

TABLE 4-59 ENHANCED FUJITA SCALE AND ASSOCIATED DAMAGE

EF-Scale Number	Wind Speed (MPH)	Type of Damage Possible
EF0	65-85	**Minor damage**: Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	**Moderate damage**: Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	**Considerable damage**: Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes completely destroyed; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
EF3	136-165	**Severe damage**: Entire stories of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	**Devastating damage**: Well-constructed houses and whole frame houses completely leveled; cars thrown and small missiles generated.
EF5	>200	**Extreme damage**: Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 m (300 ft.); steel reinforced concrete structure badly damaged; high-rise buildings have significant structural deformation.

The Storm Prediction Center (SPC) has developed damage indicators to be used with the Enhanced Fujita Scale for different types of buildings. They can be also be used to classify any high wind event. Some of the indicators for different building types are shown in the following tables.

TABLE 4-60 SPC INSTITUTIONAL BUILDING DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	59-88 MPH (72 MPH)
Loss of roof covering (<20%)	72-109 MPH (86 MPH)
Damage to penthouse roof and walls, loss of rooftop HVAC equipment	75-111 MPH (92 MPH)
Broken glass in windows or doors	78-115 MPH (95 MPH)
Uplift of lightweight roof deck and insulation, significant loss of roofing material (>20%)	95-136 MPH (114 MPH)
Façade components torn from structure	97-140 MPH (118 MPH)
Damage to curtain walls or other wall cladding	110-152 MPH (131 MPH)
Uplift of pre-cast concrete roof slabs	119-163 MPH (142 MPH)
Uplift of metal deck with concrete fill slab	118-170 MPH (146 MPH)
Collapse of some top building envelope	127-172 MPH (148 MPH)
Significant damage to building envelope	178-268 MPH (210 MPH)

Source: Storm Prediction Center, 2009

TABLE 4-61 SPC EDUCATIONAL INSTITUTIONS (ELEMENTARY) DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	55-83 MPH (68 MPH)
Loss of roof covering (<20%)	66-99 MPH (79 MPH)
Broken windows	71-106 MPH (87 MPH)
Exterior door failures	83-121 MPH (101 MPH)
Uplift of metal roof decking; significant loss of roofing material (>20%); loss of rooftop HVAC	85-119 MPH (101 MPH)
Damage to or loss of wall cladding	92-127 MPH (108 MPH)
Collapse of tall masonry walls at gym, cafeteria, or auditorium	94-136 MPH (114 MPH)
Uplift or collapse of light steel roof structure	108-148 MPH (125 MPH)
Collapse of exterior walls in top floor	121-153 MPH (139 MPH)
Most interior walls of top floor collapsed	133-186 MPH (158 MPH)
Total destruction of a large section of building envelope	163-224 MPH (192 MPH)

Source: Storm Prediction Center, 2009

TABLE 4-62 SPC METAL BUILDING SYSTEMS DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	54-83 MPH (67 MPH)
Inward or outward collapsed of overhead doors	75-108 MPH (89 MPH)
Metal roof or wall panels pulled from the building	78-120 MPH (95 MPH)
Column anchorage failed	96-135 MPH (117 MPH)
Buckling of roof purlins	95-138 MPH (118 MPH)
Failure of X-braces in the lateral load resisting system	118-158 MPH (138 MPH)
Progressive collapse of rigid frames	120-168 MPH (143 MPH)
Total destruction of building	132-178 MPH (155 MPH)

Source: Storm Prediction Center, 2009

TABLE 4-63 SPC ELECTRIC TRANSMISSION LINES DAMAGE INDICATORS

Damage Description	Wind Speed Range (Expected, in Parentheses)
Threshold of visible damage	70-98 MPH (83 MPH)
Broken wood cross member	80-114 MPH (99 MPH)
Wood poles leaning	85-130 MPH (108 MPH)
Broken wood poles	98-142 MPH (118 MPH)

Source: Storm Prediction Center, 2009

Improved and consistent building codes have been considered a key measure for mitigating the life and property losses associated with tornadoes and wind events. All of Tuscarawas County is equally at risk of tornado damage.

4.7.4 HISTORICAL OCCURRENCES

General Trends

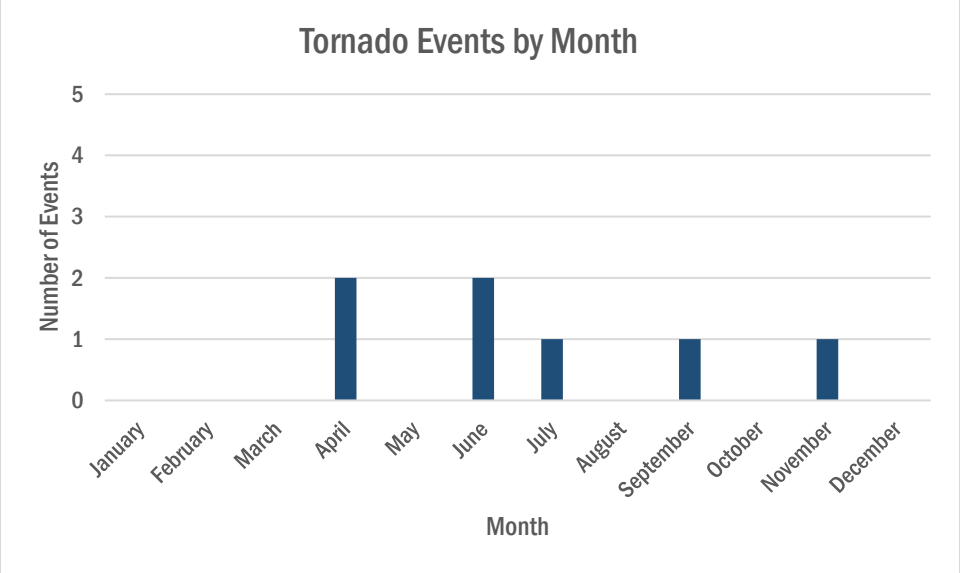
Tuscarawas County may experience intense winds from thunderstorms, tornadoes, or even the remnants of hurricanes and tropical storms. Tornadoes can occur any time of the year, though

county records indicate that tornado occurrences peak from April through November (see Figure 4-16). There has been a total of 7 tornadoes in the last twenty years in Tuscarawas County, resulting in no deaths, 1 injury, $710,00 in property damages, and no reported crop damages. A complete list of tornado events from 1950 to current day can be found in **Appendix B.**

TABLE 4-64 TORNADO EVENTS IN TUSCARAWAS COUNTY, JANUARY 1, 2001-NOVEMBER 30, 2021

Location	Date	Time	Mag	Deaths	Injuries	Property Damage	Crop Damage
New Philadelphia	11/23/2003	8:00 PM	F2	0	1	$160,000	-
Strasburg	6/22/2006	4:47 PM	F1	0	0	$50,000	-
Shanesville	6/5/2010	1:55 PM	EF1	0	0	$350,000	-
Yorktown	9/16/2010	5:20 PM	EF1	0	0	$75,000	-
Bolivar	7/10/2013	3:44 PM	EF1	0	0	$75,000	-
Winfield	4/14/2019	4:49 PM	EF0	0	0	-	-
Sandyville	4/7/2020	11:30 PM	EF0	0	0	-	-
Grand Total				**0**	**1**	**$ 710,000**	**$ 0**

FIGURE 4-30 TUSCARAWAS COUNTY TORNADO EVENTS BY MONTH, JANUARY 1, 2001-NOVEMBER 30, 2021



Tuscarawas County has been directly affected by 15 tornadoes events since 1950. The County has been a part of one disaster declaration where tornadoes were a factor in the overall emergency.

TABLE 4-65 DECLARED DISASTERS AFFECTING TUSCARAWAS COUNTY

Disaster Number	Declaration Date	Title	Public Assistance	Individual Assistance
DR-1227	6/30/1998	Severe Storms, Flooding, and Tornadoes	-	-

Event Narratives

- June 7, 1980: An F1 tornado 0.5 miles long and 50 yards wide touched down near the golf course in Sugarcreek. There were no injuries or fatalities, but the damages were estimated at $2.5 million.

- November 12, 2003: An F2 tornado touched down near May Rd just off Route 52 southwest of New Philadelphia. It moved northeast at 45 mph, damaging several homes along Crooked Run Rd. Several homes had significant damage with roofs taken completely off; some walls were toppled. Several garages and barns suffered significant damage. Few garages completely destroyed. A least one mobile home was knocked off its foundation. Many trees and power lines were downed. Tornado went across Interstate 77 and into New Philadelphia, where 12 homes had scattered damage. Crooked Run Rd had the most significant damage. The tornado path length was 3.5 miles; path width 175 yards; maximum winds estimated 120 mph. Damages were estimated at $160,000.

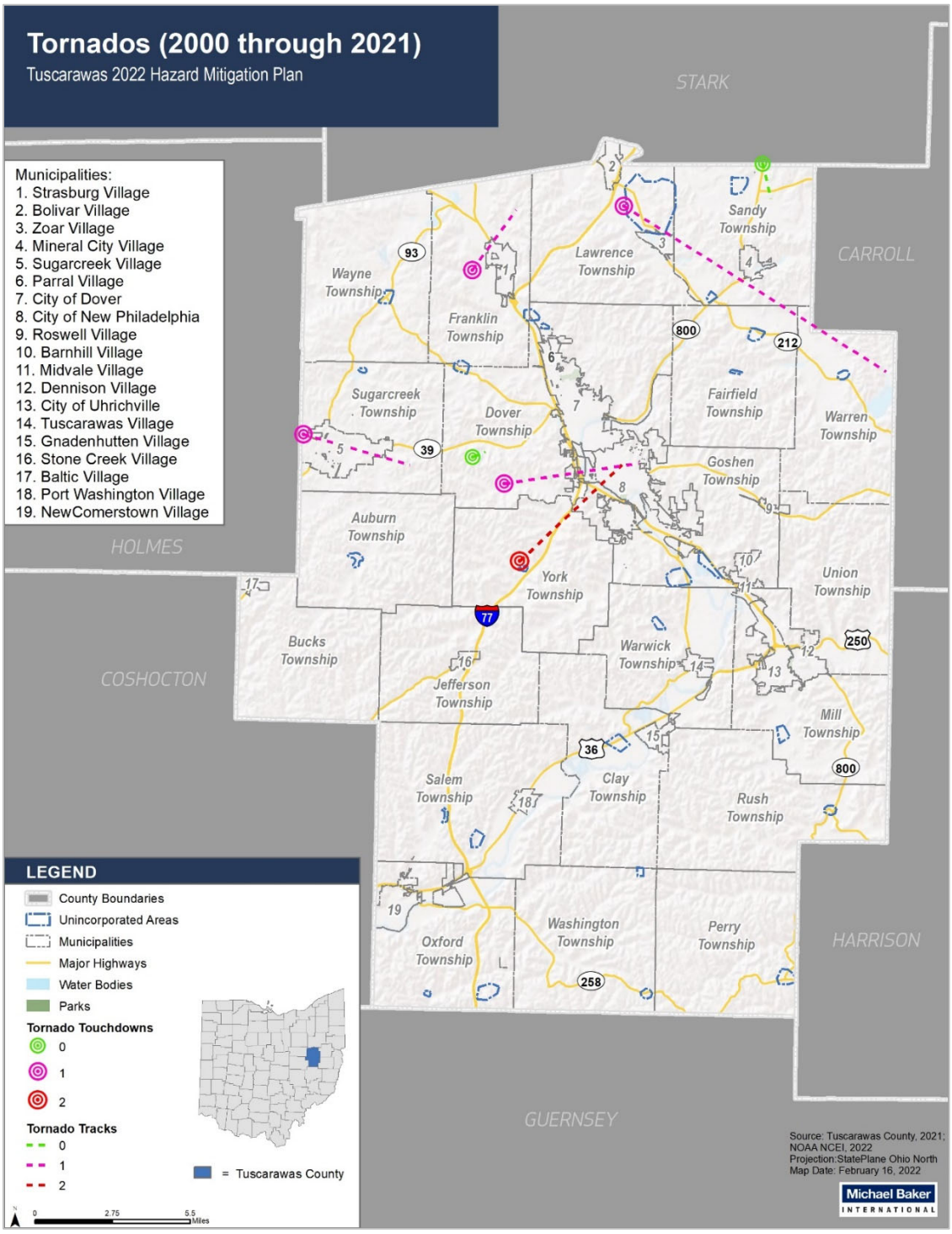
- June 5, 2010: An NWS storm survey found this tornado developed in Holmes County, Ohio around 2 miles south of Walnut Creek and moved into Tuscarawas County one half mile west of SR 93 near SR 39 at 1:55 PM. This supercell tornado was rated an EF1 with maximum winds of 95 MPH and a maximum width of 100 yards. The tornado dissipated about 3 miles east of Sugarcreek at 2:00 PM. Damage was found to 6 homes and 7 businesses with 2 businesses suffering moderate damage. Numerous trees were snapped, power lines and telephone poles were knocked down, and signs destroyed. A 12-foot aluminum boat was lifted one quarter mile and dropped in a tree. Damages were estimated to be $350,000.

- July 10, 2013: An NWS storm survey found an EF1 tornado touched down in Tuscarawas County south of Bolivar and continued into Carroll County near Atwood Lake, before dissipating. EF0 damage was found along SR 212 south of Bolivar where numerous large limbs were snapped, and trees uprooted northwest of Zoar. EF0 damage became more significant as the circulation descended the lee side of a hill west of Mineral City, where a broad swath of snapped trees was observed. EF1 structural damage was noted in Mineral City where the roof of the fire house was lifted, and cinder block walls collapsed. Several homes lost shingles, and windows were blown out on northwest facing walls. Thereafter damage was confined primarily to trees before the tornado dissipated. Maximum winds were estimated to be from 90 to 100 MPH, with a path length near 14 miles. The maximum path width was near 300 yards. Estimated damages were $75,000.

- April 14, 2019: An EF0 tornado touched down near Gasser Road in Dover in the late afternoon of April 14th. The length of the tornado's path was 0.5 miles, with a width of 75 yards, and a maximum wind speed of 85 mph. A 100-year-old barn was demolished by the tornado, and several items that were inside the barn were displaced. Additional impacts included several large branches downed.

- **April 7, 2020:** An EF0 tornado moved through Tuscarawas County in the late evening of April 7th. The length of the tornado's path was 1.25 miles, with a width of 100 yards. Damage was reported to several mobile homes and downed multiple trees along Route 800. Additional damage was reported at the Sandy Valley High School with downed trees and public structures near athletic fields.

FIGURE 4-31 HISTORICAL TORNADOES IN TUSCARAWAS COUNTY



4.7.5 PROBABILITY OF FUTURE OCCURRENCES

Reported tornado events over the past 20 years provide an acceptable framework for projecting the frequency of future occurrence. The probability of experiencing a tornado event can be difficult to quantify, but based on a historical record of 7 tornado events since 2001, it can reasonably be assumed that this type of event occurred once every 2.86 years from 2001 through 2021.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (7 Events) = 2.86 Years Between Events

The historic frequency indicates that there is a 35% chance of this type of event occurring each year. The Steering Committee, based on their own knowledge, concluded that Tornado events are "Likely" each year. This means that they have between at 10% and 100% chance of happening annually.

4.7.6 ASSETS EXPOSED TO TORNADOES

Potential Losses

TABLE 4-66 POTENTIAL IMPACTS FROM TORNADOES

Impact	Description
People	Severe injuries or death may occur, particularly to those outside or in their vehicles. Large enough tornadoes can kill people, even in moderately sturdy structures.
Infrastructure	Damaged or completely destroyed. Weak tornadoes may only rip shingles off a roof, while the strongest can level buildings completely. Power lines can be ripped off their poles and create power outages for large areas.
Economy	Small towns will often be affected the most by significant events. Large tornadoes can hinder transportation, delaying or cutting off supplies to towns.
Natural Systems	Small trees may be completely uprooted, and large trees could lose significant branches. Crops may be destroyed or heavily damaged.
Transportation	Transportation can be severely disrupted by debris on roadways.

While all county assets are considered to be at risk from this hazard, a particular tornado would only cause damages along its specific track. A high-magnitude tornado sweeping through densely populated portions of the county could create extensive injuries, deaths, and economic losses. There is no way to be sure how many people would be injured or killed due to the differences in time of day and path, but property values can be used to estimate economic losses.

Community Vulnerability

All assets in Tuscarawas County can be considered at risk from tornadoes and wind events. This includes 100% of the county's population and all critical facilities, structures, and infrastructure. Mobile homes can have a heightened vulnerability to strong wind and tornado events if they are not anchored in place. There are an estimated 850 mobile homes within Tuscarawas County. New Philadelphia has the highest number of mobile homes, with 453 structures on mobile home parcels. Sandy Township has the second highest number of structures on mobile home parcels with 245, and Uhrichsville has 69 mobile homes. Sandy Township has the largest percentage of mobile homes in

relation to total structures, with 24% of its total structures are mobile home parcels. New Philadelphia and Tuscarawas both have the second highest percentage, with 5% of its total structures are mobile home parcels. Uhrichsville has the third highest percentage, with 3% of its total structures are mobile home parcels.

TABLE 4-67 ESTIMATED MOBILE HOMES PER MUNICIPALITY IN TUSCARAWAS COUNTY

Municipality	Total Structures	Structures on mobile home parcels	Percent Mobile Homes
Auburn Township	418	0	0%
Baltic Village	359	0	0%
Barnhill Village	166	0	0%
Bolivar Village	440	0	0%
Bucks Township	489	0	0%
City of Dover	6,420	48	1%
City of New Philadelphia	9,081	453	5%
City of Uhrichsville	2,692	69	3%
Clay Township	331	0	0%
Dennison Village	1,273	0	0%
Dover Township	1,932	0	0%
Fairfield Township	701	0	0%
Franklin Township	1,044	0	0%
Gnadenhutten Village	601	0	0%
Goshen Township	1,730	0	0%
Jefferson Township	425	0	0%
Lawrence Township	852	0	0%
Midvale Village	339	6	2%
Mill Township	960	0	0%
Mineral City Village	365	0	0%
Newcomerstown Village	1,912	0	0%
Oxford Township	552	0	0%
Parral Village	121	0	0%
Perry Township	254	0	0%
Port Washington Village	249	0	0%
Roswell Village	102	0	0%
Rush Township	431	0	0%
Salem Township	514	0	0%
Sandy Township	1,004	245	24%
Stone Creek Village	91	0	0%
Strasburg Village	1,346	0	0%
Sugarcreek Township	822	0	0%
Sugarcreek Village	1,292	0	0%

Municipality	Total Structures	Structures on mobile home parcels	Percent Mobile Homes
Tuscarawas Village	501	27	5%
Unincorporated	2,946	0	0%
Union Township	639	0	0%
Warren Township	666	0	0%
Warwick Township	769	2	0%
Washington Township	358	0	0%
Wayne Township	801	0	0%
York Township	647	0	0%
Zoar Village	104	0	0%
Grand Total	**46,739**	**850**	**2%**

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Open spaces remain vulnerable to tornadoes. Of particular interest is the county fairgrounds where several well populated events take place during tornado season.
Dover	Increased risk in recent years - valley of Crooked Run Road, 2 touchdowns and 1 tracked in valley (township) within the last 15 years.
New Philadelphia	SW / W sections of city are vulnerable to tornadoes that have periodically developed in the Crooked Run valley west of the city.
Uhrichsville	Certain parts of the city - older parts (downtown/western side) - if a tornado were to come through, buildings and structures would not be able to withstand a tornado.
Baltic	The school was built in the 1900's I believe and not built to modern codes. We have a mobile home park which would not be protected
Barnhill	No specific vulnerabilities.
Bolivar	Same as thunderstorms. Warning system is outdated.
Dennison	Tornadoes are not a concern for the village. The village has torn down 70+ blighted homes and at least 10 garages in the past 10 years to minimize vulnerability.
Gnadenhutten	The power companies have cleaned up the lines. We have a lot of mature trees that can affect neighborhoods and power lines.
Midvale	Midvale has a lot of older homes. However, Midvale sits in a valley and partially on a hill. There are several manufactured homes in the village as well.
Mineral City	Older homes in the village, roofs and trees can be impacted. Tornado passed through and wiped out the old fire station.
Newcomerstown	No particular vulnerabilities.

Jurisdiction/Organization	Vulnerability Assessment Response
Parral	Our primary building stock is comprised of older homes.
Port Washington	The old Union Hall is a registered historical landmark. The brick and mortar are old and deteriorating. The school was built in the early 2000s and is one of the more up to date structures in the town.
Roswell	There are some houses in the village that could be destroyed if a EF3 tornado were to pass through the community as the majority of homes were built in the early 1900s. The village hall is a cement block building and is designated as the storm shelter for the village.
Stone Creek	Some of the buildings date back to the 1800s/early 1900s, could not withstand a tornado event. Town Hall built in 1900. There is not a significant amount of mobile homes in the area, and new developments must adhere to building code ordinances.
Strasburg	We've applied for a grant to cover some of the costs to install a new tornado siren.
Sugarcreek	We do have a lot of older construction in the Village.
Tuscarawas	No specific vulnerabilities.
Zoar	Many older historic buildings in Zoar are very solidly built and have stone cellars which also provide good shelter from storms.
Tuscarawas County Regional Planning and Floodplain Office	We have many trailers. We have not adopted building codes that require building to stronger standards. We have no county-wide building code,
Trinity Twin City Medical Center	Interior hallways are usually what we can do. We don't have saferooms. Power is the main issue here.

4.7.7 LAND USE AND DEVELOPMENT TRENDS

Improved and consistent building codes are considered to be a key measure to mitigate the risk of life and property losses associated with tornadoes and wind events. All Tuscarawas County property is equally at risk to tornado damage, and there are no locations of high-risk exposure.

Regulatory Environment

The formal regulations that pertain to tornadoes are negligible. While protective measures are suggested, especially for mobile/modular homes, these are not generally required in local codes.

4.7.8 TORNADOES SUMMARY

It is difficult to separate the tornado wind components that cause damage from other wind-related natural events that often generate those tornadoes. For example, hurricanes with intense winds often spawn numerous tornadoes or generate severe thunderstorms that produce strong, localized down-drafts. Tornadoes are difficult to predict, and the entire county is subject to all categories of windstorms.

In addition to improved construction standards, retrofitting infrastructure to enhance the design standards can limit exposure. Examples include structural cladding, shuttering systems, and materials that are resistant to the penetration of wind-blown debris and projectiles.

8. DROUGHT

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Drought	2	0.6	1	0.3	4	0.8	1	0.1	4	0.4	2.2
Medium Risk Hazard (2.0 – 2.9)											

4.8.1 DROUGHT DESCRIPTION

Drought is a normal, recurrent, feature of climate and originates from a deficiency of precipitation over an extended period, usually one or more seasons. Drought can result in a water shortage for some activity, group, or environmental sector. Drought is a complex natural hazard, as is reflected in the following four definitions commonly used to describe it:

- **Agricultural:** Defined principally in terms of naturally occurring soil moisture deficiencies relative to the water demands of plant life, usually arid crops.
- **Hydrological:** Related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels.
- **Meteorological:** Defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount, based on monthly, seasonal, or annual time scales.
- **Socio-economic:** Associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of a weather-related supply shortfall. It may also be called a water management drought.

Although climate is a primary contributor to hydrological drought, factors such as changes in land use (e.g., deforestation), land degradation, and the construction of dams also affect the hydrological characteristics of a particular region. Since regions are interconnected by natural systems, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Changes in land use upstream may alter hydrologic characteristics such as infiltration and runoff rates, resulting in more variable stream flow and a higher incidence of hydrologic drought downstream. Land use change is one way human actions alter the frequency of water shortage, even when no change in precipitation has been observed.

Drought risk is assessed based on a combination of the frequency, severity, and spatial extent (the physical nature of drought) and the degree to which a population or activity is vulnerable to the effects of drought. The degree of Tuscarawas County's vulnerability to drought depends on the region's environmental and social characteristics and is measured by its ability to anticipate, cope with, resist, and recover from drought.

Because drought is usually considered a regional hazard, it is not enhanced or analyzed by county-level mapping. Mapping of the current drought status is published by the National Integrated Drought Information System (NIDIS).

4.8.2 LOCATION

Droughts are region-wide events that affect all of Tuscarawas County. All communities are affected during these occurrences. Drought impacts can be exasperated in agriculture land use and for structures that have a well as the source of water.

4.8.3 DROUGHT EXTENT

The Palmer Drought Severity Index (PDSI), developed by Wayne Palmer in the 1960s, uses temperature and rainfall information in a formula to determine dryness. It has become the semi-official drought index. The Palmer Index is most effective in determining long term drought—a matter of several months—and is not as good with short-term forecasts (a matter of weeks). It uses 0 as normal, and drought is shown in terms of negative numbers; for example, minus 2 is moderate drought, minus 3 is severe drought, and minus 4 is extreme drought.

TABLE 4-68 PALMER DROUGHT SEVERITY INDEX

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

Drought severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. The severity of drought can be aggravated by other climatic factors, such as prolonged high winds and low relative humidity. The magnitude of drought is usually measured in time and the severity of the hydrologic deficit.

Several resources are available to evaluate drought status and estimate future expected conditions. The NIDIS Act of 2006 (Public Law 109-430) prescribes an interagency approach for drought monitoring, forecasting, and early warning. The NIDIS maintains the U.S. Drought Portal (www.drought.gov), a web-based access point to several drought-related resources, including the U.S. Drought Monitor (USDM) and the U.S. Seasonal Drought Outlook (USSDO).

4.8.4 HISTORICAL OCCURRENCES

General Trends

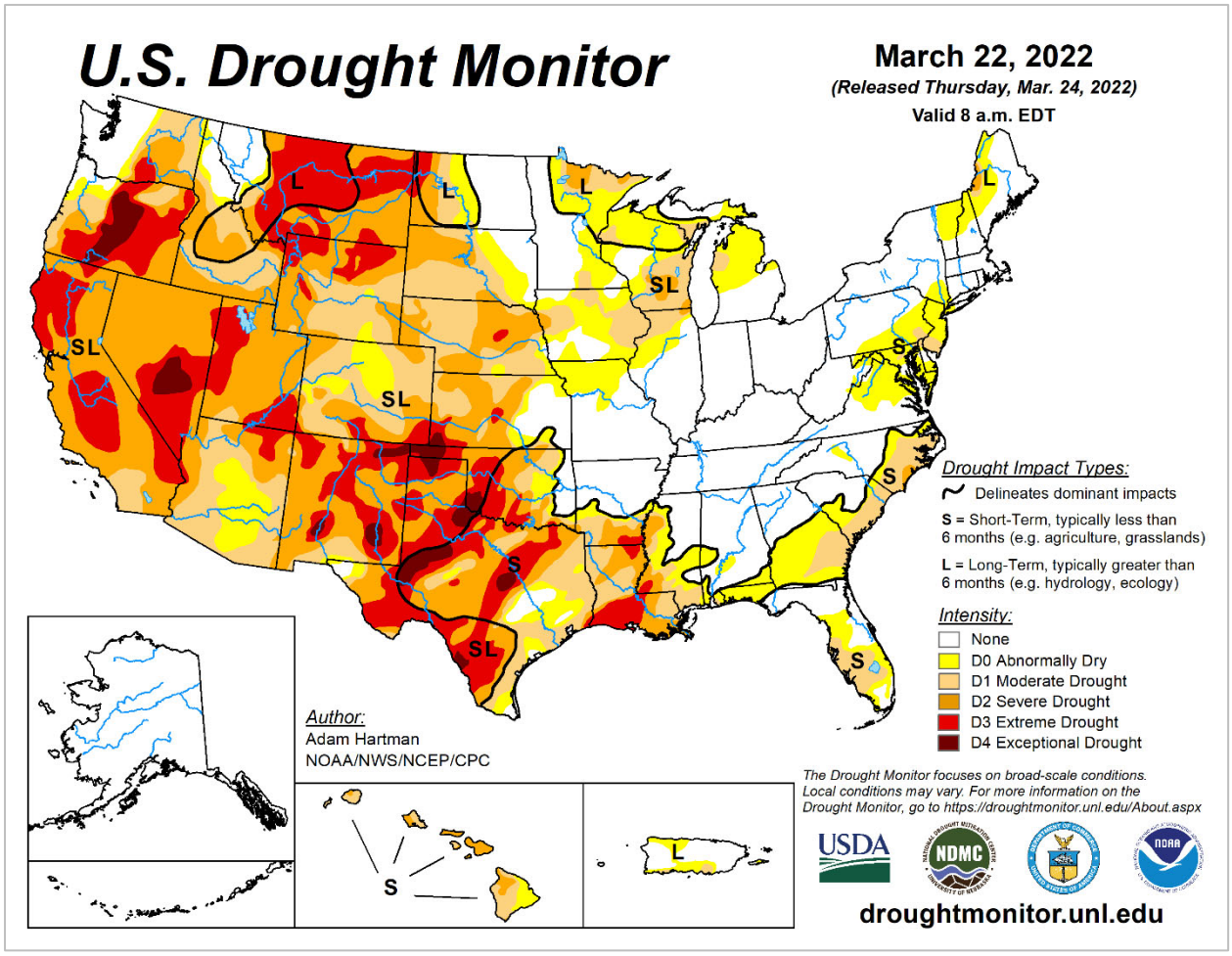
Tuscarawas County has not experienced any notable drought events since 2001, according to the NOAA NCEI Storm Events Database.

Event Narratives

- **August 1999:** The dry conditions that actually began in July 1998 continued through the month of August. On August 10, the U.S. Department of Agriculture declared all of Eastern Ohio an agricultural disaster area. Precipitation deficits for the period of May through August show the area to be anywhere between 2 and 8 inches below normal. Preliminary estimates predict a $600 million agricultural loss statewide from the drought.

- **September 1999:** September rainfall for Eastern Ohio again averaged below normal, with the Palmer Drought Severity Index keeping the entire area under a moderate to severe drought. The Crop Moisture Index also showed abnormally dry conditions continuing across all of Eastern Ohio.

FIGURE 4-32 EXAMPLE US DROUGHT MONITOR MAP



4.8.5 PROBABILITY OF FUTURE OCCURRENCES

Drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. Drought related to climate change will increase pressure on Ohio water resources. Decreasing snowmelt and spring stream flows, coupled with increasing populations, anticipated hotter climate, and demand for water may lead to water shortages for residents.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (0 Events) = Greater than 20 years between events

Drought is difficult to predict but warning indicators can be tracked and monitored. Understanding the historical frequency, duration, and spatial extent of drought can help determine the likelihood and potential severity of future droughts. The characteristics of past droughts provide benchmarks for future projections. However, the probability that the county will experience a drought in any given year is difficult to predict. Based on historic frequency, there is a 0% chance for a drought event each year. The Steering Committee, based on their own knowledge, concluded that Drought events are

"Possible" each year. This means that they have between at 1% and 10% chance of happening annually.

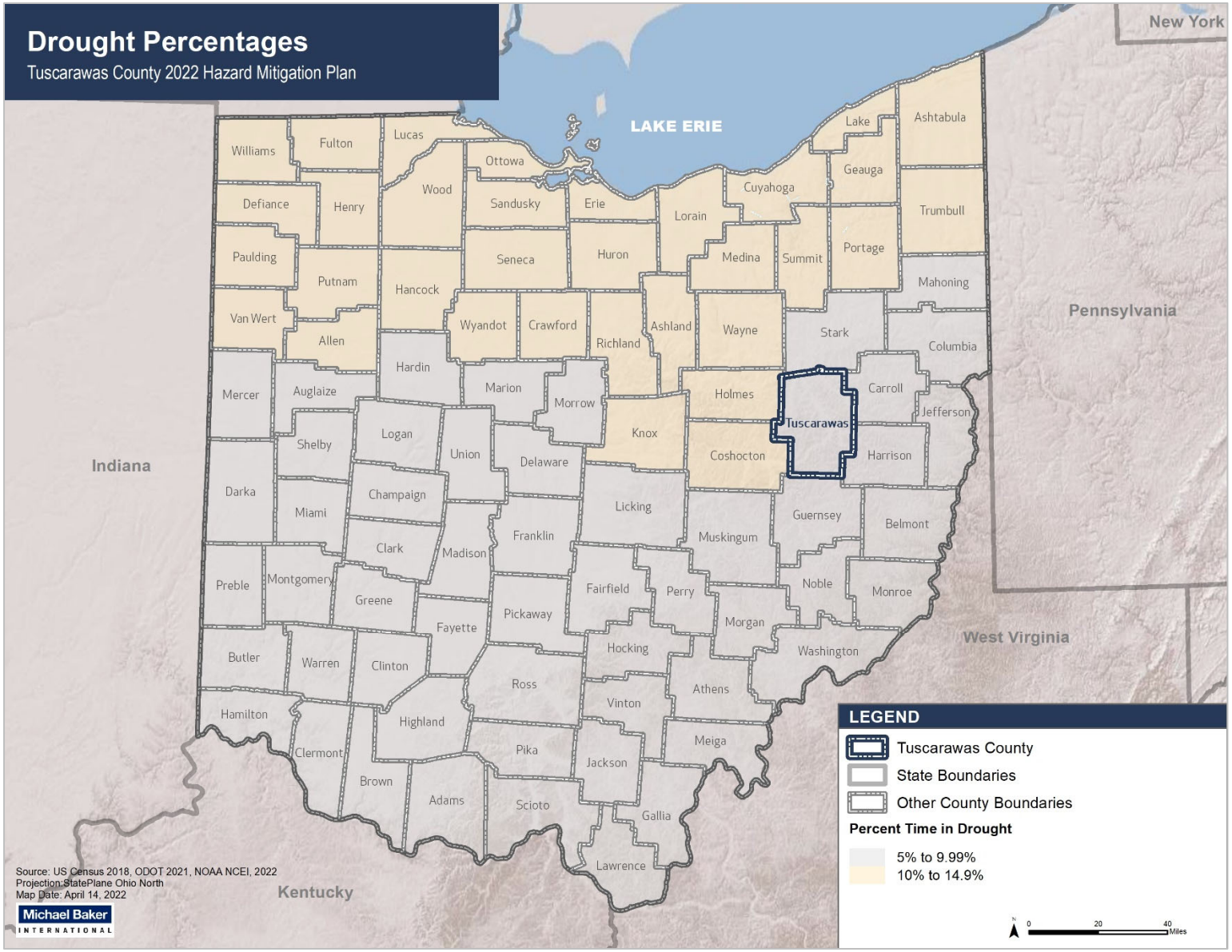
NOAA's Paleoclimatology Program studies drought by analyzing records from tree rings, lake and dune sediments, archaeological remains, historical documents, and other environmental indicators to obtain a broader picture of the frequency of droughts in the United States. According to their research, "…paleoclimatic data suggest that droughts as severe as the 1950s drought have occurred in central North America several times a century over the past 300-400 years, and thus we should expect (and plan for) similar droughts in the future. The paleoclimatic record also indicates that droughts of a much greater duration than any in the 20th century have occurred in parts of North America as recently as 500 years ago." Based on this research, the 1950s drought situation could be expected approximately once every 50 years (or has a 20% chance of occurring every 10 years). An extreme drought, worse than the 1930s "Dust Bowl," has an approximate probability of occurring once every 500 years or a 2% chance of occurring each decade. (NOAA, 2003) A 500-year drought with a magnitude similar to that of the 1930s, which destroys the agricultural economy and leads to wildfires, is an example of a high-magnitude event.

Impacts to vegetation and wildlife can include death from dehydration, the spread of invasive species, or disease because of stressed conditions. However, drought is a natural part of the environment in Ohio, and native species are likely to be adapted to surviving periodic drought conditions. It is unlikely that drought would jeopardize the existence of rare species or vegetative communities.

Environmental impacts are more likely at the interface of the human and natural world. The loss of crops or livestock due to drought can have far-reaching economic effects. Wind and water erosion can alter the visual landscape, and dust can damage property. Water-based recreational resources are affected by drought conditions. Indirect impacts from drought include wildfire, which may have additional effects on the landscape and sensitive resources, such as historic or archeological sites.

The following figure depicts the percentage of time that each county within Ohio spends in drought. The northern part of the state spends approximately 10-14% of the time in a drought; Tuscarawas County spends approximately 5 to 9.99% of the time in a drought.

FIGURE 4-33 TUSCARAWAS COUNTY DROUGHT PERCENTAGE



4.8.6 ASSETS EXPOSED TO DROUGHT

Potential Losses

Agriculture: Impacts associated with agriculture, farming, and ranching. Drought-induced agricultural effects include: poor crop quality; income loss for farmers due to reduced crop yields; reduced productivity of cropland (due to wind erosion, long-term loss of organic matter, etc.); insect infestation; plant disease; increased irrigation costs; costs of developing new or supplemental water resources (wells, dams, pipelines); reduced productivity of rangeland; forced reduction of foundation stock; closure/limitation of public lands to grazing; high cost for/unavailability of water for livestock; and range fires.

Water/Energy: Impacts associated with surface or subsurface water supplies (i.e., reservoirs or aquifers), stream levels or stream flow, hydropower generation, or navigation. Drought-induced water/energy impacts include: lower water levels in reservoirs, lakes, and ponds; reduced flow from springs; reduced stream flow; loss of wetlands; estuarine impacts (e.g., changes in salinity levels); increased groundwater depletion, land subsidence, reduced recharge; water quality effects (e.g., salt concentration, increased water temperature, pH, dissolved oxygen, turbidity); revenue shortfalls and/or windfall profits; cost of water transport or transfer; cost of new or supplemental water resource development; loss from impaired navigability of streams, rivers, and canals.

Environment: Impacts associated with wildlife, fisheries, forests, and other fauna. Drought-induced environment impacts include: loss of plants or wildlife biodiversity; loss of trees from urban landscapes, shelterbelts, and wooded conservation areas; reduced or degraded fish and wildlife habitat; lack of feed and drinking water; greater wildlife mortality as animals seek food from farms and producers are less tolerant of the intrusion; disease; increased vulnerability to predation (from species concentrated near water); migration and concentration (loss of wildlife in some areas and too much in others); and increased stress on endangered species.

Fire: Impacts associated with forest and range fires that occur during droughts. The relationship between fires and droughts is very complex. Not all fires are caused by droughts, and serious fires occur when droughts are not taking place.

Social: Impacts associated with the public or the recreation/tourism sector. Drought-induced social impacts include: health-related low-flow problems (cross-connection contamination, diminished sewage flows, increased pollutant concentrations, reduced firefighting capability, etc.); loss of human life (e.g., from heat stress, suicides); public safety from forest and range fires; increased respiratory ailments; increased disease caused by wildlife concentrations; population migrations (rural to urban areas, migrants into the United States); loss of aesthetic values; reduction or modification of recreational activities; losses to manufacturers and sellers of recreational equipment; losses related to curtailed activities (hunting and fishing, bird watching, boating, etc.).

TABLE 4-69 POTENTIAL IMPACTS FROM DROUGHT

Impact	Description
People	Dehydration can occur if water reserves run out.
Infrastructure	Lack of moisture in the ground can cause roadways to crack after long periods. Water reservoirs can dry up.
Economy	Rural areas that rely on crops suffer the most damage economically. Farmers lose large amounts of money during extended drought.
Natural Systems	Vegetation can be severely damaged. Rivers and streams can dry up.
Transportation	Cracks in roads can cause delays or detours.

Drought does not typically have a direct impact on critical facilities or structures. However, possible losses/impacts to critical facilities include the loss of function due to low water supplies. Severe droughts can negatively affect drinking water supplies. If this affects a public water system, shipping in outside water could cost millions of dollars. Private springs/wells could also dry up. Possible losses to infrastructure include the loss of potable water.

Droughts are not likely to affect structures or infrastructure. The prolonged absence of precipitation is more likely to have an impact on agricultural operations than on urban settings. The agricultural program's various project areas in Tuscarawas County may be affected. The county has an estimated $229 million in agriculture products. A 1% loss in crops would equate to $2,290,542, and a 5% loss would be $11,452,705 million.

Community Vulnerability

Droughts evolve slowly, and the population typically has ample time to prepare for their effects. However, if a drought affects the water available for public water systems or individual wells, the compromised availability of clean drinking water would require emergency actions and could overwhelm the local government and financial resources.

Due to the nature of drought, all property in the county is expected to be affected by drought conditions. However, agricultural land throughout the county would be affected the most. No injuries, death, or property damage have been recorded as a result of drought in Tuscarawas County.

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Agriculture is an important economic sector in the county. Crop based industries would be severely affected.
Dover	Typical risk.
New Philadelphia	No specific vulnerabilities to this hazard.

Jurisdiction/Organization	Vulnerability Assessment Response
Uhrichsville	We would be vulnerable to drought, but the drought event would have to be extreme - like a drought that has not occurred yet in the state.
Baltic	We live in a rural area and do depend on agriculture. We do maintain a reservoir.
Barnhill	No specific vulnerabilities to this hazard.
Bolivar	Reservoir ran low a couple of years ago due to lack of precipitation. Switched to metered water system - switching to purchasing water from the County in 2023.
Dennison	Residents use city water through the water district. No agriculture within the village.
Gnadenhutten	This hazard is not a risk to the village.
Midvale	There is no agriculture in the village, and the residents of the village are largely on village water. There is minimal vulnerability to this hazard.
Mineral City	Small village, not applicable to the community.
Newcomerstown	No particular vulnerabilities.
Parral	All homes rely on well water.
Port Washington	We are a very rural community and farming is a huge resource. Everyone in town has their own well. We do not have county water.
Roswell	We do have city water, but approximately 10-12 of the 80 homes in the village are still running off of well water.
Stone Creek	Everyone in town is on a well - no public water. If there were to be a problem with water supply, residents would be affected. However, no significant drought events for approximately 7 years.
Strasburg	No significant issues.
Sugarcreek	Not an issue.
Tuscarawas	The surrounding fields only provide marginal economic benefit to the village.
Zoar	In extreme drought, we have experienced drinking water piping leaks from abnormal settling.
Tuscarawas County Regional Planning and Floodplain Office	We have some communities that rely on one municipal well. Our systems are not connected to provide back up.
Trinity Twin Medical Center	This hazard is not applicable to the stakeholder.

4.8.7 LAND USE AND DEVELOPMENT TRENDS

Society's vulnerability to drought is affected by (among other things) population growth and shifts, urbanization, demographic characteristics, technology, water use trends, government policy, social behavior, and environmental awareness. These factors are continually changing, and society's vulnerability to drought may rise or fall in response to these changes. For example, increasing and shifting populations put more pressure on water and other natural resources.

Future development's greatest impact on drought hazards could be related to ground water resources. New water and sewer systems or significant well and septic sites could use more of the

water available, particularly during periods of drought. Public water systems are monitored, but individual wells and septic systems are not as strictly regulated. Therefore, future development could have an impact on drought vulnerabilities.

Regulatory Environment

The formal regulations that pertain to drought events are negligible.

4.8.8 DROUGHT SUMMARY

Drought is extremely difficult to predict, but drought indicators can be identified and monitored. The county will review and consider several mitigation measures for incorporation into future Plan updates.

- Assessment programs.
- Water supply augmentation and development of new supplies.
- Public awareness and education programs.
- Technical assistance on water conservation.
- Reduction and water conservation programs.
- Emergency response programs.
- Drought contingency plans.

Some of these actions can have long-term impacts, such as developing contingency plans and water conservation and public awareness programs. As Tuscarawas County gains more experience in assessing and responding to drought, future actions will undoubtedly become more timely, effective, and proactive.

9. EARTHQUAKE

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Earthquake	1	0.3	1	0.3	2	0.4	4	0.4	1	0.1	1.5
Low Risk Hazard (1.0 – 1.9)											

4.9.1 EARTHQUAKE DESCRIPTION

Earthquake Characteristics

The term "earthquake" refers to a vibration of the Earth's surface. These can be caused by movement along a fault, a volcanic eruption, or even manmade explosions. The vibration can be violent and cause widespread damage and injury or may be barely felt. Most destructive earthquakes are caused by movements along faults. An earthquake is both the sudden slip on an active earth fault and the resulting shaking and radiated seismic energy caused by the slip (USGS 2009). Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt. The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface. Seismic shaking is typically the greatest cause of damage to structures during earthquakes.

Earthquakes may also cause landslides, particularly during the wet season, in areas of high water or saturated soils. The most likely areas for earthquake-induced landslides correlate to the areas of high landslide potential discussed later in this section.

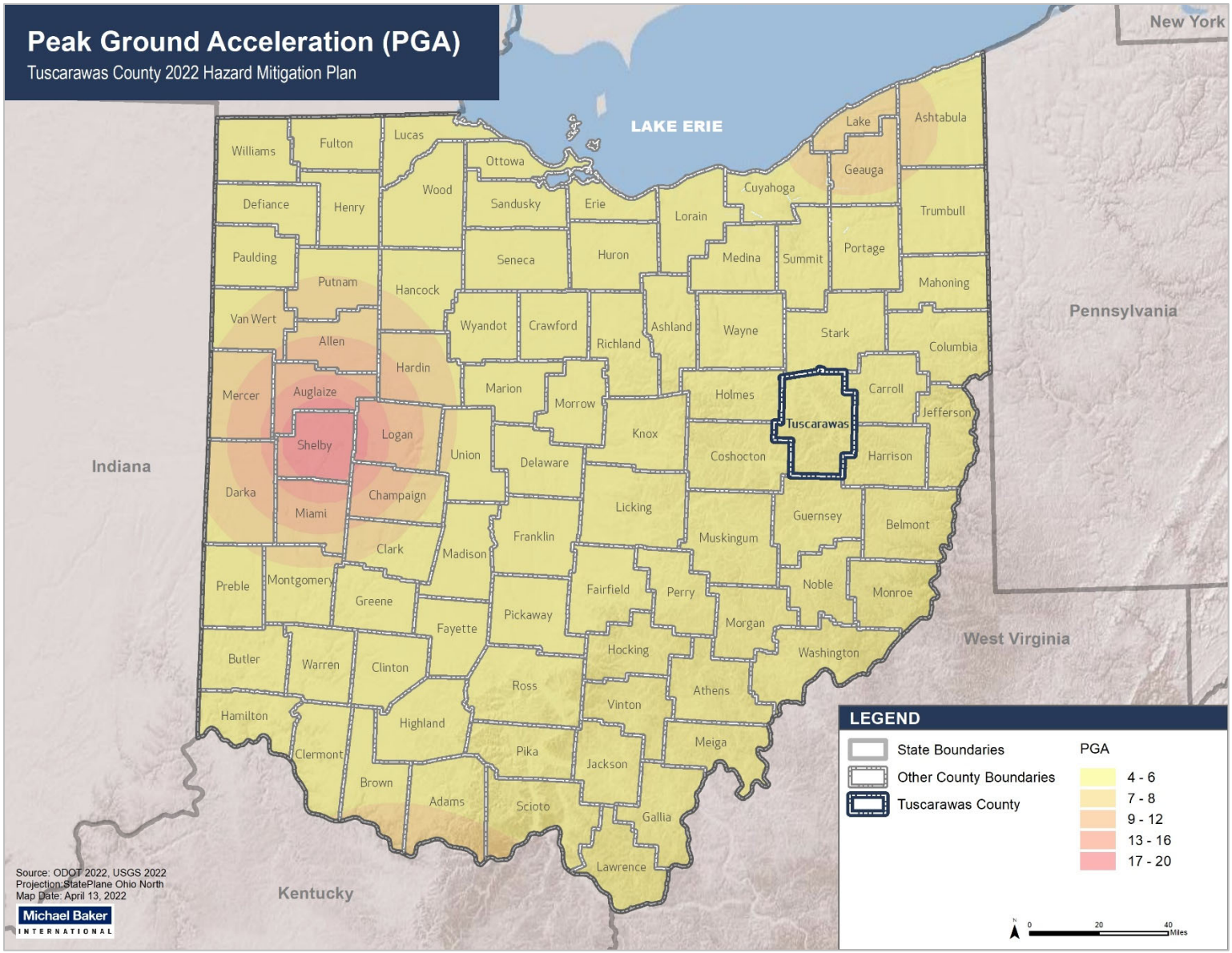
Ohio lies on the outermost boundaries of the New Madrid fault, centered at New Madrid, Missouri. This particular fault has created significant activity over the last 200 years. The most intense activity occurred in 1811 and-1812, when two earthquakes estimated to be 7's on the Richter scale hit the New Madrid Fault.

Ohio has recorded more than 300 earthquakes with a magnitude of 2.0 or greater since 1776. Of these, 15 were reported to have caused noticeable to moderate damage statewide. Two major centers of seismic activity in Ohio are 1) the Anna Seismogenic Area in Shelby and Auglaize counties, and 2) the northeast area of the state on the eastern side of Lake Erie, which is referred to as the Akron Magnetic Boundary. The Anna area has had more than 40 earthquakes, while northeastern Ohio has recorded over 100. None of these were reported to cause major damage or loss of life. Most seismologists predict that the largest magnitude of earthquake that might occur in the western Ohio zone could register between 6.5 and 7.0, while the northeastern zone could generate an earthquake with a magnitude between 6.0 and 6.5. The amount of damage would be difficult to predict, due to the area's lack of historic activity.

The county's lack of noticeable activity can be partly attributed to the Peak Ground Acceleration (PGA). PGA is partly determined by an area's soils and bedrocks. Tuscarawas County's PGA is very low.

According to the Ohio Seismic Network, poorly constructed buildings may be damaged when the peak acceleration nears 0.1g, while acceleration nearing 0.2g would create a loss of balance and greater damage to lesser quality structures. Tuscarawas County has a peak acceleration much below that number and is thus buffered from most seismic activity. The following figure depicts Tuscarawas County's PGA.

FIGURE 4-34 TUSCARAWAS COUNTY PEAK GROUND ACCELERATION



Earthquake Mechanics

Regardless of the source of the earthquake, the associated energy travels in waves radiating outward from the point of release. When these waves travel along the surface, the ground shakes and rolls, fractures form, and water waves may be generated. Earthquakes generally last a matter of seconds, but the waves may travel for long distances and cause damage well after the initial shaking at the point of origin has subsided.

Breaks in the crust associated with seismic activity are known as "faults." They are classified as either active or inactive. Faults may be expressed on the surface by sharp cliffs or scarps or may be buried below surface deposits.

"Foreshocks," minor releases of pressure or slippage, may occur months or minutes before the actual onset of an earthquake. "Aftershocks," which range from minor to major, may occur for months after the main earthquake. In some cases, strong aftershocks may cause significant additional damage, especially if the initial earthquake affected emergency management and response functions or weakened structures.

Factors Contributing to Damage

The damage associated with each earthquake is subject to four primary variables:

- Seismic Activity: The properties of earthquakes vary greatly from event to event. Some seismic activity is localized (a small point of energy release), while other activity is widespread (e.g., a major fault slipping all at once). Earthquakes can be very brief (a few seconds) or last for a minute or more. The depth of release and type of seismic waves also play roles in the nature and location of damage; shallow quakes will hit the area close to the epicenter harder but tend to be felt across a smaller region than deep earthquakes.

- Geology and Soils: The surface geology and soils of an area influence the propagation (conduction) of seismic waves and how strongly the energy is felt. Generally, stable areas (e.g., solid bedrock) experience less destructive shaking than unstable areas (e.g., fill soils). The siting of a community or even individual buildings plays a strong role in the nature and extent of damage from an event.

- Development: A small earthquake in the center of a major city can have far greater consequences than a major event in a thinly populated place.

- Time of Day: The timing of an event controls the distribution of the population of an affected area. On weekdays, the majority of the community will commute between work or school and home. The relative seismic vulnerability of each location can strongly influence the resulting injuries and loss of life.

Types of Damage

- Shaking: In minor events, objects fall from shelves and dishes are rattled. In major events, large structures may be torn apart by the forces of the seismic waves. In all but the largest quakes, structural damage is generally limited to older structures that are poorly maintained, constructed, or designed. Unreinforced masonry buildings and wood frame homes not

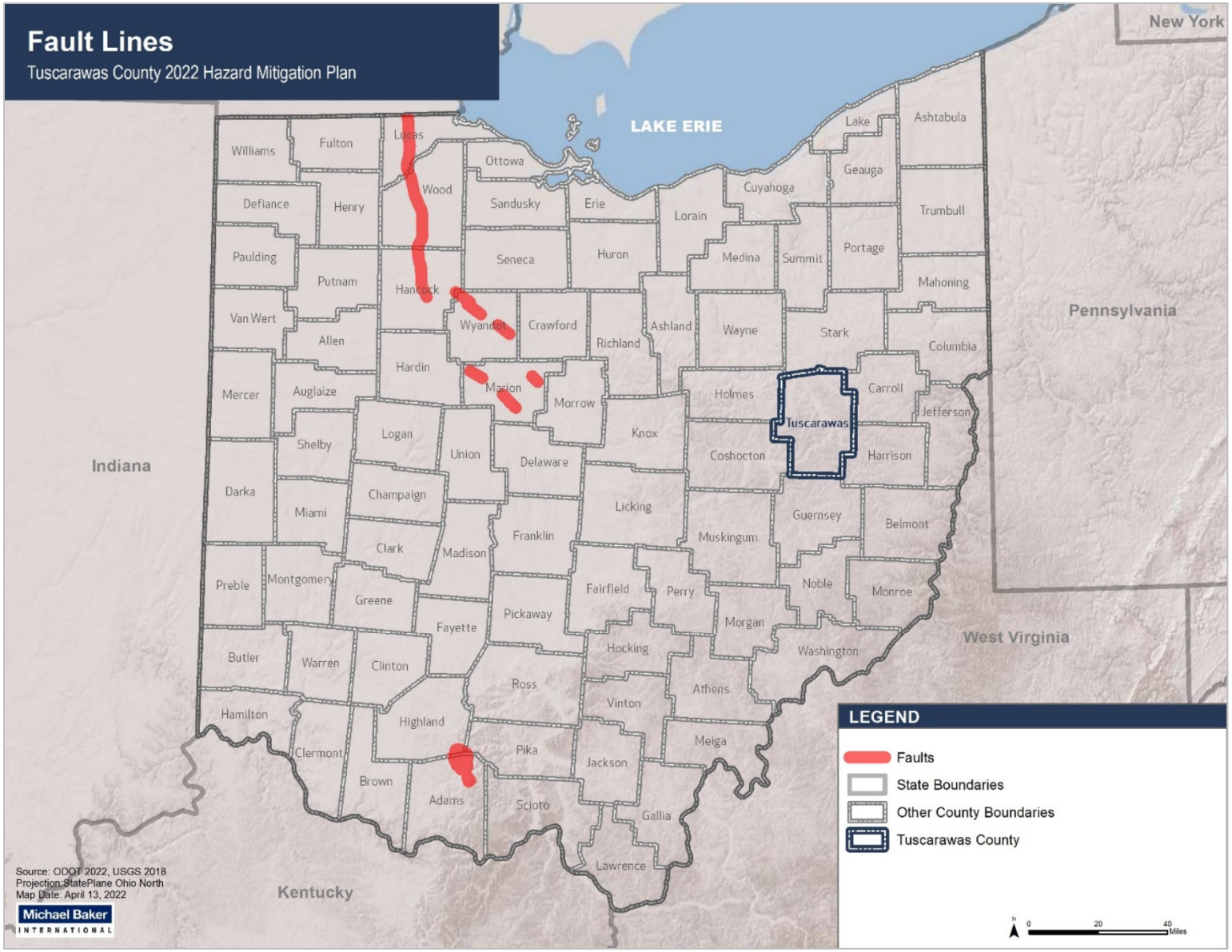
anchored to their foundations are typical victims. Loose or poorly secured objects also pose a significant hazard. These "non-structural falling hazard" objects include bookcases, heavy wall hangings, and building facades. Home water heaters pose a special risk due to their tendency to start fires when they topple over and rupture gas lines. Crumbling chimneys may also be responsible for injuries and property damage. Dam and bridge failures are significant risks during stronger earthquake events, and such failures may result in considerable property damage and loss of life. In areas of severe seismic shaking hazard, Intensity VII or higher can be experienced even on solid bedrock. In these areas, older buildings especially are at significant risk.

- **Ground Displacement:** Often, the most dramatic evidence of an earthquake is ground displacement along a fault line. Utility lines and roads may be disrupted, but direct damage is generally limited. In rare instances displacement may destroy a structure directly on the fault line.
- **Landslides and Avalanches:** Even small earthquake events can cause landslides. Rock falls are common as unstable material on steep slopes is shaken loose, but certain conditions can also generate significant landslides or debris flows. Roads blocked by landslides may hamper response and recovery operations.
- **Liquefaction and Subsidence:** Soils may liquefy and/or subside when impacted by the seismic waves. Fill and previously saturated soils are especially at risk. The failure of the soils can lead to widespread structural damage. It may also result in increased water flow and/or failure of wells as the subsurface flows are disrupted and sometimes permanently altered. Increased flows may be dramatic, with geyser-like waterspouts and/or flash floods. Similarly, damaged septic systems can create both inconvenience and health concerns.

4.9.2 LOCATION

While there are multiple sources of seismic activity in Ohio, the location of seismic activity varies as well. Many earthquakes do occur along faults. Information about faults can be obtained from the Ohio Seismic Network. No fault lines are within the county's border, so it is not possible to designate a specific area or areas as potential earthquake hazard locations. All of Tuscarawas County is at risk.

FIGURE 4-35 FAULT LINES IN THE STATE OF OHIO



4.9.3 EARTHQUAKE EXTENT

The most common method for measuring earthquakes is magnitude, which refers to the strength of the earthquake. Although the Richter Scale is known as a measurement for magnitude, most scientists currently use either the Mw Scale or Modified Mercalli Intensity (MMI) Scale. The effects of an earthquake in a particular location are measured by intensity. The earthquake's intensity decreases with increasing distance from its epicenter.

The magnitude of an earthquake is related to the total area of the fault that ruptured, as well as the amount of offset (displacement) across the fault. As shown in Table 4-49, the seven earthquake magnitude classes range from great to micro. An earthquake with a "great" magnitude could cause tremendous damage to county infrastructure, while a micro class results in only minor damage.

TABLE 4-70 MOMENT MAGNITUDE SCALE

Magnitude Class	Magnitude Range (M = Magnitude)	Probable Damage Description
Micro	M < 3	Minor damage
Minor	3 <= M < 3.9	Rarely causes damage.
Light	4 <= M < 4.9	Moderate damage
Moderate	5 <= M < 5.9	Considerable damage
Strong	6 <= M < 6.9	Severe damage
Major	7 <= M < 7.9	Widespread heavy damage
Great	M > 8	Tremendous damage

The MMI Scale measures earthquake intensity. As Table 4 50 shows, the MMI Scale has 12 intensity levels. Each is defined by a group of observable earthquake effects, such as ground shaking or damage to infrastructure. Levels I through VI describe what people see and feel during a small to moderate earthquake. Levels VII through XII describe damage to infrastructure during a moderate to catastrophic earthquake.

TABLE 4-71 MODIFIED MERCALLI SCALE WITH ASSOCIATED IMPACTS

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
I	**Instrumental**	Usually detected only on seismographs.	<4.2
II	**Feeble**	Felt only by a few persons at rest, especially on upper floors of buildings.	
III	**Slight**	Felt quite noticeably indoors, especially on upper floors. Most people don't recognize it as an earthquake (i.e. a truck rumbling).	

Scale	Intensity	Description of Effects	Corresponding Richter Scale Magnitude
IV	Moderate	Can be felt by people walking; dishes, windows, and doors are disturbed.	
V	Slightly Strong	Sleepers are awoken; unstable objects are overturned.	<4.8
VI	Strong	Trees sway; suspended objects swing; objects fall off shelves; damage is slight.	<5.4
VII	Very Strong	Damage is negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, and considerable in poorly built or badly designed structures; some chimneys are broken.	<6.1
VIII	Destructive	Damage is slight in specially designed structures; considerable in ordinary, substantial buildings. Moving cars become uncontrollable; masonry fractures, poorly constructed buildings damaged.	<6.9
IX	Ruinous	Some houses collapse, ground cracks, pipes break open; damage is considerable in specially designed structures; buildings are shifted off foundations.	
X	Disastrous	Some well-built wooden structures are destroyed; most masonry and frame structures are destroyed along with foundations. Ground cracks profusely; liquefaction and landslides widespread.	<7.3
XI	Very Disastrous	Most buildings and bridges collapse, roads, railways, pipes and cables destroyed.	<8.1
XII	Catastrophic	Total destruction; trees fall; lines of sight and level are distorted; ground rises and falls in waves; objects are thrown upward into the air.	>8.1

As indicated earlier, Ohio has multiple sources and locations of seismic activity. Many earthquakes occur along faults, and information about faults can be obtained from the Ohio Seismic Network.

4.9.4 HISTORICAL OCCURRENCES

Earthquake Events

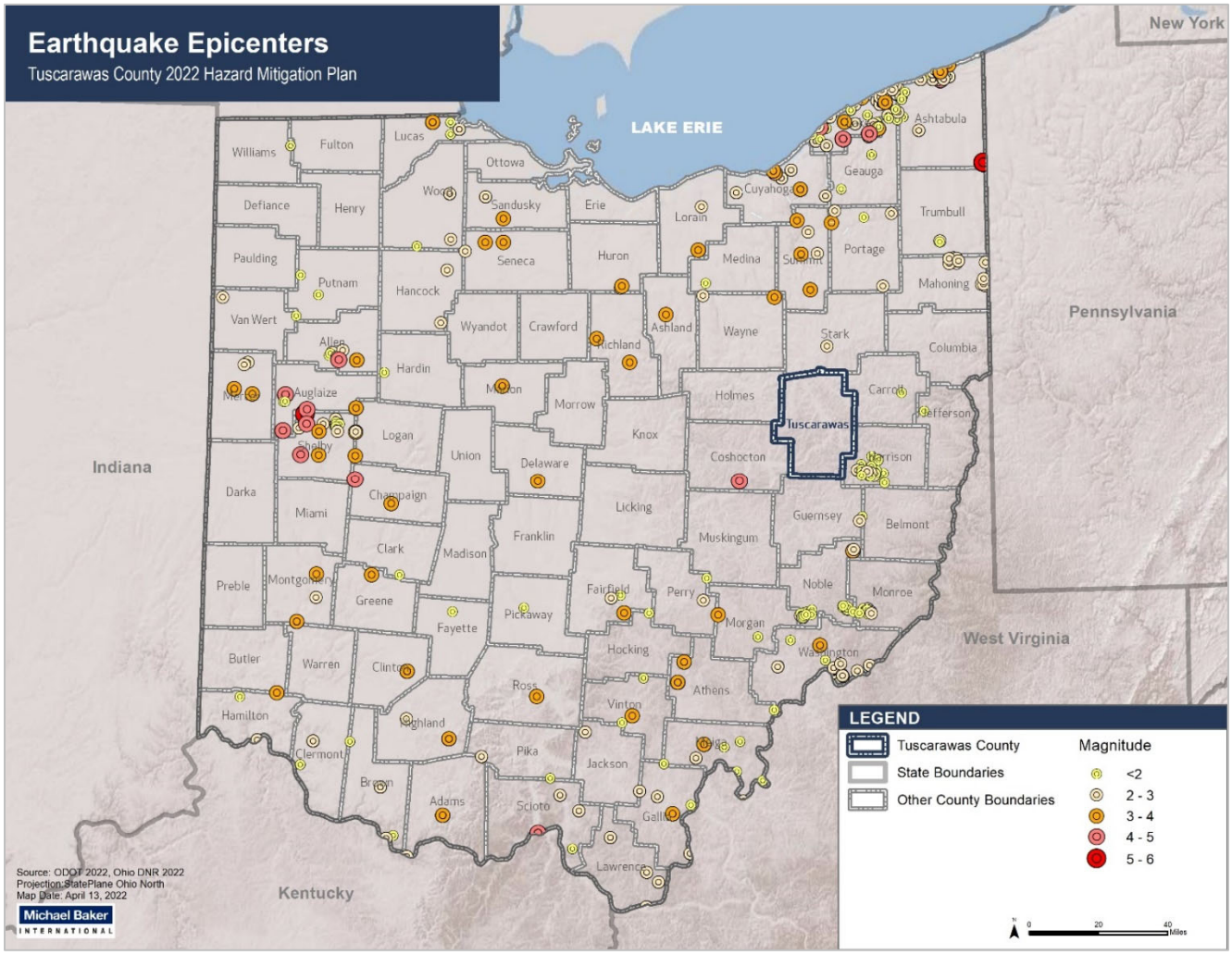
There has been a total of 2 recorded earthquakes in Tuscarawas County, both of which occurred in 2021. The earthquakes in 2021 range in magnitudes 2.2 to 2.55 with Modified Mercalli Intensity NF for both events. The Ohio Department of Natural Resources recorded minor quakes in the adjacent counties of Harrison, Guernsey, and Carroll. The following table displays the data on these earthquakes' data from Tuscarawas County and neighboring counties earthquake events for the timeframe 2001-2021.

TABLE 4-72 RECORDED EARTHQUAKES IN TUSCARAWAS AND SURROUNDING COUNTIES, 2001-2021

Location	Magnitude	Year	MMF
Harrison County	1.6	2013	Null
Harrison County	1.6	2013	Null
Harrison County	2	2013	Null
Harrison County	2	2013	Null
Harrison County	2	2013	Null
Harrison County	1.7	2015	NF
Harrison County	1.7	2015	NF
Harrison County	1.7	2015	NF
Harrison County	1.7	2015	NF
Harrison County	1.7	2015	NF
Harrison County	2.1	2015	NF
Harrison County	2.2	2015	NF
Harrison County	2.8	2015	NF
Harrison County	2.2	2016	NF
Guernsey County	2.3	2016	NF
Harrison County	2.5	2016	NF
Harrison County	2.5	2016	NF
Harrison County	0.8	2019	NF
Harrison County	1	2019	NF
Harrison County	1.1	2019	NF
Harrison County	1.1	2019	NF
Harrison County	1.2	2019	NF
Harrison County	1.3	2019	NF
Harrison County	1.3	2019	NF
Harrison County	1.3	2019	NF
Harrison County	1.3	2019	NF
Harrison County	1.3	2019	NF
Harrison County	2	2019	NF
Harrison County	2	2019	NF
Harrison County	2	2019	NF
Harrison County	2	2019	NF
Harrison County	1.2	2020	NF
Harrison County	1.2	2020	NF
Harrison County	1.2	2020	NF
Harrison County	1.2	2020	NF
Harrison County	1.2	2020	NF
Harrison County	1.7	2020	NF
Harrison County	1.8	2020	NF
Carroll County	2.07	2021	NF
Tuscarawas County	2.2	2021	NF
Carroll County	2.5	2021	F
Tuscarawas County	2.55	2021	NF
Carroll County	2.75	2021	NF

The following figure shows epicenters in the State of Ohio from 1970 – 2021 from Ohio Department of Natural Resources Earthquake Epicenters Database.

FIGURE 4-36 OHIO HISTORIC EARTHQUAKE EPICENTERS



4.9.5 PROBABILITY OF FUTURE OCCURRENCES

Recorded earthquakes over the past 20 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of experiencing earthquakes associated with damages or injury can be difficult to predict. Based on the historical record of 2 earthquake event from 2001 through 2021, it can reasonably be assumed that this type of event will occur once every 10 years, or there is a 10% chance it will occur annually.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (2 Events) = 10 Years Between Events

The Steering Committee, based on their own knowledge, concluded that Earthquake events are "Unlikely" each year. This means that they have a less than 1% chance of happening annually.

4.9.6 ASSETS EXPOSED TO EARTHQUAKES

Potential Losses

TABLE 4-73 POTENTIAL IMPACTS FROM EARTHQUAKES

Impact	Description
People	Injuries may occur from falling objects during an earthquake. Landslides can result in death or injury if unexpected.
Infrastructure	Homes and businesses can suffer cracks to their structure. If they are close to a landslide, they could be potentially destroyed. Underground infrastructure may be split open during an earthquake.
Economy	Localized damaged only.
Natural Systems	Landslides can move large sections of land, killing trees and rerouting rivers.
Transportation	Entire roads can be cracked, uplifted, or otherwise made impassable until repaired. Detours would be needed in the meantime.

Community Vulnerability

Tuscarawas County is at a very low vulnerability to disastrous seismic activity. The nearest major fault, the New Madrid Fault, is hundreds of miles away. The lack of major historical events in the County, along with the relatively low PGA associated with the lands around the area put seismic events very low in the category of probability of occurrence. However, if a severe event were to occur with the County near the epicenter, damages would significant.

Hazus-MH 5.0 Earthquake

Hazus-MH was used to determine the types and numbers of potential assets exposed to earthquake damage. Hazus-MH is a regional multi-hazard loss estimation model developed by FEMA and the National Institute of Building Sciences. This program was conducted at the census block level, and a 5.0 magnitude earthquake was modeled. The results are presented below.

Although a 5.0-magnitude has never occurred within Tuscarawas County, this is the accepted baseline for simulating potential losses due to seismic events. The software takes into account the depth and location of the epicenter. In addition, the program helps determine the potential losses based on the region's prevailing soil types.

The geographical size of the region is 571.30 square miles and contains 21 census tracts. There are over 36 thousand households in the region which has a total population of 92,582 people (2010 Census Bureau data). There are an estimated 41 thousand buildings in the region with a total building replacement value (excluding contents) of 10,491 (millions of dollars). Approximately 89.00 % of the buildings (and 70.00% of the building value) are associated with residential housing. The replacement value of the transportation and utility lifeline systems is estimated to be 2,340 and 4,099 (millions of dollars), respectively.

Hazus breaks critical facilities into two (2) groups: essential facilities and high potential loss facilities (HPL). Essential facilities include hospitals, medical clinics, schools, fire stations, police stations and emergency operations facilities. High potential loss facilities include dams, levees, military installations, nuclear power plants and hazardous material sites.

For essential facilities, there are 6 hospitals in the region with a total bed capacity of 380 beds. There are 147 schools, 20 fire stations, 36 police stations and 1 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 146 hazardous material sites, no military installations and no nuclear power plants.

Within Hazus, the lifeline inventory is divided between transportation and utility lifeline systems. There are seven (7) transportation systems that include highways, railways, light rail, bus, ports, ferry and airports. There are six (6) utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The total value of the lifeline inventory is over 6,439.00 (millions of dollars). This inventory includes over 142.29 miles of highways, 339 bridges, 8,297.79 miles of pipes. The lifeline inventory data are provided in the following tables.

TABLE 4-74 TRANSPORTATION SYSTEM LIFELINE INVENTORY

System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	339	654.7912
	Segments	79	1172.3645
	Tunnels	0	0.0000
	Subtotal		**1827.1557**
Railways	Bridges	54	248.0011
	Facilities	0	0.0000
	Segments	129	211.5319
	Tunnels	0	0.0000
	Subtotal		**459.5330**
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
	Subtotal		**0.0000**
Bus	Facilities	2	2.9392
	Subtotal		**2.9392**
Ferry	Facilities	0	0.0000
	Subtotal		**0.0000**
Port	Facilities	0	0.0000
	Subtotal		**0.0000**
Airport	Facilities	1	4.5926
	Runways	2	46.1236
	Subtotal		**50.7162**
	Total		**2,340.30**

TABLE 4-75 UTILITY SYSTEM LIFELINE INVENTORY

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	163.0585
	Facilities	3	104.8950
	Pipelines	0	0.0000
		Subtotal	**267.9535**
Waste Water	Distribution Lines	NA	97.8351
	Facilities	24	3152.3700
	Pipelines	0	0.0000
		Subtotal	**3250.2051**
Natural Gas	Distribution Lines	NA	65.2234
	Facilities	1	1.6074
	Pipelines	31	194.4503
		Subtotal	**261.2811**
Oil Systems	Facilities	1	0.1050
	Pipelines	0	0.0000
		Subtotal	**0.1050**
Electrical Power	Facilities	2	319.6459
		Subtotal	**319.6459**
Communication	Facilities	7	0.7350
		Subtotal	**0.7350**
		Total	**4,099.90**

Building Damage

Hazus estimates that about 7,473 buildings will be at least moderately damaged. This is over 18.00% of the buildings in the region. An estimated 421 buildings will be damaged beyond repair. Volume 1: Chapter 5 of the Hazus technical manual defines the various states of damage. The following table summarizes the expected damage to buildings in the region by general occupancy. The next table summarizes the expected damage by general building type.

FIGURE 4-37 EXPECTED BUILDING DAMAGE BY OCCUPANCY

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	124.93	0.50	45.06	0.51	47.10	0.88	21.38	1.24	4.54	1.08
Commercial	1234.98	4.97	583.84	6.66	609.43	11.45	275.10	15.93	71.66	16.99
Education	49.05	0.20	21.22	0.24	22.29	0.42	8.92	0.52	2.53	0.60
Government	53.54	0.22	22.08	0.25	23.96	0.45	8.90	0.52	2.52	0.60
Industrial	439.35	1.77	179.15	2.04	204.36	3.84	100.31	5.81	23.84	5.65
Other Residential	2794.57	11.24	1283.47	14.63	1331.45	25.00	502.16	29.08	101.36	24.03
Religion	182.24	0.73	68.07	0.78	57.11	1.07	25.14	1.46	6.44	1.53
Single Family	19986.78	80.38	6569.29	74.89	3029.14	56.89	784.83	45.45	208.96	49.54
Total	**24,865**		**8,772**		**5,325**		**1,727**		**422**	

FIGURE 4-38 EXPECTED BUILDING DAMAGE BY BUILDING TYPE

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	17965.67	72.25	5537.86	63.13	1863.67	35.00	214.09	12.40	15.98	3.79
Steel	565.08	2.27	227.77	2.60	362.78	6.81	215.32	12.47	55.11	13.06
Concrete	175.81	0.71	65.58	0.75	72.88	1.37	31.89	1.85	5.66	1.34
Precast	166.98	0.67	52.76	0.60	80.25	1.51	50.20	2.91	7.51	1.78
RM	74.32	0.30	18.63	0.21	28.23	0.53	16.21	0.94	1.55	0.37
URM	4247.61	17.08	1984.59	22.62	1786.22	33.55	755.16	43.73	249.62	59.17
MH	1669.96	6.72	884.97	10.09	1130.78	21.24	443.88	25.71	86.41	20.48
Total	**24,865**		**8,772**		**5,325**		**1,727**		**422**	

*Note:
RM Reinforced Masonry
URM Unreinforced Masonry
MH Manufactured Housing

Before the earthquake, the region had 380 hospital beds available for use. On the day of the earthquake, the model estimates that only 159 hospital beds (42.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 64.00% of the beds will be back in service. By 30 days, 86.00% will be operational.

TABLE 4-76 EXPECTED DAMAGE TO ESSENTIAL FACILITIES

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	6	0	0	1
Schools	147	16	0	50
EOCs	1	0	0	0
PoliceStations	36	0	0	12
FireStations	20	1	0	10

TABLE 4-77 EXPECTED DAMAGE TO THE TRANSPORTATION SYSTEMS

System	Component		Number of Locations			
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	79	0	0	79	79
	Bridges	339	1	0	338	339
	Tunnels	0	0	0	0	0
Railways	Segments	129	0	0	129	129
	Bridges	54	0	0	54	54
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	2	1	0	2	2
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	1	1	0	1	1
	Runways	2	0	0	2	2

TABLE 4-78 EXPECTED UTILITY SYSTEM FACILITY DAMAGE

System	# of Locations				
	Total #	With at Least Moderate Damage	With Complete Damage	with Functionality > 50 %	
				After Day 1	After Day 7
Potable Water	3	1	0	2	3
Waste Water	24	0	0	0	0
Natural Gas	1	0	0	0	0
Oil Systems	1	0	0	0	0
Electrical Power	2	0	0	0	0
Communication	7	0	0	0	0

TABLE 4-79 EXPECTED UTILITY SYSTEM PIPELINE DAMAGE (SITE SPECIFIC)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	5,066	0	0
Waste Water	3,040	0	0
Natural Gas	193	0	0
Oil	0	0	0

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be 0 ignitions that will burn about 0.00 sq. mi 0.00 % of the region's total area.) The model also estimates that the fires will displace about 0 people and burn about 0 (millions of dollars) of building value.

Debris Generation

Hazus estimates the amount of debris that the earthquake will generated. The model breaks the debris into two general categories: a) brick/wood and b) reinforced concrete/steel. It makes this distinction because different types of material-handling equipment are required to handle the debris.

The model estimates that the earthquake will generate 273,000 tons of debris. Of that total amount, brick/wood comprises 49.00%, and the remainder is reinforced concrete/steel. The tonnage of this debris will require 10,920 truckloads (@25 tons/truck) to remove.

FIGURE 4-39 HAZUS EARTHQUAKE DEBRIS

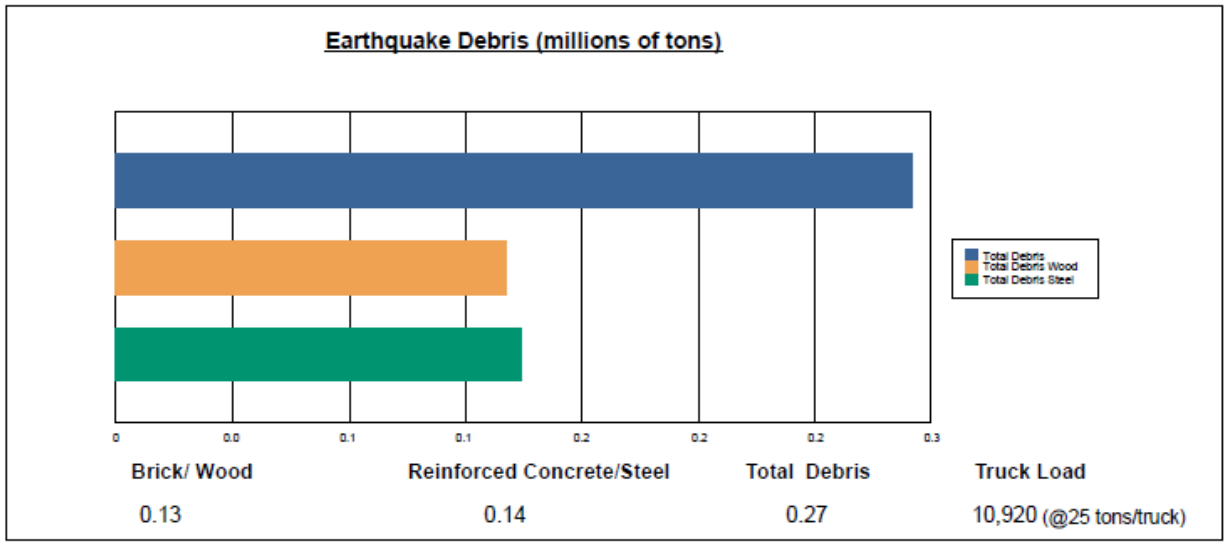
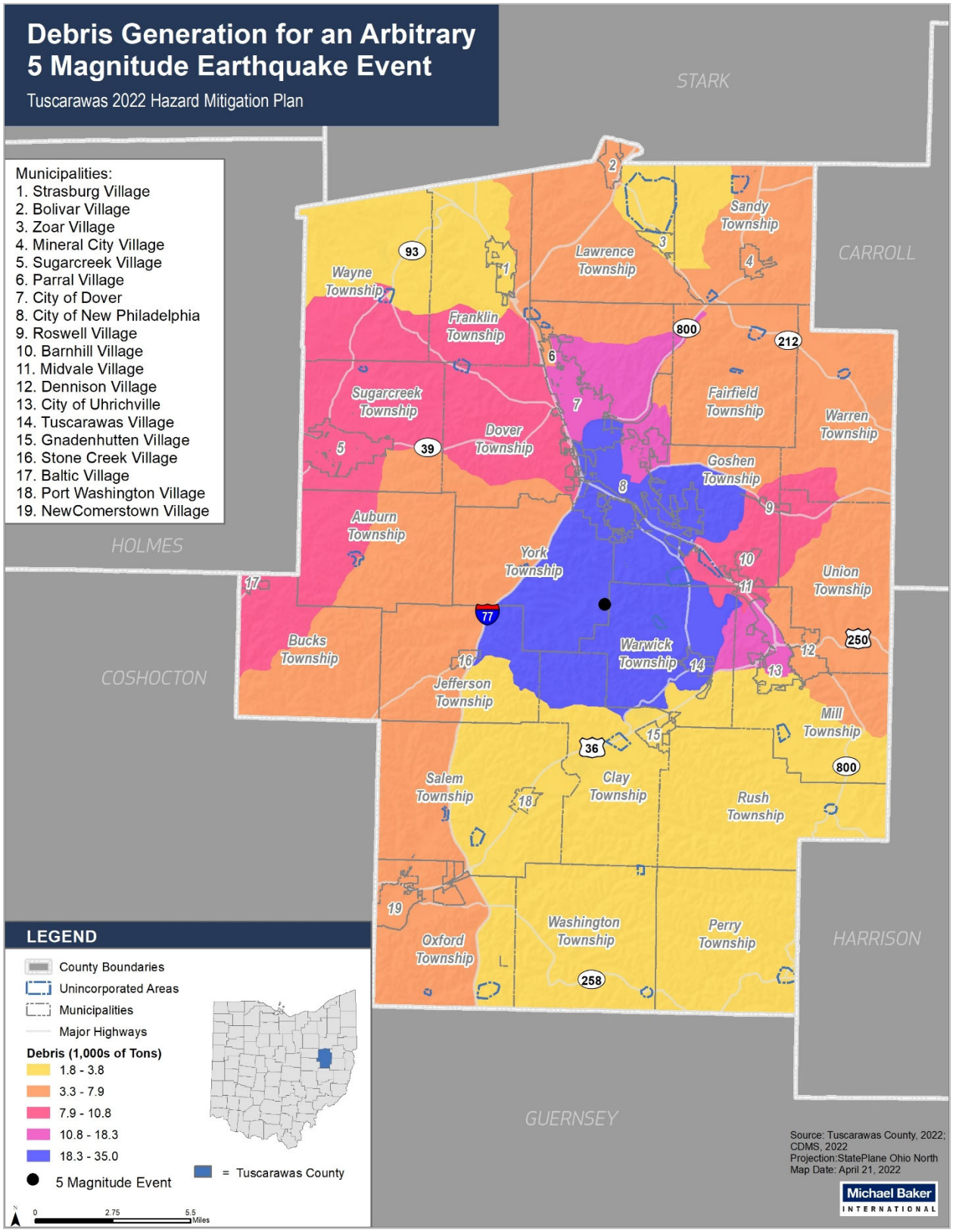


FIGURE 4-40 TUSCARAWAS COUNTY DEBRIS GENERATION



Shelter Requirements

HAZUS estimates the number of households that would be displaced from their homes by the earthquake and the number of displaced people who will require accommodations in temporary public shelters. The model estimates 464 households will be displaced by the earthquake. Of these, 277 people (from a total population of 92,582) will seek temporary shelter in public shelters.

Casualties

Hazus estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows;

- Severity Level 1: Injuries will require medical attention but hospitalization is not needed.
- Severity Level 2: Injuries will require hospitalization but are not considered life-threatening
- Severity Level 3: Injuries will require hospitalization and can become life threatening if not promptly treated.
- Severity Level 4: Victims are killed by the earthquake.

The casualty estimates are provided for three (3) times of day: 2:00 AM, 2:00 PM and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

TABLE 4-80 CASUALTY ESTIMATES

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	2.52	0.56	0.07	0.14
	Commuting	0.00	0.01	0.01	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	5.38	1.19	0.14	0.28
	Other-Residential	49.49	9.68	0.96	1.82
	Single Family	123.11	26.51	3.48	6.81
	Total	**181**	**38**	**5**	**9**
2 PM	Commercial	151.87	33.90	4.29	8.30
	Commuting	0.04	0.06	0.10	0.02
	Educational	57.47	13.49	1.89	3.66
	Hotels	0.00	0.00	0.00	0.00
	Industrial	39.62	8.75	1.06	2.04
	Other-Residential	11.34	2.28	0.24	0.44
	Single Family	28.95	6.44	0.88	1.65
	Total	**289**	**65**	**8**	**16**
5 PM	Commercial	109.49	24.57	3.15	6.00
	Commuting	0.75	1.04	1.70	0.33
	Educational	4.39	1.05	0.15	0.29
	Hotels	0.00	0.00	0.00	0.00
	Industrial	24.76	5.47	0.66	1.27
	Other-Residential	18.70	3.75	0.40	0.73
	Single Family	49.35	10.97	1.50	2.81
	Total	**207**	**47**	**8**	**11**

Economic Loss

The total economic loss estimated for the earthquake is $986.82 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a business because of the damage sustained during the earthquake.

The total building-related losses were $956.61 (millions of dollars); 21% of the estimated losses were related to the business interruption of the region. By far, the largest loss was sustained by the residential occupancies which made up over 47% of the total loss. The following table provides a summary of the losses associated with the building damage.

TABLE 4-81 BUILDING-RELATED ECONOMIC LOSS ESTIMATES

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	2.6470	39.3880	3.0319	2.7152	47.7821
	Capital-Related	0.0000	1.1261	31.9502	1.9479	0.6597	35.6839
	Rental	8.7343	5.9447	16.1698	0.9990	1.1529	33.0007
	Relocation	30.7579	6.2848	28.1214	4.4249	10.3650	79.9540
	Subtotal	**39.4922**	**16.0026**	**115.6294**	**10.4037**	**14.8928**	**196.4207**
Capital Stock Losses							
	Structural	47.9055	11.9545	37.9117	15.8460	12.2861	125.9038
	Non_Structural	186.1688	55.4119	101.5506	47.6810	32.7295	423.5418
	Content	75.1680	16.1137	57.3507	34.3245	18.7964	201.7533
	Inventory	0.0000	0.0000	1.5933	7.1695	0.2244	8.9872
	Subtotal	**309.2423**	**83.4801**	**198.4063**	**105.0210**	**64.0364**	**760.1861**
	Total	**348.73**	**99.48**	**314.04**	**115.42**	**78.93**	**956.61**

For the transportation and utility lifeline systems, Hazus computes the direct repair cost for each component only. There are no losses computed by Hazus for business interruption due to lifeline outages.

TABLE 4-82 TRANSPORTATION SYSTEM ECONOMIC LOSSES

(Millions of dollars)

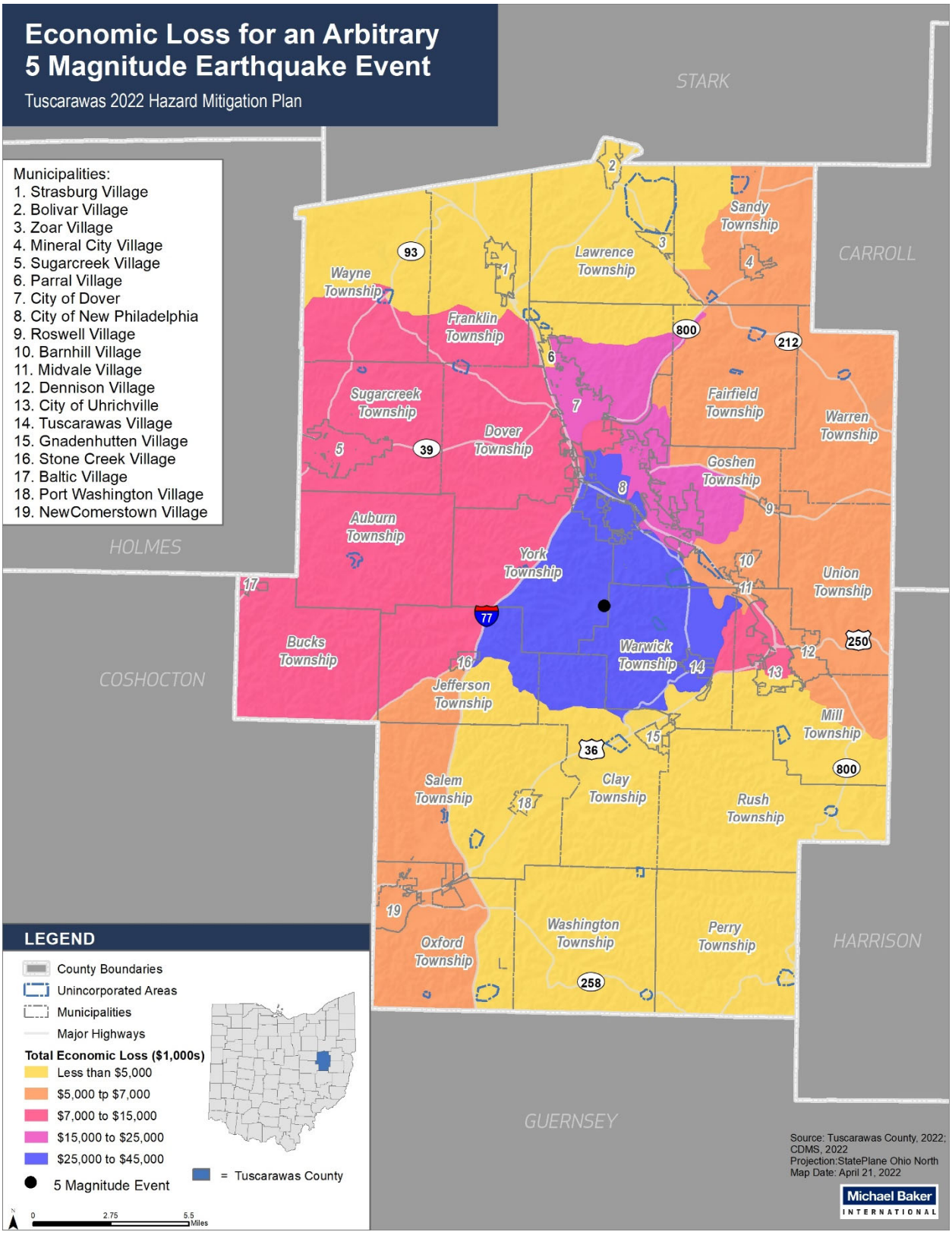
System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	1172.3645	0.0000	0.00
	Bridges	654.7912	8.7277	1.33
	Tunnels	0.0000	0.0000	0.00
	Subtotal	**1827.1557**	**8.7277**	
Railways	Segments	211.5319	0.0000	0.00
	Bridges	248.0011	0.4667	0.19
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**459.5330**	**0.4667**	
Light Rail	Segments	0.0000	0.0000	0.00
	Bridges	0.0000	0.0000	0.00
	Tunnels	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Bus	Facilities	2.9392	0.7723	26.28
	Subtotal	**2.9392**	**0.7723**	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Port	Facilities	0.0000	0.0000	0.00
	Subtotal	**0.0000**	**0.0000**	
Airport	Facilities	4.5926	1.8005	39.20
	Runways	46.1236	0.0000	0.00
	Subtotal	**50.7162**	**1.8005**	
	Total	**2,340.34**	**11.77**	

TABLE 4-83 UTILITY SYSTEM ECONOMIC LOSSES

(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Potable Water	Pipelines	0.0000	0.0000	0.00
	Facilities	104.8950	18.4428	17.58
	Distribution Lines	163.0585	0.0000	0.00
	Subtotal	**267.9535**	**18.4428**	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	3152.3700	0.0000	0.00
	Distribution Lines	97.8351	0.0000	0.00
	Subtotal	**3250.2051**	**0.0000**	
Natural Gas	Pipelines	194.4503	0.0000	0.00
	Facilities	1.6074	0.0000	0.00
	Distribution Lines	65.2234	0.0000	0.00
	Subtotal	**261.2811**	**0.0000**	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.1050	0.0000	0.00
	Subtotal	**0.1050**	**0.0000**	
Electrical Power	Facilities	319.6459	0.0000	0.00
	Subtotal	**319.6459**	**0.0000**	
Communication	Facilities	0.7350	0.0000	0.00
	Subtotal	**0.7350**	**0.0000**	
	Total	**4,099.93**	**18.44**	

FIGURE 4-41 TUSCARAWAS COUNTY TOTAL ECONOMIC LOSS



The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	No specific vulnerabilities to this hazard.
Dover	Downtown area has a number of older buildings built in 1870-1920, would be structural collapse if earthquake were to occur. About 70% of downtown buildings are made of limestone, mortar, soft brick materials.
New Philadelphia	If an earthquake would occur, most likely the city's downtown would be inordinately affected due to the large number of brick building and facades.
Uhrichsville	Nothing built in the city is built to withstand a strong earthquake. Older homes and structures would be severely impacted.
Baltic	Our fire station is old, and we are looking to build a new one.
Barnhill	No vulnerabilities to this hazard at this time.
Bolivar	Not applicable to the village at this time.
Dennison	Main stock of buildings are 75-100 years old, and they are all well-maintained. Earthquake is not a concern to the village at this time.
Gnadenhutten	The Town Hall is an older building, but other municipal buildings are structurally sound.
Midvale	The older structures in the village may sustain heavy damage in event of an earthquake occurring. The businesses in Midvale might sustain light to moderate damage. There are several manufactured homes in the village as well.
Mineral City	High percentage of the houses are older and could not withstand a moderate to extreme earthquake.
Newcomerstown	Our housing infrastructure is quite old. These would not withstand a significant earthquake.
Parral	Our primary building stock is comprised of older homes.
Port Washington	The old Union Hall is a registered historical landmark. The brick and mortar are old and deteriorating.
Roswell	The village is not vulnerable to earthquakes.
Stone Creek	Similar to tornado vulnerability statement - town is comprised of older structures. There is not a significant amount of mobile homes in the area, and new developments must adhere to building code ordinances.
Strasburg	No significant issues.
Sugarcreek	Not an issue.
Tuscarawas	No specific vulnerabilities.
Zoar	This has not been a problem for many years.
Tuscarawas County Regional Planning and Floodplain Office	This is not really an issue at this time.
Trinity Twin City Medical Center	If this impacted us directly, the issue would come from power outages. The infrastructure of the building could also potentially be compromised, possibly needing to evacuate patients.

4.9.7 LAND USE AND DEVELOPMENT TRENDS

Infrastructure in Tuscarawas County, including office buildings, government buildings, and homes, are not built to withstand the effect of a major earthquake. Continued enforcement of the unified construction code should mitigate this vulnerability.

Regulatory Environment

Ohio building codes generally do not focus on construction relative to earthquake loads. Where earthquakes or seismic events are mentioned, it is usually in relation to truss design and anchoring appliances in structures. Because Ohio does not have strong earthquakes, the laws and guidelines pertaining to seismic stress on roads, bridges, or buildings are negligible.

4.9.8 EARTHQUAKE SUMMARY

Most sources in the geology science predict that the largest magnitude earthquake that might occur in Ohio would register no higher than 5. However, some sources state that an earthquake with a magnitude of 6 or higher could be registered in the Anna region. An event of this intensity would likely be felt throughout the county, but since the area has not been the epicenter to an earthquake or seismic event, it is difficult to estimate potential damage.

Man-Made Hazards

10. HAZARDOUS MATERIALS RELEASE/SPILL

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Hazardous Materials Release/Spill	4	1.2	3	0.9	2	0.4	4	0.4	1	0.1	3.0
High Risk Hazard (3.0 – 4.0)											

4.10.1 HAZARDOUS MATERIALS RELEASE/SPILL DESCRIPTION

Traditional Hazardous Materials

A hazardous material release is the contamination of the environment (i.e. air, water, soil) by any material that because of its quantity, concentration, physical characteristics, or chemical characteristics threatens human, animal, or plant health, the environment, or property. Hazardous material spills are usually accidental events that arise from human activities such as the manufacture, transportation, storage, and use of hazardous materials. The consequences of such spills are usually unintended. An accidental or intentional release of hazardous materials could produce a health hazard to those in the area, downwind, and/or downstream with immediate, prolonged, and/or delayed effects. The spread of the material may additionally be defined by weather conditions and topography of the area. A hazardous material release can come from a fixed facility, transportation, or an intentional release such as terrorism.

A hazardous material release may also occur due to a transportation accident. The most likely locations for a transportation-related hazardous material release are along the highways that run through the County. Gas, propane, and other hazardous materials are delivered throughout the area year-round. The need for gas, propane, fertilizers, and other toxic materials in daily life creates a larger risk for a hazardous materials release.

A hazardous materials release in the County may not only contaminate dirt or surface material but potentially contaminate flowing water in ditches, rivers, and small streams. Ground water may also be contaminated, depending on the size of the incident. Other potential concerns for spills/leaks are icy road conditions during winter months, sabotage, and terrorism.

Fixed facilities housing hazardous substances at the County include swimming pools, gas stations, and supply stores containing substances such as fuel, farm chemicals, propane, fuel oil, paint, and small amounts of chlorine.

Hospital Radioactive Isotopes

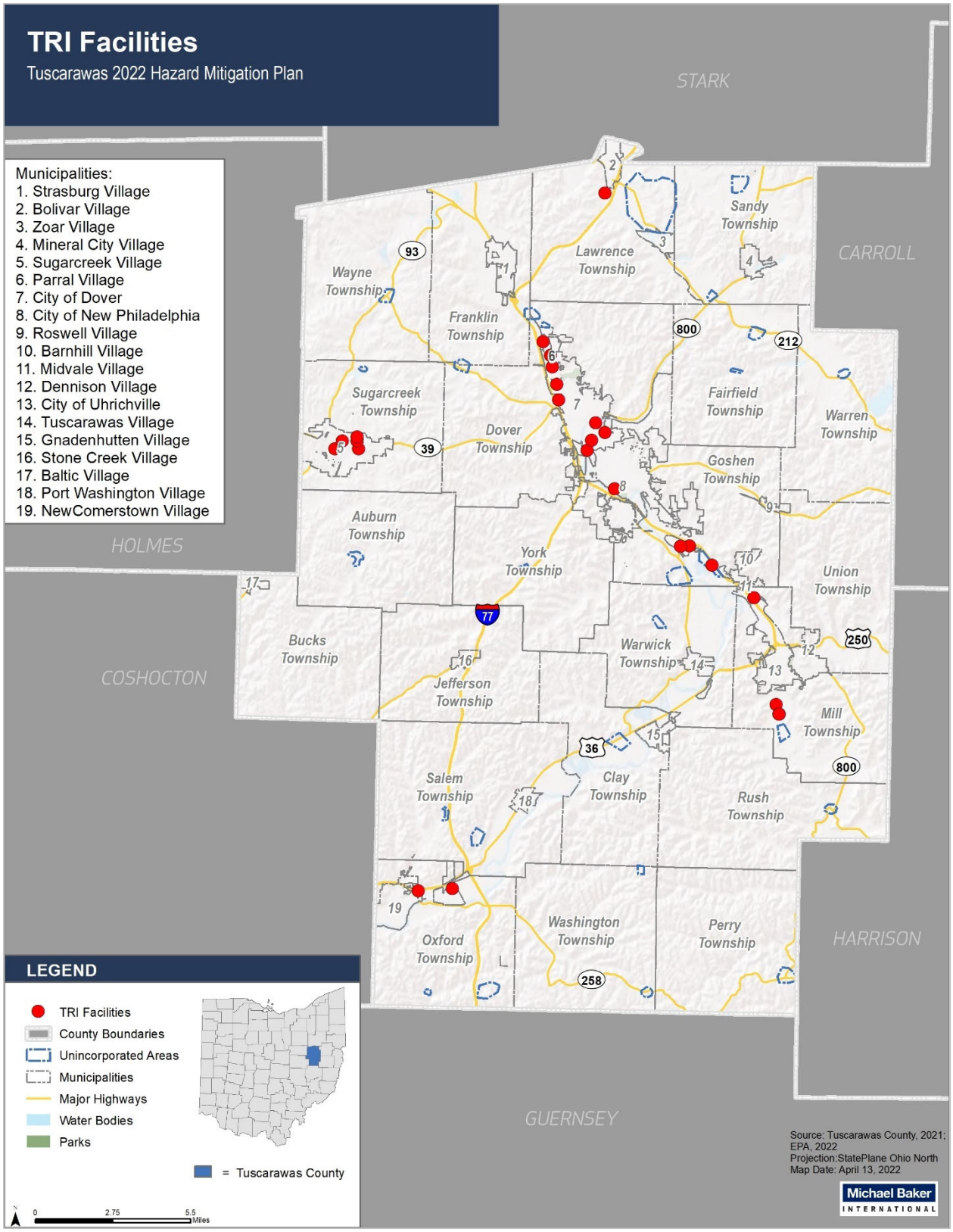
Hospitals are increasingly using radioactive isotopes for diagnostic and therapeutic applications. The bulk of the hospital radioactive waste is commonly generated in the department of Nuclear Medicine. Generally, most of the radioactive waste is liquid. Some lesser amounts of the waste are solid and gaseous. The solid waste containing traces of radioactivity can be in the form of syringes, needles, cotton swabs, vials, contaminated gloves and absorbent materials.

4.10.2 HAZARDOUS MATERIALS RELEASE/SPILL LOCATION

While the initial incident may occur on a roadway, railroad, or in a facility that houses hazardous materials, the hazard could expand to the entire County. Contamination of hazardous materials can spread through the air, soil, and water of surrounding resources thus carrying the toxin throughout the area. There are several major state routes and a major highway that intersect Tuscarawas County. Hazardous Materials incidents can occur on any roadway, railroad, or in a facility, but roadways that see heavier traffic have a higher probability of being a location for an event.

Tuscarawas County has 27 Toxics Release Inventory (TRI) facilities according to the United States Environmental Protection Agency (EPA) website. TRI facilities are industrial and federal facilities that are releasing certain toxic chemicals through the air, water, or land disposal. These facilities' releases are tracked and regulated by the EPA as the chemicals they are releasing may pose a threat to human health and the environment. The toxic chemicals that facilities are required to report when released include chemicals that cause cancer or other chronic human health effects, significant adverse acute human health effects, and significant adverse environmental effects. As these facilities are regulated, thus required to safely release toxic chemicals, they are not considered to be a hazardous materials incident. However, it is still important to identify the locations of where toxic chemicals are being released.

FIGURE 4-42 TRI FACILITIES IN TUSCARAWAS COUNTY

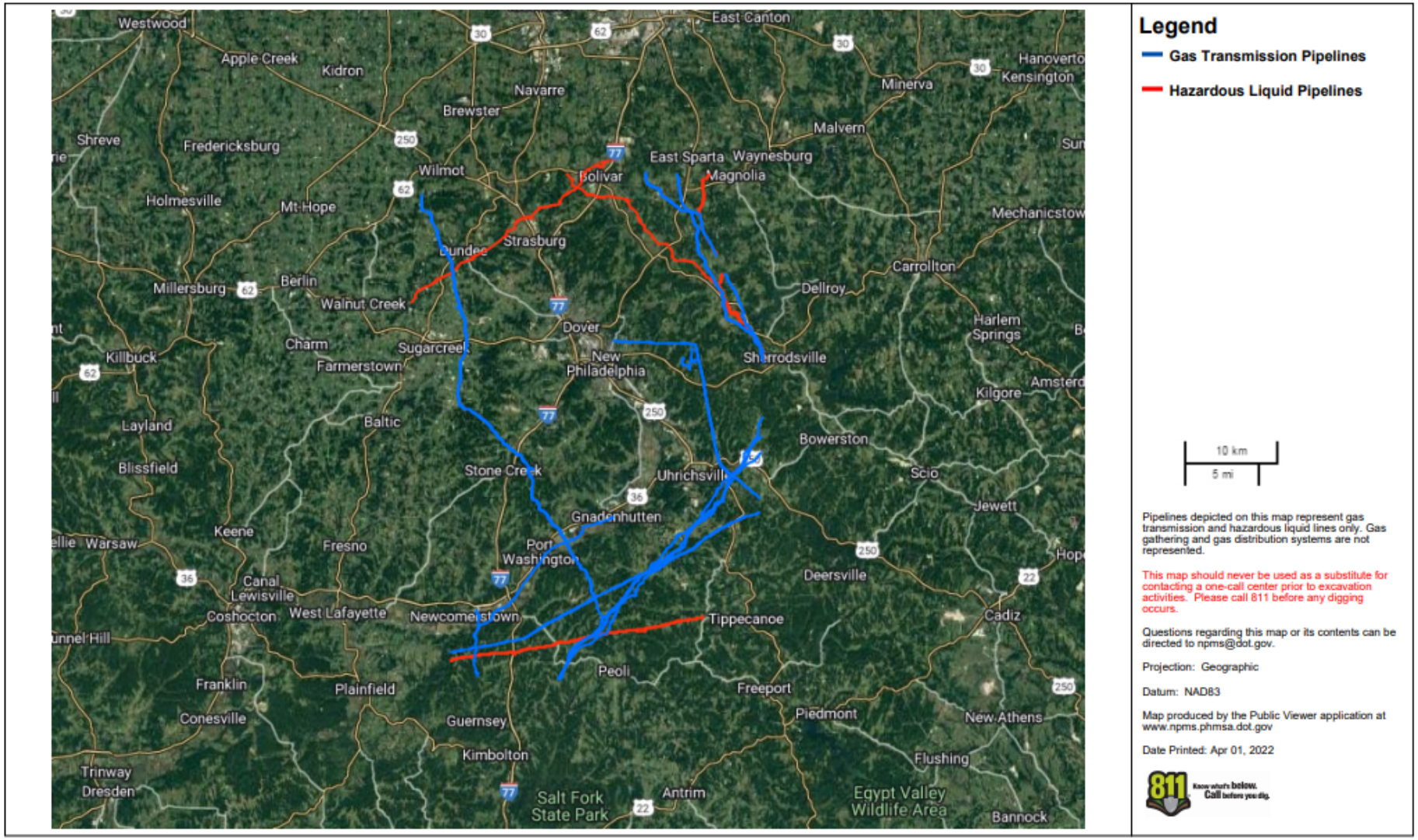


The following figure shows the locations of gas transmission pipelines and hazardous liquid pipelines within Tuscarawas County. The pipelines are possible locations for a hazardous materials incident should the structures fail.

TABLE 4-84 PIPELINES IN TUSCARAWAS COUNTY

Pipeline and Hazardous Materials Safety Administration

NATIONAL PIPELINE MAPPING SYSTEM



4.10.3 EXTENT

With a hazardous material release, whether accidental or intentional, there are several potentially exacerbating or mitigating circumstances that will affect its severity or impact. Mitigating conditions are precautionary measures taken in advance to reduce the impact of a release on the surrounding environment. Primary and secondary containment or shielding by sheltering-in-place protects people and property from the harmful effects of a hazardous material release. Exacerbating conditions, or characteristics that can enhance or magnify the effects of a hazardous material release, include:

- Weather conditions: affects how the hazard occurs and develops
- Micro-meteorological effects of buildings and terrain, alters dispersion of hazardous materials
- Non-compliance with applicable codes (e.g. building or fire codes) and maintenance failures (e.g. fire protection and containment features): can substantially increase the damage to the facility itself and to surrounding buildings

Whether or not a hazardous materials site is contained in the SFHA is also a concern, as there could be larger-scale water contamination during a flood event should the flood compromise the production or storage of hazardous chemicals. Such a situation could swiftly move toxic chemicals throughout a water supply and across great distances.

The severity of a given incident is dependent not only on the circumstances described above, but also with the type of material released and the distance and related response time for emergency response teams. The areas within closest proximity to the releases are generally at greatest risk, yet depending on the agent, a release can travel great distances or remain present in the environment for a long period of time (e.g., centuries to millennia for radioactive materials), resulting in extensive impacts on people and the environment.

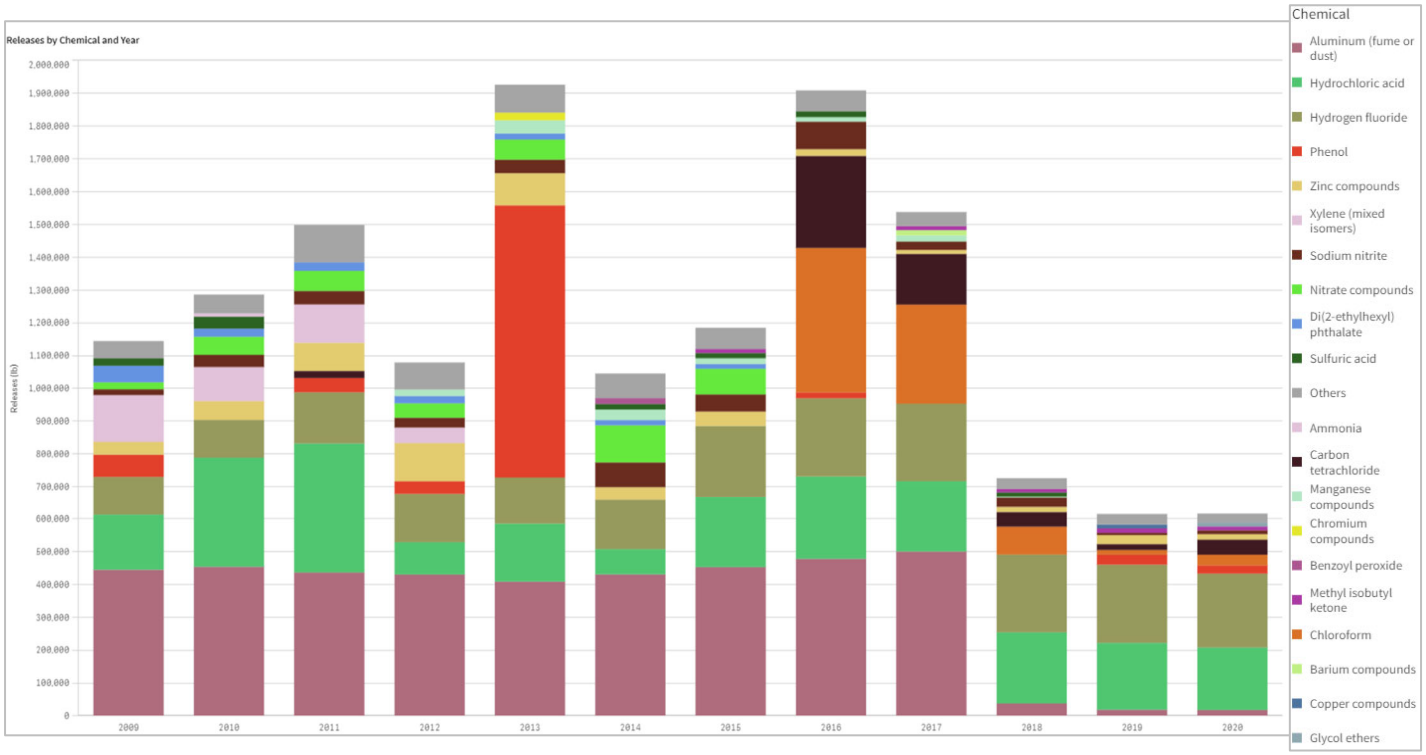
4.10.4 HISTORICAL OCCURRENCES

There are small-scale spills and hazardous materials incidents that occur on a regular basis. These usually consist of mostly innocuous incidents such as traffic accidents that leave gasoline on the roadway. However, large-scale incidents are far rarer and more catastrophic when they occur.

General Trends

From 2009 to 2020, Tuscarawas County TRI facilities have released 14,568,026 pounds of 62 different chemicals into the county's air, land, water, and off-site locations during the twelve-year timeframe. Aluminum (fume or dust) makes up 28.2% of the total releases in the county, followed by hydrochloric acid making up 17.5% of the total releases, and hydrogen fluoride making up 15.3% of the total releases. However, these releases of chemicals are reported to the EPA from the facilities in Tuscarawas County and do not account for hazardous materials spills or accidents.

FIGURE 4-43 TRI FACILITIES RELEASES BY YEAR IN TUSCARAWAS COUNTY



Since 2007, there have been 189 hazardous materials spill events according to the Tuscarawas County Office of Emergency Management and Ohio EPA data. The table below shows the number of events per year from 2012-2021.

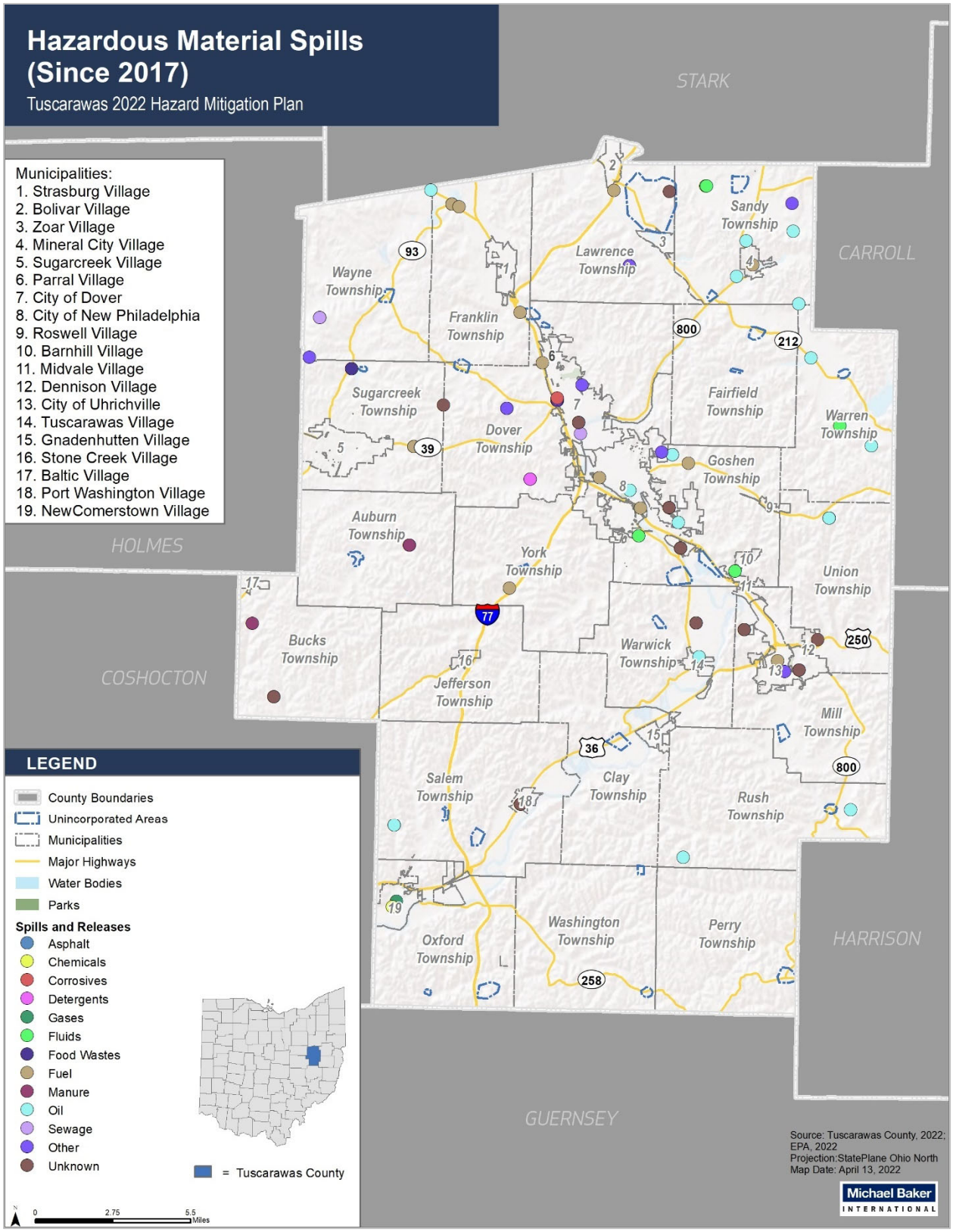
TABLE 4-85 HAZARDOUS MATERIALS SPILLS IN TUSCARAWAS COUNTY

Year	Number of Hazardous Materials Spills Recorded
2007	8
2008	9
2009	5
2010	7
2011	8
2012	14
2013	11
2014	12

Year	Number of Hazardous Materials Spills Recorded
2015	18
2016	6
2017	19
2018	24
2019	23
2020	16
2021	9
Grand Total	**189**

The following figure shows the location of each hazardous material release or spill that has occurred in Tuscarawas County since 2017. The map also includes the type of hazardous material that was released or spilled.

FIGURE 4-44 HAZARDOUS MATERIALS EVENTS IN TUSCARAWAS COUNTY SINCE 2017



4.10.5 PROBABILITY OF FUTURE OCCURRENCES

Hazardous materials incidents happen every day throughout the county. Small-scale incidents will continue to occur as normal operation around the County. Larger incidents will remain seldom but can still occur at any time.

Reported hazardous material release or spill events over the past 14 years provide an acceptable framework for determining the future occurrence in terms of frequency for such events. The probability of experiencing a hazardous material release/spill event, although infrequent, can be difficult to quantify, but based on historical record of 189 events according to the County's data since 2007, it can reasonably be assumed that this type of event has occurred once every 0.07 years from 2007 through 2021.

(2021 CY) - (2007 HY) = 14 Years on Record

(189 Events) / (14 Years) = 13.5 Events Per Year

The historic frequency indicates that there is a 100% chance of this type of event occurring each year. The Steering Committee, based on their own knowledge, concluded that hazardous material release/spill events are "Highly Likely" each year. This means that they have a 100% chance of happening annually.

4.10.6 ASSETS EXPOSED TO HAZARDOUS MATERIALS RELEASE/SPILL

Potential Losses

A hazardous materials release has the possibility of having a significant impact on the County. Most hazardous material releases do not usually have an effect on infrastructure, particularly underground infrastructure. Some critical facilities use hazardous materials to operate such as chlorine for water treatment and PCB's for electric transformers. Similarly, the contamination of the water supply may be treated like a hazardous material release. Propane, oil, and natural gas, necessary fuels for heating, can also be hazardous if released during their delivery due to their explosive potential. Transportation may be limited if a key roadway or railway is blocked by an incident.

- Possible losses to critical facilities include:
  - Critical functional losses
  - Contamination
  - Structural and contents losses, if an explosion is present

  Possible losses to structures include:
  - Inaccessibility
  - Contamination
  - Structural and contents losses, if an explosion is present
- Possible ecologic losses include:
  - Loss of wildlife
  - Habitat damage
  - Reduced air and water quality
- Possible social losses include:

- Canceled activities
- Emotional impacts of significant population losses and illnesses

TABLE 4-86 POTENTIAL IMPACTS FROM HAZMAT INDICENTS

Impact	Description
People	In some hazmat incidents, toxic chemicals can force residents to evacuate. High levels of exposure can result in health complications.
Infrastructure	Significant events can damage structures
Economy	Hazmat incidents are unlikely to cause long-lasting economic damage. Business may be closed as well as losses associated with business disruption.
Natural Systems	Nearby vegetation may die as the result of hazmat spills. Materials that spills into waterways can adversely impact wildlife and other areas downstream.
Transportation	Major highways are the most likely to incur major incidents. If one does occur, major delays and reroutes are possible.

Community Vulnerability

All County assets can be considered at risk from hazardous materials releases. This includes 100 percent of the County population and all buildings and infrastructure. The presence of the major highways that run throughout the County, as well as railways and pipelines, present a high risk of hazardous materials incidents occurring.

The following table shows the structures that are within 1.5 miles of the hazardous materials facilities that are located within Tuscarawas County, including critical facilities. Structures that are located in close proximity to hazardous material facilities are vulnerable to a release or spill incident. New Philadelphia has the highest number of structures located near a hazardous material facility with 8,525 structures. Dover has the second highest number of structures located within 1.5 miles of a hazardous material facility with 6,420 structures, and Uhrichsville has the third highest with 2,692 structures. There are numerous jurisdictions in which 100% of its structures are 1.5 miles away from a hazardous materials facility: Bolivar, Dover, Midvale, Parral, and Sugarcreek. New Philadelphia also has the highest number of its critical facilities located within 1.5 miles of a hazardous material facility with 71 critical facilities. Dover has the second highest number of critical facilities located within 1.5 miles of hazardous material facilities with 42 structures, and Sugarcreek has the third highest number with 22 structures. 59% of the 358 Tuscarawas County critical facilities are located within 1.5 miles of a hazardous material facility.

TABLE 4-87 VULNERABILITY OF STRUCTURES NEAR HAZARDOUS MATERIALS SITES

Municipality	Total Structures	Structures Vulnerable to Hazardous Material Facilities (within 1.5 miles)	Percent Structures Vulnerable to Hazardous Material Facilities (within 1.5 miles)	Total Critical Facilities	Critical Facilities Vulnerable to Hazardous Material Facilities (within 1.5 miles)	Percent Critical Facilities Vulnerable to Hazardous Material Facilities (within 1.5 miles)
Auburn Township	418	0	0%	5	0	0%
Baltic Village	359	0	0%	5	0	0%
Barnhill Village	166	130	78%	1	1	100%
Bolivar Village	440	439	100%	8	8	100%
Bucks Township	489	0	0%	5	0	0%
City of Dover	6,420	6,420	100%	42	42	100%
City of New Philadelphia	9,081	8,525	94%	73	71	97%
City of Uhrichsville	2,692	2,014	75%	16	15	94%
Clay Township	331	0	0%	1	0	0%
Dennison Village	1,273	151	12%	25	0	0%
Dover Township	1,932	1,093	57%	6	2	33%
Fairfield Township	701	0	0%	1	0	0%
Franklin Township	1,044	82	8%	3	0	0%
Gnadenhutten Village	601	0	0%	9	0	0%
Goshen Township	1,730	961	56%	11	9	82%
Jefferson Township	425	0	0%	0	0	0%
Lawrence Township	852	288	34%	1	1	100%
Midvale Village	339	339	100%	2	2	100%
Mill Township	960	502	52%	3	3	100%
Mineral City Village	365	0	0%	4	0	0%
Newcomerstown Village	1,912	1,596	83%	23	20	87%
Oxford Township	552	268	49%	2	1	50%
Parral Village	121	121	100%	0	0	0%
Perry Township	254	0	0%	0	0	0%
Port Washington Village	249	0	0%	4	0	0%
Roswell Village	102	0	0%	1	0	0%

Municipality	Total Structures	Structures Vulnerable to Hazardous Material Facilities (within 1.5 miles)	Percent Structures Vulnerable to Hazardous Material Facilities (within 1.5 miles)	Total Critical Facilities	Critical Facilities Vulnerable to Hazardous Material Facilities (within 1.5 miles)	Percent Critical Facilities Vulnerable to Hazardous Material Facilities (within 1.5 miles)
Rush Township	431	8	2%	4	0	0%
Salem Township	514	37	7%	1	0	0%
Sandy Township	1,004	0	0%	10	0	0%
Stone Creek Village	91	0	0%	2	0	0%
Strasburg Village	1346	0	0%	14	0	0%
Sugarcreek Township	822	354	43%	6	2	33%
Sugarcreek Village	1,292	1,292	100%	22	22	100%
Tuscarawas Village	501	0	0%	5	0	0%
Unincorporated	2,946	1,124	38%	23	11	48%
Union Township	639	18	3%	2	0	0%
Warren Township	666	0	0%	4	0	0%
Warwick Township	769	23	3%	3	0	0%
Washington Township	358	0	0%	1	0	0%
Wayne Township	801	0	0%	2	0	0%
York Township	647	0	0%	5	0	0%
Zoar Village	104	0	0%	3	0	0%
Grand Total	**46,739**	**25,785**	**55%**	**358**	**210**	**59%**

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	Several hazmat producing facilities are located within residential areas. The release from which would immediately result in protective actions being necessary.
Dover	A concern, two chemical plants in the community, a lot of storage in a rail yard of chlorine and a silo of ammonium nitrate. Also have state highways and the haz-mat traffic that comes with larger state roads.
New Philadelphia	US 250 and I-77 run through the city. Thus, the city is at risk for any type of hazardous waste spill in this corridor.
Uhrichsville	There is an increase of hazardous materials incidents traveling through the city by rail that pass by schools and other critical facilities.
Baltic	No known vulnerabilities to this hazard at this time.
Barnhill	No vulnerabilities to this hazard.
Bolivar	Major highway 77, State Route 212. Railway that splits the town (the west)
Dennison	We have a state route and four lane highway that borders the village, but the highway has a clear right-of-way. Our emergency personnel are well-trained for a hazmat incident. We have a railroad that runs through the village; trains often carry trash to landfills or natural resources that are extracted from the area.
Gnadenhutten	There are homes that are right next to the rail line. There is not an indication of what these lines carry.
Midvale	State Route 250; there is also a railway that dissects the village - both the roadway and railway can have hazardous materials traveling through the village.
Mineral City	No railroads or hazardous material industry. There is a main road (State Route 800) that trucks could be traveling on with hazardous materials.
Newcomerstown	A railroad goes through the middle of town. An industrial park where we have caustic chemicals (31 Incorporated). There is a hydrochloric acid transfer station.
Parral	I-77 and a railroad to the west. A hazmat incident was played out. A train derailed that was carrying hazmat materials.
Port Washington	There is a rail line that runs through town.
Roswell	We do not have any major roadways that runs through the village or any railways that dissect the village.
Stone Creek	We have an interstate in our protection area but have not had a has mat problem in the past 5 years. State Route 751 goes directly through the town with semis/tankers hauling hazardous materials. No industrial sites that could affect the village.

Jurisdiction/Organization	Vulnerability Assessment Response
Strasburg	The east side of Wooster Ave has many homes next to the railway. A major derailment or spillage would result in a large issue trying to get residents to safety.
Sugarcreek	Not an issue.
Tuscarawas	State Route 416 cuts through the center of the village.
Zoar	Some concern as the number of oil and gas tank trucks that come through town on SR 212 has increased over the past several years.
Tuscarawas County Regional Planning and Floodplain Office	We are bisected by I-77 that has haulers of hazardous waste. We have chemical plants close to residential areas.
Trinity Twin City Medical Center	Air quality of major incidents. Significant oil and gas traffic nearby.

4.10.7 LAND USE & DEVELOPMENT TRENDS

The population impacts are often greater than the structural impacts during a hazardous material release. Depending on the material, the health impacts to humans can be long and short term. Generally, an incident will affect only a subset of the total population at risk. In a hazardous materials release, those in the immediate isolation area would have little to no warning, whereas, the population further away in the dispersion path may have some time to evacuate, depending on the weather conditions, material released, and public notification.

Regulatory Environment

Extensive regulations are in place, set forth by both the State of Ohio and the United States government on the handling and transport of hazardous materials. Newer hazards, such as those introduced through fracking, also have many regulations pertaining to their safety and use.

The US EPA's Toxic Release Inventory (TRI) program tracks hazardous materials release and disposal data for communities throughout the nation. Disposals in Tuscarawas County largely include hydrogen fluoride, hydrochloric acid, aluminum (fume or dust), chloroform, phenol, and others. The TRI data also provides data regarding the effect on the public of releases or disposals of hazardous materials.

4.10.8 HAZARDOUS MATERIALS RELEASE/SPILL SUMMARY

Hazardous materials incidents can pose a series of threats to human safety and welfare, as well as the environment. Incidents occur regularly but are not often of a size to cause a significant countywide threat. However, it seems likely that incidents will continue and the potential for a significant release is present. Incidents often occur in conjunction with, or as a result of, natural hazards impacting facilities that house hazardous materials. Depending upon the materials released, as well as atmospheric conditions, an incident has the potential to cause significant disruption to the County.

Mitigation Best Practices

FEMA has published a series of prevention and mitigation measures that is geared toward residents and households on what they can do to help reduce the number of hazardous materials incidents, or

the severity of these events. These can be used in educational materials distributed by the County or its jurisdictions and are a good way of preventing smaller scale incidents.

Prevention

- Use all materials in accordance with their instructions.
- Store pesticides and other hazardous chemicals in safe places where children and animals cannot be exposed. Storage areas must guard against freezing and overheating of hazardous materials. They should also have separate locks.
- Store chemicals on the floor or on lower shelves to prevent spills. Lips are recommended for all shelving upon which hazardous materials are stored.
- Properly dispose of any unsafe or excess materials and containers.

Protection Actions

- Ask your local fire department or emergency management agency for information on hazardous materials in your community.
- Find out what clinical signs these toxins may cause if a person or an animal has been exposed.
- Take a training course in hazardous materials.
- FEMA may provide resource information and technical and financial assistance to States for developing emergency plans for hazardous materials accidents and other types of emergencies, and assist State and local governments in hazardous materials training.
- The Environmental Protection Agency (EPA) also conducts technical and environmental training programs related to hazardous materials. At the request of community officials, the EPA can provide technical expertise on the full range of environmental contamination issues.

Mitigation Measures

- Install and label sinks and eye wash stations.
- Store appropriate absorbent materials near hazardous materials in the event of a spill.
- Post warning signs on storage areas.
- Post and review Material Safety Data Sheets (MSDS) for commonly used chemicals.

The full guide can be found at https://emilms.fema.gov/is10a/AID0107030text.htm

11. TERRORISM

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Terrorism/CBNRE Incident	1	0.3	3	0.9	2	0.4	4	0.4	3	0.3	2.3
Moderate Risk Hazard (2.0 – 2.9)											

4.11.1 TERRORISM DESCRIPTION

The term "terrorism" refers to intentional, criminal, malicious acts, but the functional definition of terrorism can be interpreted in many ways. Officially, terrorism is defined in the Code of Federal Regulations as "…the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives" (28 CFR §0.85). Terrorists use threats to create fear, to try to convince citizens of the powerlessness of their government, and/or to get publicity for their cause.

Terrorist attacks can take many forms, including agriterrorism, arson/incendiary attack, armed attack, assassination, biological agent, chemical agent, cyberterrorism, conventional bomb, hijackings, intentional hazardous material release, kidnapping, nuclear bomb and radiological agent (FEMA April 2009). Explosives have been the traditional method of conducting terrorism, but intelligence suggests that the possibility of biological or chemical terrorism is increasing. The severity of terrorist incidents depends upon the method of attack, the proximity of the attack to people, animals, or other assets and the duration of exposure to the incident or attack device. For example, chemical agents are poisonous gases, liquids or solids that have toxic effects on people, animals, or plants. Many chemical agents can cause serious injuries or death. In this case, severity of injuries depends on the type and amount of the chemical agent used and the duration of exposure.

Biological agents are organisms or toxins that have illness-producing effects on people, livestock and crops. Some biological agents cannot be easily detected and may take time to develop. Therefore, it can be difficult to know that a biological attack has occurred until victims display symptoms. In other cases, the effects are immediate. Those affected by a biological agent require the immediate attention of professional medical personnel. Some agents are contagious which may result in the need for victims to be quarantined.

Terrorism using **explosive** and incendiary devices includes bombs and any other technique that creates an explosive, destructive effect. Bombs can take many forms from a car bomb to a mail bomb. They can be remotely detonated using a variety of devices or directly detonated in the case of a suicide bomb.

Radiological terrorism involves the use of radiological dispersal devices or nuclear facilities to attack the population. Exposure to radiation can cause radiation sickness, long-term illness, and even death. Terrorism experts fear the use of explosive and radiological devices in the form of a "dirty bomb" to attack the population. A "dirty bomb" is a low-tech, easily assembled and transported device made up of simple explosives combined with a suitable radioactive agent.

In recent years, **cyber terrorism** has become a larger threat than in years past. Cyber terrorism can be defined as activities intended to damage or disrupt vital computer systems. These acts can range from taking control of a host website to using networked resources to directly cause destruction and harm. Protection of databases and infrastructure appear to be the main goals at this point in time. Cyber terrorists can be difficult to identify because the internet provides a meeting place for individuals from various parts of the world. Individuals or groups planning a cyber-attack are not organized in a traditional manner, as they are able to effectively communicate over long distances without delay. They have been known to overtake websites and alter the content that is presented to the public. The largest threat to institutions from cyber terrorism comes from any processes that are networked and controlled via computer. Any vulnerability that could allow access to sensitive data or processes should be addressed, and any possible measures taken to harden those resources to attack.

In recent years, as **drones** have become more available to the public and prevalent in society; they pose a growing risk. These small, remote-controlled objects are becoming a tool for criminals and terrorists. Of specific worry to law enforcement is that these small aircraft are difficult to detect and stop. Recently, drones have been used to smuggle drugs and contraband. Another concern is that these drones could be modified to mount attacks with explosives or chemical weapons. Most small drones remain limited by short battery life and small payload capacity. The most popular consumer drones can carry just a few pounds. But some of the features that have made the devices increasingly attractive for businesses and photographers—that they are small, easy to fly and can capture high-definition images—also make them a potentially powerful tool for criminals and terrorists.

NOAA Alerts

When notified by a government official, the NWS has the ability to send alert messages through the Emergency Alert System and over NOAA Weather Radio. Examples include the following:

Local Area Emergency Message: This message defines an event that by itself does not pose a significant threat to public safety and/or property, but the event could escalate, contribute to other more serious events, or disrupt critical public safety services. Instructions, other than public protective actions, may be provided by authorized officials. Examples of when this message may be used include utility disruptions, road closures, or a potential terrorist threat where the public is asked to remain alert.

- Civil Emergency Message: This message outlines a significant threat or threats to public safety and/or property that is imminent or in progress. The hazard is usually less specific or severe than those requiring a Civil Danger Warning.
- Law Enforcement Warning: This warning is issued for a bomb explosion, riot, or other criminal event. An authorized law enforcement agency may block roads, waterways, or facilities, evacuate or deny access to affected areas, and arrest violators or suspicious persons.

- Radiological Hazard Warning: This warning warns of the loss, discovery, or release of a radiological hazard such as the theft of a radiological isotope used for medical, seismic, or other purposes, discovery of radioactive materials, or a transportation accident involving nuclear weapons, nuclear fuel, or radioactive wastes. Authorized officials may recommend protective actions be taken if a radioactive hazard is discovered.
- Civil Danger Warning: This warning is issued when an event presents a danger to a significant civilian population. The message usually warns of a specific hazard and outlines specific protective actions such as evacuation or shelter in place.
- Shelter-in-Place Warning: This warning is issued when the public is recommended to shelter in place (go inside, close doors and windows, turn off air conditioning or heating systems, and turn on the radio or TV for more information). Examples include hazardous material releases or radioactive fallout.

4.11.2 TERRORISM LOCATION

Due to the nature of the hazard, it is impossible to predict where a terrorist attack will take place. Generally, terrorist tend to target areas with large populations, gatherings, or infrastructure that will cause as much destruction as possible. Possible targets for such events include, but are no means limited to, the County's car and rail infrastructure, the multiple health facilities located within the County, any of the local school districts, and any events that draw large crowds.

4.11.3 EXTENT

Events classified as terrorism have been shown to impact as few as one person to tens of thousands. One of the inherent risks of terrorism is the unpredictability. Terrorism events impact not only those who are directly killed or injured, but also those around them through psychological trauma afterward. Terrorists are not always easily identified, and events can be unpredictable.

Terrorism attacks can occur extremely quickly, with some events lasting just a few minutes from beginning to end.

4.11.4 HISTORICAL OCCURRENCES

There have been no terrorist attacks on Tuscarawas County to date. However, incidents throughout the country have occurred in locations Tuscarawas County. Nationally, terrorism continues to be an issue of significant importance.

May 2003: A series of over 24 sniper attacks concentrated along the Cap-City Beltway I-270 in the Columbus Metropolitan Area caused widespread fear across Ohio and left one dead.

July 20, 2012: In Aurora, Colorado, during the midnight screening of The Dark Knight Rises, a gunman dressed in tactical clothing, set off tear gas grenades and shot into the audience with multiple firearms. Twelve people were killed, and seventy others were injured.

December 2, 2015: In San Bernardino, CA a planned shooting occurred at the Inland Regional Center which resulted in 16 deaths and 23 casualties. A shootout occurred between the suspects, ultimately leading to their deaths.

June 12, 2016: A 29-year old man armed with an automatic assault rifle, walked into the LGBTQI+ Pulse nightclub in Orlando, Florida, killing 49 people and injuring 53 more. The man swore allegiance to the leader of the Islamic State of Iraq and the Levant. It has been marked as the deadliest terror attack since the 9/11 attacks in 2001 in the United States.

August 4, 2019: A gunman entered a bar in the Oregon Historic District in Dayton, Ohio. At around 1 AM, he opened fire on the bar, killing 10 and injuring 27 others. The gunman was shot dead by responding police. The incident was then investigated by the FBI as Domestic Terrorism.

4.11.5 PROBABILITY OF FUTURE OCCURRENCES

There is not enough historical precedence to determine frequency or future probability of terrorism or threatened terroristic events. The Steering Committee determined that it is "Unlikely" that a Terrorism Incident will occur in Tuscarawas County, meaning that there is less than 1% chance of an event occurring.

Since the probability of terrorism occurring cannot be quantified in the same way as that of many natural hazards, it is not possible to assess vulnerability in terms of likelihood of occurrence. Instead, vulnerability is assessed in terms of specific assets. By identifying potentially at-risk terrorist targets, planning efforts can be put in place to reduce the risk of attack. FEMA's Integrating Manmade Hazards into Mitigation Planning (2003) encourages site-specific assessments that should be based on the relative importance of a particular site to the surrounding community or population, threats that are known to exist and vulnerabilities including:

- Inherent vulnerability:
    - Visibility – How aware is the public of the existence of the facility?
    - Utility – How valuable might the place be in meeting the objectives of a potential terrorist?
    - Accessibility – How accessible is the place to the public?
    - Asset mobility – Is the asset's location fixed or mobile?
    - Presence of hazardous materials – Are flammable, explosive, biological, chemical and/or radiological materials present on site? If so, are they well secured?
    - Potential for collateral damage – What are the potential consequences for the surrounding area if the asset is attacked or damaged?
    - Occupancy – What is the potential for mass casualties based on the maximum number of individuals on site at a given time?
- Tactical vulnerability:

  Site Perimeter
    - Site planning and Landscape Design – Is the facility designed with security in mind – both site-specific and with regard to adjacent land uses?

- Parking Security – Are vehicle access and parking managed in a way that separates vehicles and structures?

Building Envelope

- Structural Engineering – Is the building's envelope designed to be blast-resistant? Does it provide collective protection against chemical, biological and radiological contaminants?

Facility Interior

- Architectural and Interior Space Planning – Does security screening cover all public and private areas?
- Mechanical Engineering – Are utilities and Heating, Ventilating and Air Conditioning (HVAC) systems protected and/or backed up with redundant systems?
- Electrical Engineering – Are emergency power and telecommunications available? Are alarm systems operational? Is lighting sufficient?
- Fire Protection Engineering – Are the building's water supply and fire suppression systems adequate, code-compliant and protected? Are on-site personnel trained appropriately? Are local first responders aware of the nature of the operations at the facility?
- Electronic and Organized Security – Are systems and personnel in place to monitor and protect the facility?

4.11.6 ASSETS EXPOSED TO TERRORISM

Potential Losses

TABLE 4-88 POTENTIAL IMPACTS OF TERRORISM

Impact	Description
People	People can be killed or severely injured in terrorism attacks. Psychological scarring is also extremely likely after the events for those who survive.
Infrastructure	Infrastructure can be damaged or destroyed in an attack
Economy	The economy can be impacted and can slow after terrorism events
Natural Systems	Depending on the location of an attack, some natural systems can be damaged, particularly if the event is related to ecoterrorism. It is also possible for drinking water supplies to be damaged if they are the target.
Transportation	Transportation systems may be severely disrupted during an event. Transportation can be shut down for multiple hours as situations are contained.

Community Vulnerability

Due to its unpredictable nature, all County assets, including all structures and all population, can be considered at risk for terrorism. Public facilities such as government buildings, sports venues, and dams can be considered as higher-potential potential targets for terrorism since these are highly important and can cause severe disruption if their operations are interrupted due to terrorist threats or activity.

4.11.7 LAND USE & DEVELOPMENT TRENDS

Land use and development are not directly tied to the prevention or discouragement of terrorism. However, structures can be designed with safety devices meant to protect the populations inside. Precautionary devices such as two-way fire alarm panels, security cameras, and alarm boxes are currently in use throughout the country.

Regulatory Environment

Terrorism, by definition, is an act that is against the law. The regulatory environment tied to terrorism falls under law enforcement jurisdiction. Terrorism is investigated by the Federal Bureau of Investigations.

4.11.8 TERRORISM SUMMARY

One of the primary attributes of terrorism is its unexpected nature. This makes planning for potential attacks virtually impossible. The key to terrorism mitigation lies in the planning phase and understanding the potential vulnerability of a specific area.

12. MINE SUBSIDENCE/ABANDONDED WELLS

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Mine Subsidence/Abandoned Wells	2	0.6	1	0.3	1	0.2	3	0.3	2	0.2	1.6
Low Risk Hazard (1.0 – 1.9)											

4.12.1 MINE SUBSIDENCE/ABANDONDED WELLS DESCRIPTION

Subsidence can occur as a result of underground mining, excessive pumping of groundwater from wells, or subsurface erosion due to the failure of existing utility lines. As the supports of the mines fail over time, the ground above them begins to collapse, causing sinkholes.

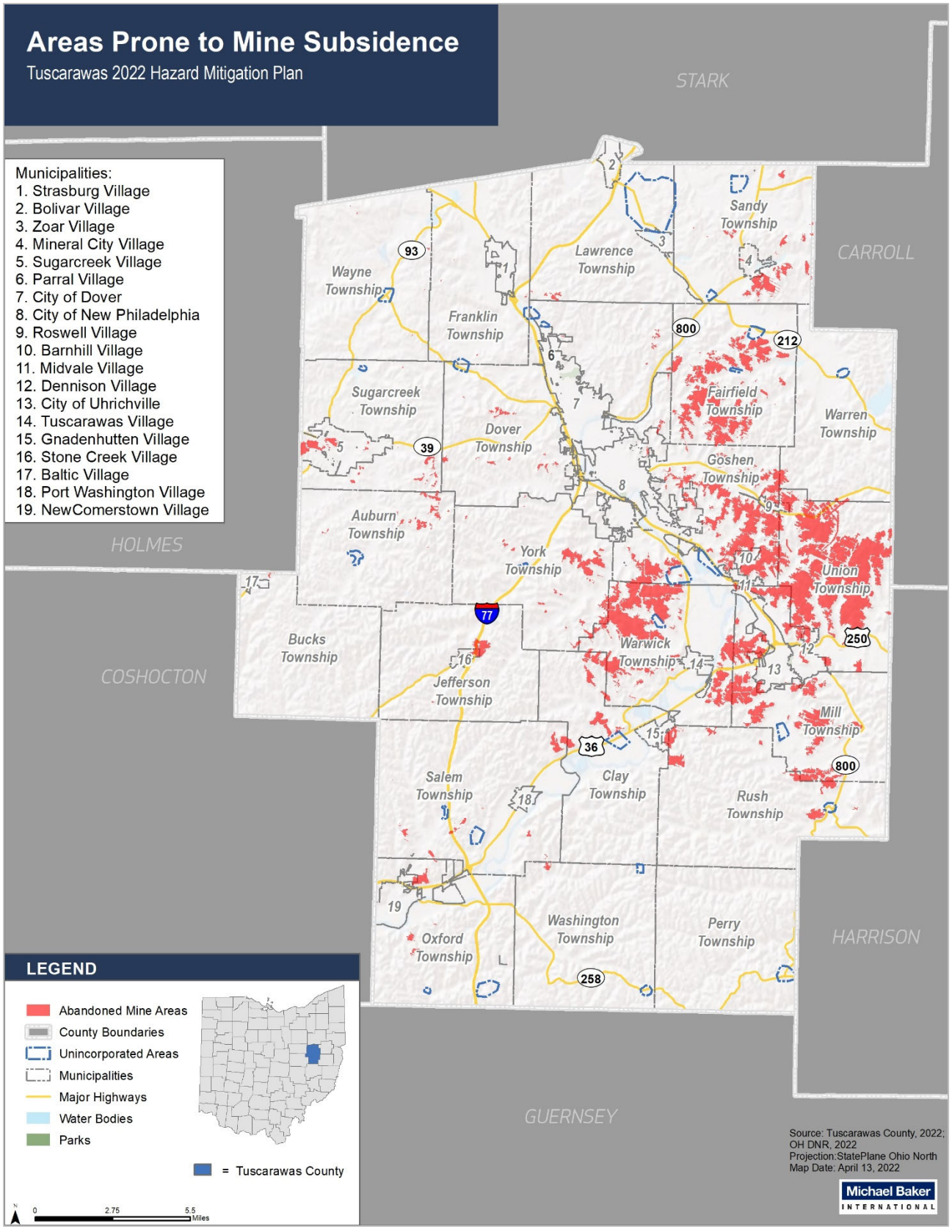
A sinkhole can be defined as a subsidence feature that can form rapidly and which is characterized by a distinct break in the land surface and the downward movement of surface materials into the resulting hole or cavity. Sinkholes are generally found in areas underlain by carbonate bedrock (such as limestone and dolomite), found in large areas of central and eastern Pennsylvania. They occur naturally due to the physical and chemical weathering of the bedrock. Water passing through naturally occurring fractures and bedding planes dissolve the bedrock leaving voids below the surface. Eventually, overburden on top of the voids collapse, leaving surface depressions resulting in karst topography. Characteristics structures associated with karst topography include sinkholes, linear depressions and caves. Often, sub-surface solution of limestone will not result in the immediate formation of karst features.

Although the actual subsidence process occurs over a long period of time, the final collapse can occur very rapidly. Collapse sometimes occurs only after a large amount of activity, or when a heavy burden is placed on the overlying material. Abrupt or long-term changes in the ground surface may also occur following sub-surface fluid extraction (e.g. natural gas, water, oil, etc.).

4.12.2 MINE SUBSIDENCE/ABANDONED WELLS LOCATION

The following figure shows the location of the abandoned mines in Tuscarawas County.

FIGURE 4-45 TUSCARAWAS COUNTY MINES, ODNR



4.12.3 EXTENT

Subsidence and sinkhole events may occur gradually or abruptly. Events could result in minor elevation changes or deep, gaping holes in the ground surface. Subsidence and sinkhole events can cause severe damage in urban environments, although gradual events can be addressed before significant damage occurs. If long-term subsidence or sinkhole formation is not recognized and mitigation measures are not implemented, fractures or complete collapse of building foundations and roadways may result.

A worst-case scenario for subsidence and sinkholes would be if a sinkhole occurred under a critical facility such as a hospital. Not only could structural damage occur to the building, but there could be injuries to patients, as well. In addition, part of the facility would have to be closed in order to repair the structural damage and this would reduce the hospital's capacity and ability to treat people with other illnesses and injuries.

Tuscarawas County has an estimated 367 abandoned mines, the most out of any county in the State of Ohio, according to the Ohio Department of Natural Resources spatial data obtained for the HMP. Many of these are coal mines.

4.12.4 HISTORICAL OCCURENCES

General Trends

While subsidence occurs throughout the County, much of it takes place in areas where there are no buildings or roads, so these incidents go relatively unnoticed. Many of the mines in Tuscarawas County, and throughout Ohio, are old coal mines. As a result of this, there are subsidence issues dating back to 1923. Because these mines and wells are significantly aged, they are not documented well, and may not have complete records.

In 2009, there were 2 reported claims regarding mine collapse. These events become hazards when they begin to affect life and property.

Event Narratives

July 9, 2009: A mine collapsed underneath a home in Sugarcreek, Ohio. The collapse caused significant structural damage, including large cracks along the walls. The area was part of the Finzer Mine, which had been abandoned in 1960. There were no other documented reports or problems with this mine.

FIGURE 4-46 DAMAGE TO A HOME FROM MINE SUBSIDENCE

There has been no mine subsidence/abandoned well events in Tuscarawas County since the previous plan was developed.

4.12.5 PROBABILITY OF FUTURE OCCURRENCES

The Ohio Department of Natural Resources and the Tuscarawas County Emergency Management Agency have reported no instances of mine subsidence hazards since the last reported event in 2009.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (1 Events) = 20 years between events

The Steering Committee, based on their own knowledge, concluded that Mine Subsidence/Abandoned Wells events are "Possible" each year. This means that they have between at 1% and 10% chance of happening annually.

4.12.6 ASSETS EXPOSED TO MINE SUBSIDENCE/ABANDONED WELLS

Potential Losses

Abandoned wells and mines exist throughout the entire County. All County assets, including 100% of its population and all critical facilities, are at risk.

Community Vulnerability

In Tuscarawas County, there are a total of 652 structures vulnerable to abandoned mine collapse, or 1% of the total structures in the county. Additionally, three of the county's critical facilities are vulnerable to abandoned mine collapse, or 1% of the county's inventory of critical facilities. Sugarcreek has the highest number of structures vulnerable to abandoned mine areas with 158 structures. Union Township has the second highest number of structures vulnerable to abandoned mine areas with 156 structures, and Fairfield Township has the third highest number of structures vulnerable to abandoned mine areas with 87 structures. Union Township has the highest percentage of its structures vulnerable to abandoned mine areas with 24%, both Sugarcreek and Fairfield Township have the second highest with 12%, and Warwick Township has the third highest with 7%. The three critical facilities vulnerable to abandoned mine collapse area located in Oxford Township, Sugarcreek, and Warwick Township.

TABLE 4-89 TUSCARAWAS COUNTY VULNERABILITY TO ABANDONED MINE AREAS

Municipality	Total Structures	Structures Vulnerable to Abandoned Mine Areas	Percent Structures Vulnerable to Abandoned Mine Areas	Total Critical Facilities	Critical Facilities Vulnerable to Abandoned Mine Areas	Percent Critical Facilities Vulnerable to Abandoned Mine Areas
Auburn Township	418	0	0%	5	0	0%
Baltic Village	359	0	0%	5	0	0%
Barnhill Village	166	0	0%	1	0	0%
Bolivar Village	440	0	0%	8	0	0%
Bucks Township	489	0	0%	5	0	0%

Municipality	Total Structures	Structures Vulnerable to Abandoned Mine Areas	Percent Structures Vulnerable to Abandoned Mine Areas	Total Critical Facilities	Critical Facilities Vulnerable to Abandoned Mine Areas	Percent Critical Facilities Vulnerable to Abandoned Mine Areas
City of Dover	6,420	0	0%	42	0	0%
City of New Philadelphia	9,081	11	0%	73	0	0%
City of Uhrichsville	2,692	3	0%	16	0	0%
Clay Township	331	6	2%	1	0	0%
Dennison Village	1,273	8	1%	25	0	0%
Dover Township	1,932	3	0%	6	0	0%
Fairfield Township	701	87	12%	1	0	0%
Franklin Township	1,044	0	0%	3	0	0%
Gnadenhutten Village	601	0	0%	9	0	0%
Goshen Township	1,730	71	4%	11	0	0%
Jefferson Township	425	0	0%	0	0	0%
Lawrence Township	852	0	0%	1	0	0%
Midvale Village	339	0	0%	2	0	0%
Mill Township	960	33	3%	3	0	0%
Mineral City Village	365	1	0%	4	0	0%
Newcomerstown Village	1,912	6	0%	23	0	0%
Oxford Township	552	3	1%	2	1	50%
Parral Village	121	0	0%	0	0	0%
Perry Township	254	0	0%	0	0	0%
Port Washington Village	249	0	0%	4	0	0%
Roswell Village	102	2	2%	1	0	0%
Rush Township	431	12	3%	4	0	0%
Salem Township	514	0	0%	1	0	0%
Sandy Township	1,004	19	2%	10	0	0%
Stone Creek Village	91	0	0%	2	0	0%
Strasburg Village	1,346	0	0%	14	0	0%
Sugarcreek Township	822	3	0%	6	0	0%
Sugarcreek Village	1,292	158	12%	22	1	5%
Tuscarawas Village	501	0	0%	5	0	0%
Unincorporated	2,946	0	0%	23	0	0%
Union Township	639	156	24%	2	0	0%
Warren Township	666	6	1%	4	0	0%
Warwick Township	769	56	7%	3	1	33%
Washington Township	358	0	0%	1	0	0%
Wayne Township	801	0	0%	2	0	0%
York Township	647	8	1%	5	0	0%
Zoar Village	104	0	0%	3	0	0%
Grand Total	**46,739**	**652**	**1%**	**358**	**3**	**1%**

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	No specific vulnerabilities at this time.
Dover	Not a significant problem.
New Philadelphia	New Philadelphia has no known active/legacy mines in the area.
Uhrichsville	There are no abandoned wells in the city.
Baltic	No known vulnerabilities to this hazard at this time.
Barnhill	No known vulnerabilities at this time.
Bolivar	Sand and gravel mining to the northwest - became operational in 2021. Anticipating heavy traffic eventually.
Dennison	We don't have abandoned wells or mining done in the village. Clay mining was done on the edges of the village, but the old shafts are not a risk to the village at this time.
Gnadenhutten	No mines in the municipal boundary.
Midvale	Midvale is an old mining town; old coal mines are located nearby.
Mineral City	Have a lot of abandoned wells around the community - heavy traffic along State Route 800, Linden Tree Road.
Newcomerstown	No particular vulnerabilities.
Parral	No vulnerability to this hazard.
Port Washington	There are no issues with this hazard in town.
Roswell	There are abandoned mines under the village; fifty years ago, the road sank, and ODNR addressed the issue with adding asphalt to the road.
Stone Creek	Our only known abandoned mine is on private land with no roads or access, and the entrance is cemented shut. All the wells in the area are operating and maintained. There are most likely a high number of abandoned wells within the village - abated by the drilling companies.
Strasburg	No significant issues.
Sugarcreek	Not an issue.
Tuscarawas	There are no mines in the village borders.
Zoar	No known vulnerabilities to this hazard.
Tuscarawas County Regional Planning and Floodplain Office	People build homes on land without checking to see if there has ever been mining activity on the site.
Trinity Twin City Medical Center	There are lots of old wells and mines. Access could be interrupted if a mine collapsed under a major roadway.

4.12.7 LAND USE & DEVELOPMENT TRENDS

Much of the land throughout Tuscarawas County has agricultural uses. As farmers continue to use underground aquifers as a water source, it is possible that they may exacerbate any well collapse. This is particularly true in times of drought when aquifers are not being recharged. Development of all critical facilities should be kept away from land that is known to have a mine underneath it.

Regulatory Environment

The Ohio Department of Natural Resources Division of Mineral Resources is responsible for the permitting of mining for industrial minerals and coal. The Field Inspection and Enforcement program enforces laws regulating active mining activities to ensure the protection of citizens and conservation of environmental resources and oversees land reclamation requirements to assure operators restore mine land and waters to productive uses.

4.12.8 MINE SUBSIDENCE/ABANDONED WELL SUMMARY

Tuscarawas County has the most abandoned mines out of all Ohio Counties, with a known 367 mines. Mines can collapse when their support structures begin to deteriorate, and abandoned wells, if not filled properly, can begin to cave in on themselves without support. Poor engineering practices at the time of mine withdrawal can lead to these collapses. Local roads need annual repair and damage to water and gas lines and telephone and electrical entry road facilities could occur in highly populated areas. Areas of filled wetlands or streams should be identified, and the prohibition of development in these areas should be encouraged. Additionally, caution should be taken when building structures on filled ground.

13. NATURAL RESOURCE EXTRACTION

Hazard	Probability		Impact		Spatial Extent		Warning Time		Duration		RF Rating
Natural Resource Extraction	1	0.3	1	0.3	1	0.2	4	0.4	2	0.2	1.4
Low Risk Hazard (1.0 – 1.9)											

4.13.1 NATURAL RESOURCE EXTRACTION DESCRIPTION

Minerals are defined as homogenous, naturally occurring, inorganic solids, each having their own characteristic chemical composition and highly ordered atomic structure. It is estimated that there are some 4,000 mineral types. A rock is an aggregate of one or more minerals or a body of undifferentiated mineral matter.

Minerals can be categorized in a variety of ways, including by chemical or crystal group; color; streak; hardness; and elemental affiliation. The Dana Classification System has been adopted as the primary system of mineralogy, with all minerals belonging to a specific chemical group. Copper and diamond are examples of naturally occurring minerals made up of only one element. All other mineral groups are made up of one or more metallic elements combined with another element. The largest group is the silicates which contain varying amounts of silicon and oxygen; quartz and feldspar are two examples. Other important groups include the sulfides, which combine with sulfur, and the oxides, which combine with oxygen, water, or hydroxyl. These three groups are vital as they form many of the ores from which valuable metals can be extracted, including iron, lead and bauxite.

Essentially, if a material is not grown, it must be mined. Minerals are an economic commodity, mined for their potential use or their intrinsic value. Much of the comfort that we enjoy today depends on the abundant use of mineral resources. Things we use each day, from pencils to computers, are made from minerals and other materials that have been extracted from the Earth. And, despite concern over the last few decades that some mineral resources would become scarce, the supply of most major minerals is not actually an immediate concern. In fact, known reserves of most major minerals have increased over the last two decades despite population growth, which has led to both increased demand and consumption.

Current regulation now prioritizes mine reclamation to further initiate beneficial end-uses of the land area. In addition to minimizing any residual hazards to public safety, the process includes maintaining water and air quality, minimizing flooding, erosion and damage to wildlife and aquatic habitats, and providing topsoil replacement and the introduction of appropriate plant species.

Natural Resource Extraction/Transport in Tuscarawas County focus on hazardous material releases and pollution or fire from oil and gas well drilling. Technology is making possible the exploration and extraction of oil and gas resources from the Marcellus shale formation in Eastern Ohio. Hazardous material releases can occur at facilities or along transportation routes. These releases can result in injury and death and may contaminate air, water and soils. Activities associated with oil and gas well drilling can cause fires or explosions and may pollute streams and drinking water.

Another focus of this hazard is pollution and subsidence factors associated with mining. Subsidence may be natural or related to mining activities. Areas under-laid by coal or other minerals which use deep mining techniques may become susceptible to subsidence. Poor engineering practices at the time of withdrawal or progressive degradation in geological stability contribute to subsidence. Natural subsidence results from what are considered normal geological processes particular to certain landform. For example, water movement through carbonate terrain, i.e., limestone and dolomite, may result in topographic features such as swales, sinkhole and forms of subsidence.

Oil and gas well drilling can have a variety of effects on the environment. Abandoned oil and gas wells, not properly plugged can contaminate groundwater and consequently drinking water wells. Surface waters and soil are sometimes polluted by brine, a salty wastewater product of oil and gas well drilling, and from oil spills occurring at the drilling site or from a pipeline breach. This can spoil public drinking water supplies and be particularly detrimental to vegetation and aquatic animals.

Natural gas well fires occur when natural gas is ignited at the well site. Often, these fires erupt during drilling when a spark from machinery or equipment ignites the gas. The initial explosion and resulting flames have the potential to seriously injure or kill individuals in the immediate area. These fires are often difficult to extinguish due to the intensity of the flame and the abundant fuel source.

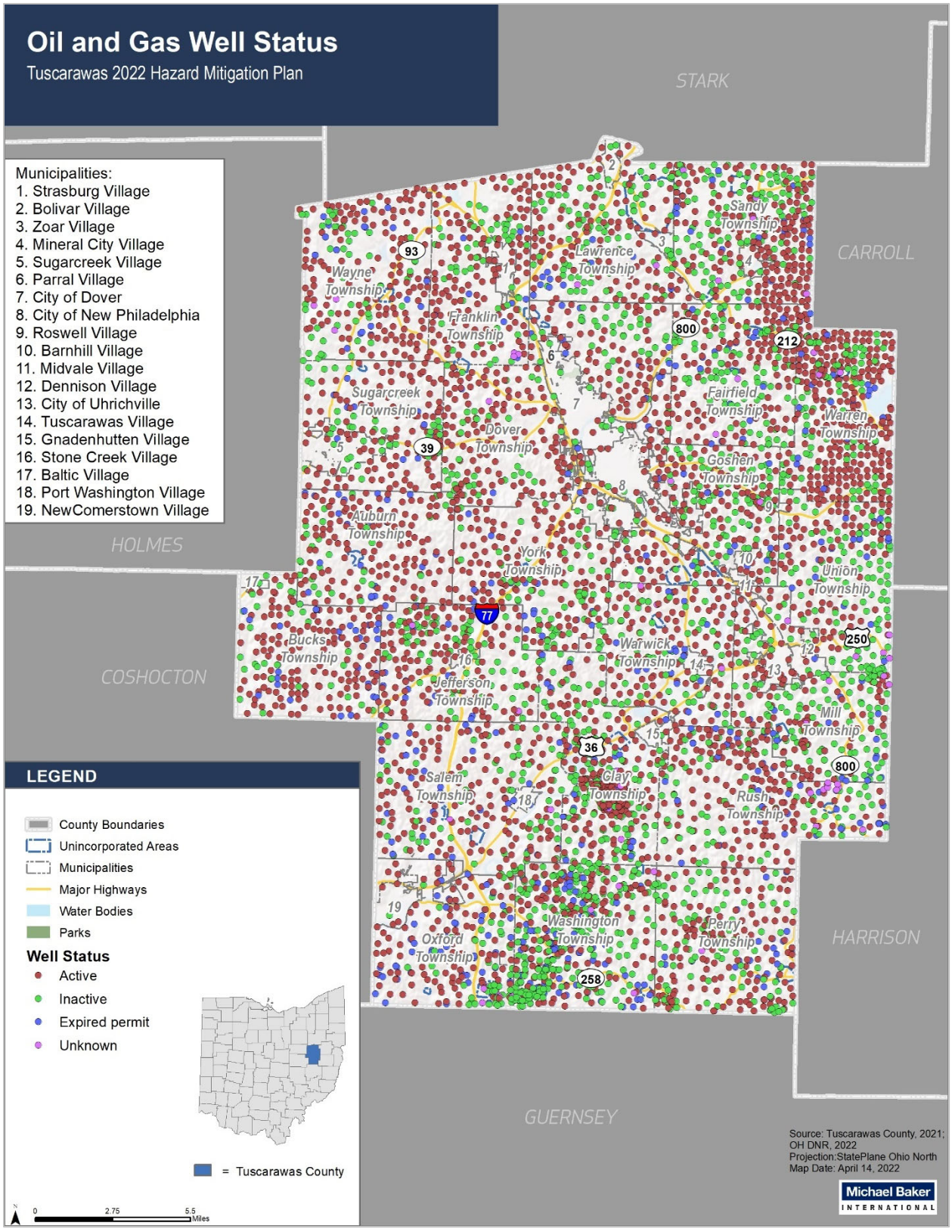
Transportation of hazardous materials on highways involves tanker trucks or trailers. Unsurprisingly, large trucks are responsible for the greatest number of hazard material release incidents. Hazardous material releases from rail transport are also of concern due to collisions and derailments that result in large spills. There are many thoroughfares within Tuscarawas County. A total of 35 Interstate highway miles traverse the county. These are located along I-77, running north to south through the county. There are also 39 U.S. highway miles that include U.S. 36 (east/west) and U.S. 250(north/south). Along with the federal highway miles, there are over 140 miles of state highway. East/west State Routes include 39, 183 and 258. North/south State Routes are 21, 93, 212, 416, and 800. Besides roadways, Tuscarawas County has a system of rails that crisscross the county. Major railways include two (2) Ohio Central Rail Systems one (1) running north/south through the northwest corner of the county and one (1) running east/west along the lower portion of the county. There are also two (2) rails for the Wheeling and Lake Erie Railroad that run north/south in the northeast corner of the county. Tuscarawas County also has a small airport on the east side of New Philadelphia with small plane service only.

Areas of the state that have underlying mines are subject to subsidence and constitute a potential threat to people living in those areas. Isolated incidents throughout the “coal regions,” over the years have been houses, garages, and trees swallowed up by subsidence holes. Lengths of local streets and highways, and countless building foundations have been damaged. Tuscarawas County out of all the Counties in Ohio has the most abandoned mines at 545.

4.13.2 LOCATION

Jurisdictions where mining and other extraction processes/transport take place in have a greater vulnerability compared to those who don’t have those activities taking place. Please refer to the following map for location information on active and inactive oil and gas wells in the county.

FIGURE 4-47 LOCATIONS OF OIL AND GAS WELLS IN TUSCARAWAS COUNTY OHIO



4.13.3 EXTENT

The extraction, processing, and transport of minerals all have impacts on the environment, as well as on the potential health and safety of those working in the industry. Mitigating the disruption of landscapes and ecosystems, while continuing to ensure supplies of critical minerals, is a constant technological challenge. In addition, the use of cyanide by some mining operations (gold, for example), and the release of gases, dust, and other particulates can impact soils, water, and the air. Water quality can also be affected by metal contamination or sedimentation; yet, the largest problem facing the mining industry is considered to be acid drainage which can threaten aquatic ecosystems.

4.13.4 HISTORICAL OCCURRENCES

The Ohio Department of Natural Resources and the Tuscarawas County Emergency Management Agency have reported no instances of natural resource extraction hazards since the previous plan was developed; there is no reported history of instances of natural resource extraction in the planning area.

4.13.5 PROBABILITY OF FUTURE OCCURRENCE

The Ohio Department of Natural Resources and the Tuscarawas County Emergency Management Agency have reported no instances of natural resource extraction hazards.

(2021 CY) - (2001 HY) = 20 Years on Record

(20 Years) / (0 Events) = Greater than 20 years between events

The Steering Committee, based on their own knowledge, concluded that Natural Resource Extraction events are “Unlikely” each year. This means that they have less than 1% chance of happening annually.

There have not been a sufficient number of events in the recent past to accurately determine the percent annual chance of this type of event occurring.

4.13.6 ASSETS EXPOSED TO NATURAL RESOURCE EXTRACTION

Potential Losses

Possible losses to structures include:

- Inaccessibility
- Contamination
- Structural and contents losses, if an explosion is present

Possible economic losses include:

- Business closures and associated business disruption losses

Possible ecologic losses include:

- Loss of wildlife
- Habitat damage

- Reduced air and water quality

Community Vulnerability

In Tuscarawas County, there are a total of 15,155 structures vulnerable to abandoned mine collapse, or 39% of the total structures in the county. Additionally, 129 of the county's critical facilities are vulnerable to abandoned mine collapse, or 36% of the county's inventory of critical facilities. Unincorporated Tuscarawas County has the highest number of structures vulnerable to abandoned mine areas with 1,550 structures. Newcomerstown has the second highest number of structures vulnerable to abandoned mine areas with 1,494 structures, and Goshen Township has the third highest number of structures vulnerable to abandoned mine areas with 1,237 structures. There are multiple municipalities who has 100% of their structures vulnerable to oil and gas fields: Barnhill, Midvale, Roswell, and Tuscarawas. Newcomerstown has the highest number of critical facilities vulnerable to oil and gas fields with 21 critical facilities. New Philadelphia has the second highest number of critical facilities vulnerable to oil and gas fields with 15, and unincorporated Tuscarawas County has the third highest with 10. There are multiple municipalities with 100% of their critical facilities vulnerable to oil and gas fields: Barnhill, Fairfield Township, Midvale, Mill Township, Roswell, Salem Township, Tuscarawas, Union Township, Warwick Township, Washington Township, and Wayne Township.

TABLE 4-90 TUSCARAWAS COUNTY VULNERABILITY TO OIL AND GAS FIELDS

Municipality	Total Structures	Structures Vulnerable to Oil and Gas Fields	Percent Structures Vulnerable to Oil and Gas Fields	Total Critical Facilities	Critical Facilities Vulnerable to Oil and Gas Fields	Percent Critical Facilities Vulnerable to Oil and Gas Fields
Auburn Township	418	326	78%	5	4	80%
Baltic Village	359	86	24%	5	0	0%
Barnhill Village	166	166	100%	1	1	100%
Bolivar Village	440	2	0%	8	0	0%
Bucks Township	489	404	83%	5	4	80%
City of Dover	6,420	343	5%	42	6	14%
City of New Philadelphia	9,081	1,095	12%	73	15	21%
City of Uhrichsville	2,692	665	25%	16	1	6%
Clay Township	331	170	51%	1	0	0%
Dennison Village	1,273	569	45%	25	9	36%
Dover Township	1,932	948	49%	6	2	33%
Fairfield Township	701	416	59%	1	1	100%
Franklin Township	1,044	552	53%	3	2	67%
Gnadenhutten Village	601	29	5%	9	0	0%
Goshen Township	1,730	1,237	72%	11	6	55%
Jefferson Township	425	308	72%	0	0	0%
Lawrence Township	852	345	40%	1	0	0%
Midvale Village	339	339	100%	2	2	100%

Municipality	Total Structures	Structures Vulnerable to Oil and Gas Fields	Percent Structures Vulnerable to Oil and Gas Fields	Total Critical Facilities	Critical Facilities Vulnerable to Oil and Gas Fields	Percent Critical Facilities Vulnerable to Oil and Gas Fields
Mill Township	960	596	62%	3	3	100%
Mineral City Village	365	46	13%	4	0	0%
Newcomerstown Village	1,912	1,494	78%	23	21	91%
Oxford Township	552	275	50%	2	1	50%
Parral Village	121	21	17%	0	0	0%
Perry Township	254	179	70%	0	0	0%
Port Washington Village	249	0	0%	4	0	0%
Roswell Village	102	102	100%	1	1	100%
Rush Township	431	296	69%	4	3	75%
Salem Township	514	237	46%	1	1	100%
Sandy Township	1,004	625	62%	10	8	80%
Stone Creek Village	91	22	24%	2	0	0%
Strasburg Village	1,346	215	16%	14	0	0%
Sugarcreek Township	822	624	76%	6	5	83%
Sugarcreek Village	1,292	347	27%	22	2	9%
Tuscarawas Village	501	501	100%	5	5	100%
Unincorporated	2,946	1,550	53%	23	10	43%
Union Township	639	522	82%	2	2	100%
Warren Township	666	474	71%	4	4	100%
Warwick Township	769	656	85%	3	3	100%
Washington Township	358	272	76%	1	1	100%
Wayne Township	801	630	79%	2	2	100%
York Township	647	451	70%	5	4	80%
Zoar Village	104	20	19%	3	0	0%
Grand Total	**46,739**	**18,155**	**39%**	**358**	**129**	**36%**

The following table reflects each jurisdiction's response as well as stakeholders who submitted responses from the Vulnerability Assessment form that was completed during the planning process.

Jurisdiction/Organization	Vulnerability Assessment Response
Tuscarawas County	No known vulnerabilities to this hazard at this time.
Dover	Nothing noteworthy.
New Philadelphia	No vulnerability.
Uhrichsville	No vulnerability to this hazard.
Baltic	No known vulnerabilities at this time.
Barnhill	No known vulnerabilities to this hazard at this time.
Bolivar	Sand and gravel mining to the northwest - became operational in 2021. Anticipating heavy traffic eventually.
Dennison	We have a facility that does injection on the edge of the village, but there have not been any impacts to the village. There are regulations on how the facility operates.
Gnadenhutten	No issues.
Midvale	No vulnerability to this hazard at this time.
Mineral City	No specific vulnerabilities.
Newcomerstown	No particular vulnerabilities.
Parral	No vulnerability to this hazard.
Port Washington	There are no issues with this hazard in town.
Roswell	The village is not vulnerable to this hazard.
Stone Creek	We have had a decrease in open mining and there for a decrease in hazards. No industrial or mining. This hazard is not applicable to the village.
Strasburg	There are two old wells. The one on the north side is located on school property, and there is one on the west side on Tiger Dr. They don't produce much, but they are still present.
Sugarcreek	Not an issue.
Tuscarawas	The area to the south of town may be minded for sand and gravel.
Zoar	No vulnerability.
Tuscarawas County Regional Planning and Floodplain Office	The state regulations favor the natural resource extractors over local concerns.
Trinity Twin City Medical Center	There have been no significant issues.

4.13.7 LAND USE & DEVELOPMENT TRENDS

Tuscarawas County and the surrounding areas are rich in natural resources and the continued development of industries related to these natural resources is a distinct possibility. New development may increase the number of people and facilities/structures exposed. The purchase of mine subsidence insurance can help reduce the expense a homeowner would occur should a mine subsidence event take place.

Regulatory Environment

The Ohio Department of Natural Resources is responsible for overseeing and permitting natural resource extraction sites throughout the State, including Tuscarawas County. This is done through ODNR's Division of Oil and Gas Resources Management. A strong regulatory framework enables the Division to ensure the safety of Ohio's citizens and environment. This framework is continuously reviewed and updated to accommodate the ever-changing technologies of oil and natural gas drilling.

4.13.8 NATURAL RESOURCE EXTRACTION SUMMARY

The transport of minerals and hazardous materials generated through extraction processes along state highway and railway corridors around Tuscarawas County could potentially be affected by a spill during transport.

Overall, it is difficult to predict when and where environmental hazards will arise. Stringent monitoring will reduce the likelihood of potential impacts to the community and the environment. Incidents involving oil and gas well drilling are expected to remain relatively low.

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SECTION 5. MITIGATION STRATEGY

The following Mitigation Strategy is designed to be comprehensive and strategic. Its intent is to provide Tuscarawas County and its municipalities with:

- Goals to serve as guiding principles for administering future mitigation policy and projects.
- A list of proposed actions to meet those goals and reduce the impact of natural, technological, and man-made hazards.

The process to develop the strategy included a thorough review of Tuscarawas County's natural, technological, and man-made hazards. We also identified policies and projects that would not only reduce the future impacts of hazards, but also help the county achieve compatible economic, environmental and social goals. This section is also intended to be strategic, in that all policies and projects are linked to established priorities assigned to specific departments or individuals, who are responsible for their implementation and completion deadlines. Potential funding sources the projects are also identified.

- **Mitigation goals** are general guidelines that explain what the county wants to achieve. Goals are usually expressed as broad policy statements that represent desired long-term results.
- **Mitigation objectives** describe strategies or steps to attain the identified goals. Objectives are more specific than goals; the steps they describe are usually measurable and can have a defined completion date.
- **Mitigation Actions** provide more detailed descriptions of specific tasks to help the county and its municipalities achieve those goals and objectives.

1. GOALS

The following goals and objectives apply to this mitigation plan:

- **GOAL 1: Protect the people, property, and infrastructure of Tuscarawas County by minimizing the potential impacts of natural and man-made hazards.**
    - OBJECTIVE 1.1: Undertake structure improvements to reduce risk.
    - OBJECTIVE 1.2: Undertake planning initiatives to protect the residents of Tuscarawas County from the risks of natural and man-made hazards.
    - OBJECTIVE 1.3: Restore natural systems to vulnerable areas to reduce hazard impacts.
- **GOAL 2: Protect Tuscarawas County's assets through best practice hazard mitigation actions and projects.**

    - OBJECTIVE 2.1: Build on the county's previous hazard mitigation successes to further resiliency by implementing the plan update's mitigation actions.

- **GOAL 3: Increase public awareness of hazards, hazard impacts, and hazard mitigation techniques through a robust public outreach campaign.**
    - OBJECTIVE 3.1: Undertake public education and outreach programs throughout the county.
- **GOAL 4: Address High Hazard Potential Dams in Tuscarawas County.**

Based on participation from the Tuscarawas County Mitigation Planning Committee, the mitigation strategy was developed. Objectives were clarified to document roles and responsibilities more clearly. Actions were added to address particular hazards the county faces, and a consensus was achieved on how to address those actions.

The last step in updating the Mitigation Strategy is to create Mitigation Action Plans (MAPs). The MAPs represent the key outcome of the mitigation planning process. They include a prioritized list of the county's proposed hazard mitigation actions (policies and projects), with accompanying information such as the agencies or individuals that are responsible for each one, potential funding sources, estimated target date for completion, and current status. The MAPs provide the individuals or agencies responsible for each mitigation action with a clear roadmap that also serves as a tool for monitoring progress over time. The combined actions listed in each jurisdiction's MAP also serve as an easily understood synopsis of activities for local decision makers.

To ensure that a broad range of mitigation actions were considered, the Mitigation Planning Committee analyzed a comprehensive range of specific mitigation actions for each hazard (after it completed the risk assessment). This helped provide sufficient span and creativity for considering the mitigation actions.

The County considered **four categories** of mitigation actions in developing its plan:

1. **Local Plans and Regulations:** These actions include work on government authorities, policies, or codes that influence the way land and buildings are developed and built.
2. **Structure and Infrastructure Projects:** These actions involve modifying existing structures and infrastructure to protect them from a hazard or to remove them from a hazard area. This could apply to public or private structures as well as critical facilities and infrastructure. This type of action also involves constructing structures to reduce the impact of hazards. Many of these types of actions are eligible for funding through FEMA's Hazard Mitigation Assistance program.
3. **Natural Systems Protection:** These actions minimize damage and losses and preserve or restore the functions of natural systems.

4. **Education and Awareness Program:** These actions inform and educate students, faculty and staff about hazards and potential ways to mitigate them. They may include participation in national programs, such as StormReady or Firewise Communities. Although this type of mitigation reduces risk less directly than structural projects or regulation, it is an important foundation. A greater understanding and awareness of hazards and risk among county officials, stakeholders, and the public is likely to lead to more direct actions.

2. 2022 PLAN UPDATE MITIGATION ACTION PRIORITIZATION METHODOLOGY

Prioritizing mitigation actions for the 2017 plan was completed with FEMA's STAPLEE methodology for each jurisdiction's actions in mind. The STAPLEE approach allows for a careful review of the feasibility of mitigation actions by using seven criteria. The criteria are described below:

- S - Social
- T - Technical
- A - Administrative
- P - Political
- L - Legal
- E - Economic
- E - Environmental

For the individual action plans in the previous plan, a STAPLEE score was calculated based on the number of favorable considerations that can be found on the STAPLEE document. Up to 23 considerations can be used to prioritize each action using this evaluation methodology. Typically, scores rank between 17 and 21. Infrastructure projects tend to incur a lower score due to their high price and lengthy completion times, while plans, regulations, and educational programs rank higher due to their ease of deployment. The figure below shows an example of the STAPLEE tool.

FIGURE 5-1 EXAMPLE STAPLEE EVALUATION

STAPLEE ACTION EVALUATION TABLE:																											
Alternative Actions	**STAPLEE Criteria Considerations** + Favorable - Less favorable N Not Applicable																										
	S (Social)		**T** (Technical)			**A** (Administrative)			**P** (Political)			**L** (Legal)			**E** (Economic)				**E** (Environmental)						
	Community Acceptance	Effect on Segment of Population	Technically Feasible	Long-Term Solution	Secondary Impacts	Staffing	Funding Allocation	Maintenance/ Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/ Water	Effect on Endangered Species	Effect on HAZMAT/ Waste Sites	Consistent with Community Environmental Goals	Consistent with Federal Laws				

Since then, the prioritization process has changed to incorporate a more adaptable method that allows for a more comprehensive examination of the mitigation actions. In the plan update, each mitigation action was classified as having a high, medium, or low priority.

FEMA mitigation planning requirements indicate that any prioritization system must include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects. To do this in an efficient manner consistent with FEMA's guidance on using cost-benefit review in mitigation planning, the high/medium/low ranking method was adapted to include a higher weighting for the economic feasibility factor – Benefits of Action and Costs of Action. This method incorporates concepts similar to those described in Method C of FEMA 386-5: Using Benefit Cost Review in Mitigation Planning (FEMA, 2007).

Projects with a high priority ranking are associated with at least five of the following qualities; projects with a medium priority ranking are associated with three or more of the following qualities; and projects with a low priority ranking are associated with two or more of the following qualities:

- Low cost
- High impact
- Urgency in completion
- Widespread mitigation
- Feasibility
- General acceptance

- Additional impacts resulting from the project
- Resources required to complete the project
- Project complexity

3. PLANNING PROCESS FOR SETTING HAZARD MITIGATION GOALS AND OBJECTIVES

The mitigation strategy represents the key outcomes of the 2022 Tuscarawas County HMP planning process. The hazard mitigation planning process conducted by the Planning Committee is a typical problem-solving methodology:

- Estimate the impacts the problem could cause;
- Describe the problem;
- Assess the existing safeguards and resources that could potentially lessen those impacts;
- Develop Goals and Objectives with current capabilities to address the problem; and
- Using this information, determine what, if anything, can be done, and select the actions that are appropriate for the community

4. TUSCARAWAS COUNTY CAPABILITY ASSESSMENT

The mitigation strategy includes an assessment of Tuscarawas County's planning and regulatory, administrative/technical, fiscal, and political capabilities to augment known issues and weaknesses related to identified natural, technological, and man-made hazards.

5.4.1 ABILITY TO EXPAND ON EXISTING CAPABILITIES

The planning process used surveys to determine the county's existing capabilities and those of its political subdivisions. These capabilities can be expanded upon with the proper influx of funds or personnel. If additional state or federal funding becomes available to specifically augment the existing capabilities, the jurisdictions represented in this plan would be able to improve their capabilities. Additionally, as personnel leave, they may be replaced by individuals with skillsets not captured in these surveys. The county will continue to develop its staff capabilities over time and expand upon them where they are able.

Planning and Regulatory Capability: The table below summarizes each community's and stakeholder's planning and regulatory capabilities. These are the plans and policies that jurisdictions have in place that can help to further mitigation. UD denotes that the planning or regulatory is currently under development for the community or stakeholder.

TABLE 5-1 PLANNING AND REGULATORY CAPABILITIES

Tool/Program	Tuscarawas County	Dover	New Philadelphia	Uhrichsville	Baltic	Barnhill	Bolivar	Dennison	Gnadenhutten	Midvale	Mineral City	Newcomerstown	Parral	Port Washington	Roswell	Stone Creek	Strasburg	Sugarcreek	Tuscarawas	Zoar	Tuscarawas County Regional Planning Commission	Trinity Twin City Medical Center
Building Codes		X	X	X	X	X	X	X	X	X	X	UD	X	X	X	X	UD	X	X	X		X
Capital Improvement Plan		UD		X	X		X	X	X		UD	X							UD			X
Comprehensive Plan			X	UD																		
Continuity of Operations Plan	UD	UD	X	X	X			X	UD					X			X				X	UD
Disaster Recovery Plan	X	UD	X	X	X			X	X		X			X	X	X	X		UD	UD	X	X
Economic Development Plan			UD	UD	UD			X			X	X		X			UD		X		X	X
Emergency Operations Plan	X	X	X	X	X			X	X	X	X	X		X			UD		X	UD	X	X
Evacuation Plan	X	UD	UD	X	X			X	X	X	X									X	X	UD
Farmland Preservation Plan																					X	
Fire Code	X	X	X	X	X		X	X	X	X	X	X		X		X	X		UD	X	X	X
Firewise																X				X		
Floodplain Management Plan		X	X	X			X				X	X		X			UD		X	X	X	X
Floodplain Regulations		X	X	X			X	X		X	X	X		X	X		UD		X	X	X	X
Historic Preservation Plan		X	UD	X	X				UD					X			X		UD	X		X
Natural Resource Protection Plan					X									X					X	X		
Open Space Management Plan		X	X	UD	X				X			UD		X			UD		X	X	X	
Stormwater Management Plan/Ordinance		X	X	X	X							X		X					X	X		X
Subdivision Regulations	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Zoning Regulations		X	X	X	X		X	X	X		X	UD		X		X	X	X	X	X		
Other																						

Administrative and Technical Capability: The table below summarizes the administrative and technical capabilities, organized by staff type and department. It is important to understand current administrative and technical capabilities before developing a myriad of mitigation activities.

TABLE 5-2 ADMINISTRATIVE AND TECHNICAL CAPABILITIES

Tool/Program	Tuscarawas County	Dover	New Philadelphia	Uhrichsville	Baltic	Bamhill	Bolivar	Dennison	Gnadenhutten	Midvale	Mineral City	Newcomerstown	Parral	Port Washington	Roswell	Stone Creek	Strasburg	Sugarcreek	Tuscarawas	Zoar	Tuscarawas County Regional Planning Commission	Trinity Twin City Medical Center
Emergency Manager	X		X	X	X			X	X			X	X			X	X		X		X	X
Engineers	X	X	X	X				X									X		X		X	X
Floodplain Manager	X	X	X	X			X	X		X		X	X				X		X		X	
GIS Personnel	X	X	X	X	X			X								X	X				X	X
Grant Writers or Fiscal Staff to handle large/complex grants		X	X	X	X	X	X	X		X	X	X		X	X	X	X		X		X	X
Land Surveyors	X	X	X	X				X								X					X	X
Planners	X		X	X			X	X											X		X	X
Others																	X*					

X* = Zoning Inspector

Fiscal Capability: This section identifies the financial tools or resources that Tuscarawas County could potentially use to help fund mitigation activities. Fiscal capabilities include community specific resources as well as state and federal resources.

TABLE 5-3 FISCAL CAPABILITY

Tool/Program	Tuscarawas County	Dover	New Philadelphia	Uhrichsville	Baltic	Barnhill	Bolivar	Dennison	Gnadenhutten	Midvale	Mineral City	Newcomerstown	Parral	Port Washington	Roswell	Stone Creek	Strasburg	Sugarcreek	Tuscarawas	Zoar	Tuscarawas County Regional Planning Commission	Trinity Twin City Medical Center
Capital Improvement Planning		X		X	X		X	X	X		X	X		X			X	UD	UD		X	X
Community Development Block Grant (CDBG)	X	X		X	UD	X		X			X		X	X	X		X		X		X	X
Development Impact Fees		UD		X				X												X		
Gas/Electric Utility Fees		X	X	X										X					X	X	X	
General Obligation, Revenue, and/or Special Tax Bonds		X		X	X	X		X	X		X	X	X	X	X		X		X	X	X	X
Partnering Arrangements or Intergovernmental Agreements	X		X	X			X	X	X	X	X	X		X	X	X	X		X	X	X	X
Special Purpose Taxes	X		X	X	X		X	X		X		X			X	X	X	X	X		X	
Stormwater Utility Fees				X	X					X											X	
Water/Sewer Fees		X	X	X	X		X		X	X		X		X	X		X	X	X		X	
Other										X*												

UD = Under Development

X* = Midvale has received firefighting grants in the past, utilized levies in the past

Self-Assessment of Capability: The table below shows each community's estimated degree of capability.

TABLE 5-4 OVERALL DEGREE OF CAPABILITY

Area	Tuscarawas County	Dover	New Philadelphia	Uhrichsville	Baltic	Bamhill	Bolivar	Dennison	Gnadenhutten	Midvale	Mineral City	Newcomerstown	Parral	Port Washington	Roswell	Stone Creek	Strasburg	Sugarcreek	Tuscarawas	Zoar	Tuscarawas County Regional Planning Commission	Trinity Twin City Medical Center
Planning and Regulatory Capability	L	M	M	M	L	L	M	M	M	L	M	M	L	M	L	L	M	M	H	M	M	H
Administrative and Technical Capability	M	M	M	M	L	L	L	H	H	M	M	M	L	M	L	M	M	L	M	M	M	M
Fiscal Capability	M	H	M	M	H	L	M	M	H	M	M	M	L	H	L	L	M	M	M	L	L	L

L = Limited, M = Moderate, H = High

5. MITIGATION ACTIONS

The goals and objectives form the basis for developing a Mitigation Action Strategy and specific mitigation projects to consider.

The process consists of 1) setting goals and objectives, 2) considering mitigation alternatives, 3) identifying strategies or "actions," and 4) developing a prioritized action plan that results in a mitigation strategy.

5.5.1 2017 MITIGATION ACTION REVIEW

During the individual meetings with the participating jurisdictions, the mitigation actions from the 2017 HMP were reviewed and determined to be: deferred into the new plan; ongoing; changed to reflect an update in priorities; completed; or deleted. These actions are found in Table 5-5. Actions marked as "Completed" were finished between the drafting of the 2017 HMP and the 2022 HMP. Deletion of an action generally refers to that action no longer being relevant to the community.

TABLE 5-5 PREVIOUS MITIGATION ACTION STATUS

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / Ongoing)
Expand existing freeboard requirements above minimum levels	City of New Philadelphia Service Director	Carrying to New Plan
Notify owners in writing of flood prone properties and recommend the need for flood insurance	Tuscarawas County Commission	Carrying to New Plan
Develop new storm water regulations	City of Uhrichsville Mayor	Ongoing
Identify properties at risk within the 1% SFHA	Village of Newcomerstown Mayor, Village of Baltic Mayor, Village of Dennison Mayor, Village of Gnadenhutten Mayor, Village of Midvale Mayor, Village of Newcomerstown Mayor, Village of Port Washington Mayor, Village of Stone Creek Mayor, Village of Strasburg Mayor, Village of Sugarcreek Mayor, Tuscarawas County Commission	Completed – Strasburg, Gnadenhutten, Port Washington Carrying to New Plan – Dennison, Stone Creek, Tuscarawas County, Sugarcreek Ongoing – Baltic, Newcomerstown, Midvale
Promote equipment fastening in county and municipal facilities	Tuscarawas County Commission	Removed from Plan
Promote the use of special roofing shingles designed to interlock and resist uplift forces for both new construction and retrofits	Tuscarawas County Commission	Removed from Plan
Ensure that NFIP requirements are being met concerning repairs, renovations, and remodeling of structures located in the regulatory floodplain	Tuscarawas County Floodplain Administrator, Village of Baltic Mayor, Village of Dennison Mayor, Village of Midvale Mayor, Village of Newcomerstown Mayor, Village of Port Washington Mayor, Village of Strasburg Mayor	Completed – Strasburg Carrying to New Plan – Newcomerstown, Port Washington, Tuscarawas County Ongoing – Baltic, Dennison, Midvale
Update storm water policies for new development (specifically subdivisions)	Tuscarawas County Commission	Carrying to New Plan
Establish countywide zoning that incorporates floodplain development permitting	Tuscarawas County Commission	Removed from Plan
Update major subdivision regulation on storm drainage to incorporate “green” planning initiatives.	Tuscarawas County Commission	Removed from Plan

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / Ongoing)
Heighten awareness of flood risk by developing and maintaining a database to track community exposure to flood risk and revising and updating floodplain maps.	Village of Stone Creek Mayor	Carrying to New Plan
Clean out storm drainage system of vegetation debris in order to improve stormwater flow	Village of Roswell Mayor, City of New Philadelphia Mayor, Village of Barnhill Mayor, Village of Midvale Mayor, Village of Stone Creek Mayor	Ongoing – Barnhill, New Philadelphia, Stone Creek, Roswell, Midvale
Improve/enlarge discharge capacity for Goettge Run to increase outflow capacity into the Sugar Creek	Tuscarawas County Engineer	Carrying to New Plan
Adopting ASCE-24-05 Flood Resistant and Design Construction. ASCE-24 is referenced standard in the IBC that specified minimum requirements and expected performance for the design and construction of building in the flood hazard areas to make them more resistant to flood loads and flood damage.	Village of Stone Creek Mayor and Council	Carrying to New Plan
Acquire repetitive loss and severe repetitive loss buildings within the 100-year floodplain.	City of Dover Mayor and Council	Completed
Undertake projects to elevate roads with fill material, particularly county and township roads that result in closures due to high water during flood events	Tuscarawas County Commission	Carrying to New Plan
Update existing flood damage prevention and ordinances (as it relates to 44 CFR 60.3) and participate in the CRS program	Village of Dennison Mayor	Carrying to New Plan
Engage active well-monitoring to assist in keeping track of water usage during drought conditions.	Stone Creek Mayor	Removed from Plan
Create a public education campaign aimed at farmers and residents about best water practices during times of drought	Tuscarawas County Commission	Carrying to New Plan
Install lightning prediction equipment near critical county facilities.	Tuscarawas County Commission	Carrying to New Plan
Require school administrators to perform annual drills so that students and teachers know where to take shelter during severe storms.	Bolivar Village Administrator	Completed

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / Ongoing)
Place signs in local parks about the dangers of lightning strikes to raise public awareness.	Village of Sugarcreek Administrator	Carrying to New Plan
Bi-annual inspection of vegetation growing in or near powerlines, and pruning as necessary	Strasburg Village Administrator, City of Dover Mayor	Ongoing – Dover, Strasburg
Relocate the designated shelter area for Zoar to be the Fire Station	Village of Zoar Mayor	Completed
Replace current tornado sirens with ones capable of reaching the corporation limit.	Village of Newcomerstown Mayor	Carrying to New Plan
Construct a saferoom within City of Uhrichsville Parks	City of Uhrichsville Mayor	Ongoing
Identify a location and construct a community saferoom within the city parks of New Philadelphia, Dover, and Uhrichsville	Cities of New Philadelphia, Dover, and Uhrichsville Mayors	Carrying to New Plan – New Philadelphia Ongoing – Uhrichsville; Dover, bidding for construction of community saferoom to start spring 2022
Install sirens for early warning capability	Village of Strasburg Mayor	Ongoing
Conduct outreach activities to increase awareness of tornado risk, as well as the promotion and use of safe rooms.	Village of Parral Mayor	Carrying to New Plan
Through a public education campaign, promote the construction and use of safe room in homes and shelter areas of manufactures homes / trailers or other vulnerable public structures.	Village of Stone Creek Mayor	Carrying to New Plan
Conduct village-wide tornado drills in conjunction with local schools, the fire department, and the police department. Promoting the use of NOAA weather radios in local homes and businesses.	Village of Tuscarawas Mayor and Village Council, Village of Dennison Mayor	Remove from Plan – Dennison Ongoing – Tuscarawas
Implement reverse 911 calling to residents of Port Washington during tornadoes.	Village of Port Washington Mayor	Carrying to New Plan
Install a siren at the west end of Port Washington	Village of Port Washington Mayor	Removed from Plan
Install a siren to alert residents of impending tornadoes	Village of Roswell Mayor	Ongoing

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / Ongoing)
Stabilize the Chesepeake insertion well near Edwards Ridge Road against minor-to-moderate magnitude earthquakes.	Village of Gnadenhutten Mayor	Removed from Plan
Coordinate with dam owners to ensure that their inundation mapping and response plans are being kept up to date	Tuscarawas County Commission	Carrying to New Plan
Make repairs to levee near Village of Zoar alongside the Army Corps of Engineers.	Village of Zoar Council, Army Corps of Engineers	Ongoing
Develop a public education program that informs residents and businesses of the County about the potential effects of Natural Resource Extraction	Tuscarawas County Commission	Removed from Plan
Identify vulnerable populations from the impacts of severe winter storms by identifying specific at-risk populations that may be vulnerable to winter storm-related power outages.	Village of Parral Mayor	Carrying to New Plan
Identify at-risk populations that may be exceptionally vulnerable in the event of long-term power outages	Village of Stone Creek Mayor	Ongoing
Establish standards for all utilities regarding tree pruning around power lines	Village of Stone Creek Mayor	Ongoing
Establishing and promoting heating centers throughout the community during winter storms.	Village of Parral Mayor	Carrying to New Plan
Planning for and maintaining adequate road and debris clearing capabilities	Village of Stone Creek Mayor	Ongoing
Acquire emergency generators for placement at critical facilities	Tuscarawas County Commission	Carrying to New Plan
Create a public education campaign that informs homeowners that faucet drip during cold weather can prevent the buildup of excessive pressure in the pipeline and avoid bursting.	Bolivar Village Administrator, Village of Barnhill Mayor, Village of Midvale Council	Completed – Bolivar Carrying to New Plan – Midvale Removed from Plan – Barnhill
Use of a monthly newsletter thru Baltic Water Corp for public outreach. Pamphlets from Swiss Valley Ambulance to increase awareness of physic effects of extreme temperatures.	Village of Baltic Mayor's Office	Ongoing; edited action as Swiss Valley Ambulance operational area is now covered by Baltic Fire and Rescue

Action	Jurisdiction	Status (Completed / Carrying to New Plan / Removed from Plan / Ongoing)
Educate residents of the risks and symptoms of extreme temperatures and raise awareness that the Mineral City FD is a heating or cooling station for residents during extreme temperatures.	Village of Mineral City Mayor	Completed
Purchase of generators to serve as backup power for heating and cooling center	City of New Philadelphia Mayor	Carrying to New Plan
Develop a public education campaign about what procedures to take if there is a large hazardous materials release.	Tuscarawas County Commission	Carrying to New Plan
Hold a training for all jurisdictions and their emergency personnel to improve hazardous material incident response time	Tuscarawas County Commission	Carrying to New Plan
Create a public education campaign detailing what to do and who to call should their home or business begin to experience damage due to mine collapse.	Tuscarawas County Commission	Removed from Plan
Repair damage to retaining walls within the Village of Roswell	Village of Roswell Mayor	Carrying to New Plan

5.5.2 MITIGATION ACTION DEVELOPMENT

To identify mitigation actions, the HMP Planning Committee first reviewed the identified hazards and the mitigation goals and objectives. Based on the priorities and risk assessment results, mitigation actions were developed. Most importantly, the newly developed mitigation actions acknowledge the updated risk assessment information outlined in Section 4.

Mitigation Costs

The cost-effectiveness of each measure was a primary consideration for developing mitigation actions. Because mitigation is an investment to reduce future damages, it is important to select measures for which the reduced damages over the life of the measure are likely to be greater than the project cost. For structural projects, the level of cost-effectiveness is based primarily on the likelihood of damages occurring in the future, the severity of the damages when they occur, and the selected measure's level of effectiveness.

Throughout the development of the mitigation actions, the planning committee members were encouraged to consult the State of Ohio Mitigation Assistance Resource Guide. This document compiles all funding and administrative support that is available for use. Federal and state programs are identified, as well as each program's contact information, funding restrictions and criteria, and success stories when available.

As the jurisdictions begin to create a plan to complete their designated actions, they are strongly encouraged to continue to reference the resource guide to acquire funds.

While a detailed analysis was not conducted during the mitigation action development process, these factors were of primary concern when selecting measures. For measures that do not result in a quantifiable reduction of damages, such as public education and outreach, the relationship of the probable future benefits and the cost of each measure was considered when developing the mitigation actions.

New mitigation actions for the 2022 plan are found below:

TABLE 5-6 TUSCARAWAS COUNTY 2022 MITIGATION ACTIONS

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
1	Baltic	Extreme Temperatures	Use of a monthly newsletter thru Baltic Water Corp for public outreach. Pamphlets from Baltic Fire and Rescue to increase awareness of physic effects of extreme temperatures.	Village of Baltic Mayor's Office	$500	Near Term (0-1 years)	Baltic Water Corp	10
2	Baltic	Extreme Temperatures, Severe Thunderstorms, Severe Winter Storms, Flooding, Tornadoes, Drought, Earthquakes, Dam Failure	Add public awareness information for natural hazards to the Village of Baltic website	Fiscal Officer	Staff time and resources	Near Term (0-1 years)	Village fund	10
3	Baltic	Extreme Temperatures, Severe Thunderstorms, Severe Winter Storms, Flooding, Tornadoes	Acquire electronic signs to post along major roadways in the Village of Baltic to alert residents of impending severe weather alerts	Fiscal Officer	$25,000 per sign	Near Term (0-1 years)	FEMA HMGP, Rosenberry Foundation Grant, local match	10
4	Baltic, Dennison, Midvale, Newcomerstown, Stone Creek, Sugarcreek, Tuscarawas County	Flooding	Identify properties at risk within the 1% SHFA	Village of Baltic Mayor, Village of Dennison Mayor, Village of Midvale Mayor, Village of Newcomerstown Mayor, Village of Stone Creek Mayor, Village of Sugarcreek Mayor, Tuscarawas County Commission	Staff time and resources	Long Term (4-5 years)	Existing budget	10
5	Barnhill	Severe Thunderstorms	Widen the storm drainage pipe on Nageley Road to accommodate storm runoff	Village Council	$7,500	Medium Term (2-3 years)	CDBG	10

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
6	Barnhill, Midvale, New Philadelphia, Roswell, Stone Creek	Flooding	Clean out storm drainage system of vegetation debris in order to improve stormwater flow	Village of Roswell Mayor, City of New Philadelphia Mayor, Village of Barnhill Mayor, Village of Midvale Mayor, Village of Stone Creek Mayor	$20,000	Long Term (4-5 years)	FEMA FMA grant, existing budget	8
7	Bolivar	All Hazards	Develop a Continuity of Operations Plan/Emergency Operations Plan to ensure there is no loss of governmental/emergency response function during a disaster event	Mayor	Staff time and resources	Near Term (0-1 years)	Local budget	4
8	Bolivar	Severe Thunderstorms, Flooding, Tornadoes	Install a dual purpose siren system throughout the Village to alert residents of impending extreme weather (i.e., thunderstorms, high wind events, tornadoes) and flooding	Mayor	$120,000	Near Term (0-1 years)	FEMA BRIC/HMGP, local match	8
9	Bolivar	Flooding	Participate in the NFIP and remain in good standing by enforcing the county's floodplain regulations	Mayor	Staff time and resources	Near Term (0-1 years)	Local budget	10
10	Dennison	Flooding	Update existing flood damage prevention and ordinances (as it relates to 44 CFR 60.3) and participate in the CRS program	Village of Dennison Mayor	Staff time and resources	Medium Term (2-3 years)	Existing budget	8
11	Dennison	Flooding	Using the digital mapping system of the stormwater pipes in the village, upgrade the stormwater pipes in the village and remove cross-sections of stormwater pipes to reduce flooding	Mayor, Contracted Engineering Firm	$2,000,000	Long Term (4-5 years)	Ohio Public Works, CDBG, ARC/GOA	10
12	Dover	Dam Failure	Evaluate the existing low-head dam in the City of Dover, and replace or renovate the dam if deemed necessary	Mayor	$300,000 for dam evaluation, $6,500,000 to replace the dam	Medium Term (2-3 years)	FEMA HHPD/BRIC/HMGP, local match	10

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
13	Tuscarawas County and all participating Jurisdictions	Tornado	Identify a location and construct a community saferoom within the city parks or jurisdictional properties.	Tuscarawas County EMA	$100,000	Long Term (4-5 years)	FEMA BRIC or HMGP, existing budget	8
14	Dover, Strasburg	Severe Thunderstorms	Bi-annual inspection of vegetation growing in or near powerlines, and pruning as necessary	Strasburg Village Administrator, City of Dover Mayor	$75,000 - $100,000	Long Term (4-5 years)	Existing operating budget	9
15	Gnadenhutten	Flooding	Create a floodplain management plan to limit development	Village Administrator, Mayor	Staff time and resources	Long Term (4-5 years)	General obligations	3
16	Midvale	Extreme Temperatures	Create a public education campaign that informs homeowners that faucet drip during cold weather can prevent the buildup of excessive pressure in the pipeline and avoid bursting.	Village of Midvale Council	$1,000	Long Term (4-5 years)	Existing budget	10
17	Midvale	Severe Thunderstorms, Tornadoes, Earthquakes	Update and adopt new building codes to ensure future development in the village is built to withstand hazard events	Mayor and Village Council	Staff time and resources	Long Term (4-5 years)	Local budget	5
18	Mineral City	Flooding	County Road 90 floods – Partner with Sandy Township to develop an access road to be able to support and help residents that are located on the other side of the flooded area	Township Trustees, Village County Members, Fire Department	$200,000	Long Term (4-5 years)	FEMA FMA/BRIC/HMGP, local match	10
19	New Philadelphia	Flooding	Expand existing freeboard requirements above minimum levels	City of New Philadelphia Service Director	Staff time and resources	Long Term (4-5 years)	Existing budget	10
20	New Philadelphia	Extreme Temperatures	Purchase of generators to serve as backup power for heating and cooling center	City of New Philadelphia Mayor	$5,000	Long Term (4-5 years)	FEMA HMGP, Existing Budget	9
21	New Philadelphia	Flooding	Replacement of undersized and 100-year-old storm water sewer lines in the 4th Street NW and West High Avenue intersection. Currently the intersection floods with up to four feet of rain during heavy downpours. The project will install 1540 LF of 48" dual wall corrugated HDPE pipe, and 1,823	Service Director	$2,000,000	Near Term (0-1 years)	Federal ARPA funds, local sewer funds	10

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
			LF of 60" dual wall corrugated HDPE pipe.					
22	Newcomerstown	Tornado	Replace current tornado sirens with ones capable of reaching the corporation limit.	Village of Newcomerstown Mayor	$23,000	Near Term (0-1 years)	Existing budget, FEMA HMGP	9
23	Newcomerstown	Flooding	Our infrastructure has aged – specifically our storm sewers. The storm sewers under Canal Street need to be upgraded and/or widened to manage increased storm runoff	Street Department, Water Department, Engineer	$1,000,000	Medium Term (2-3 years)	FEMA HMGP, local match	6
24	Newcomerstown	Flooding	Strengthen floodplain ordinances to set up at least 2 feet of freeboard about the SFHA	Floodplain Manager	Staff time and resources	Medium Term (2-3 years)	General fund	7
25	Parral	Tornado	Conduct outreach activities to increase awareness of tornado risk, as well as the promotion and use of safe rooms.	Village of Parral Mayor	Staff time and resources	Long Term (4-5 years)	Existing budget	10
26	Parral	Severe Winter Storms	Identify vulnerable populations from the impacts of severe winter storms by identifying specific at-risk populations that may be vulnerable to winter storm-related power outages.	Village of Parral Mayor	Staff time and resources	Long Term (4-5 years)	Existing budget	10
27	Parral	Severe Winter Storms	Establishing and promoting heating centers throughout the community during winter storms.	Village of Parral Mayor	Staff time and resources	Long Term (4-5 years)	Existing budget	9
28	Parral	Extreme Temperatures, Severe Thunderstorms, Severe Winter Storms	Construct a heating/cooling shelter for the village's older population	Mayor	$20,000	Long Term (4-5 years)	FEMA BRIC, local match	4
29	Port Washington	Tornado	Implement reverse 911 calling to residents of Port Washington during tornadoes.	Village of Port Washington Mayor	$10,000	Long Term (4-5 years)	FEMA HMGP, existing budget	9
30	Port Washington	Severe Thunderstorms, Flooding, Tornadoes	Renovate a section of the local school to serve as a dedicated storm shelter for the village	Mayor, Police Chief	$500,000	Long Term (4-5 years)	FEMA BRIC, local match	4

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
31	Roswell	Tornado	Install a siren to alert residents of impending tornadoes	Village of Roswell Mayor	$25,000	Long Term (4-5 years)	FEMA HMGP or BRIC, existing budget	9
32	Roswell	Mine Subsidence/ Abandoned Wells	Repair damage to retaining walls within the Village of Roswell	Village of Roswell Mayor	$25,000	Long Term (4-5 years)	FEMA BRIC, existing budget	8
33	Roswell	Flooding	Clean out and deepen Beaver Dam Creek 2 feet of trees and debris to lessen the flooding impacts on the village	Mayor	$100,000 for USACE Impact Study; $250,000 to complete maintenance	Long Term (4-5 years)	FEMA FMA/HMGP, USACE, local match	7
34	Stone Creek	Flooding	Heighten awareness of flood risk by developing and maintaining a database to track community exposure to flood risk and revising and updating floodplain maps.	Village of Stone Creek Mayor	$2,000	Long Term (4-5 years)	FEMA HMGP, existing budget	9
35	Stone Creek	Flooding	Adopting ASCE-24-05 Flood Resistant and Design Construction. ASCE-24 is referenced standard in the IBC that specified minimum requirements and expected performance for the design and construction of building in the flood hazard areas to make them more resistant to flood loads and flood damage.	Village of Stone Creek Mayor and Council	Staff time and resources	Medium Term (2-3 years)	Existing budget	8
36	Stone Creek	Drought	Engage active well-monitoring to assist in keeping track of water usage during drought conditions.	Stone Creek Mayor	$1,500	Long Term (4-5 years)	United States Department of Agriculture grants	10
37	Stone Creek	Tornado	Through a public education campaign, promote the construction and use of safe room in homes and shelter areas of manufactures homes / trailers or other vulnerable public structures.	Village of Stone Creek Mayor	$1,000	Long Term (4-5 years)	FEMA HMGP/BRIC grants, existing budget	10
38	Stone Creek	Severe Winter Storms	Identify at-risk populations that may be exceptionally vulnerable in the event of long-term power outages	Village of Stone Creek Mayor	Staff time and resources	Long Term (4-5 years)	Existing budget	10

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
39	Stone Creek	Severe Winter Storms	Establish standards for all utilities regarding tree pruning around power lines	Village of Stone Creek Mayor	$1,000	Long Term (4-5 years)	Existing budget	10
40	Stone Creek	Severe Winter Storms	Planning for and maintaining adequate road and debris clearing capabilities	Village of Stone Creek Mayor	Staff time and resources	Long Term (4-5 years)	Existing budget	9
41	Stone Creek	Flooding	Clear out all the culverts located in the Village and excavate Stone Creek to alleviate flash and waterway flooding	Mayor and Council Members	$50,000	Medium Term (2-3 years)	FEMA BRIC/FMA, local match	8
42	Strasburg	Tornado	Install sirens for early warning capability	Village of Strasburg Mayor	$20,000	Near Term (0-1 years)	FEMA BRIC or HMGP, existing budget	8
43	Strasburg	Flooding	Expand the stormwater drains along Wooster Avenue	Village Mayor, Transportation Engineer	$250,000	Long Term (4-5 years)	FEMA BRIC, local match	8
44	Sugarcreek	Severe Thunderstorms	Place signs in local parks about the dangers of lightning strikes to raise public awareness.	Village of Sugarcreek Administrator	$3,000	Near Term (0-1 years)	FEMA HMGP, Operating Budget	10
45	Sugarcreek	Flooding	Clean out storm drain pipes and waterways in the village on a regular basis to remove debris	Village of Sugarcreek	$50,000	Near Term (0-1 years)	FEMA HMGP, local budget	7
46	Trinity Twin City Medical Center, Village of Denison	Extreme Temperatures, Severe Thunderstorms, Severe Winter Storms, Earthquakes	Utilize the full capacity of the generator the hospital currently owns by hooking up more of the medical building infrastructure to the generator for future use in the event of a power outage	Hospital Emergency Manager, Village of Denison Mayor	$1,000,000	Long Term (4-5 years)	General revenue, capital expenditure, FEMA BRIC, HMGP	6
47	Trinity Twin City Medical Center, Village of Denison	Severe Thunderstorms, Severe Winter Storms, Tornadoes	Reinforce windows with storm and wind-resistant glass	Hospital Emergency Manager, Village of Denison Mayor	$250,000	Medium Term (2-3 years)	General revenue, capital expenditure, FEMA BRIC, HMGP	8
48	Tuscarawas	Tornado	Conduct village-wide tornado drills in conjunction with local schools, the fire department, and the police department. Promoting the use of NOAA weather radios in local homes and businesses.	Village of Tuscarawas Mayor and Village Council	$3,000	Medium Term (2-3 years)	Existing budget	10

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
49	Tuscarawas	Flooding, Dam Failure	Widen the storm sewer that runs along Cherry Street from East to Main. This is the longest section of storm sewer in town so it will be the most impactful renovation.	Village Administrator	$80,000	Medium Term (2-3 years)	FEMA BRIC, Ohio Public Works, CBDG, ARC, Village funds	6
50	Tuscarawas County	Flooding	Update storm water policies for new development (specifically subdivisions)	Tuscarawas County Commission	Staff time and resources	Medium Term (2-3 years)	Existing budget	9
51	Tuscarawas County	Flooding	Improve/enlarge discharge capacity for Goettge Run to increase outflow capacity into the Sugar Creek	Tuscarawas County Engineer	$50,000	Long Term (4-5 years)	FEMA FMA Grant, existing county budget	8
52	Tuscarawas County	Flooding	Undertake projects to elevate roads with fill material, particularly county and township roads that result in closures due to high water during flood events	Tuscarawas County Commission	$500,000	Long Term (4-5 years)	FEMA FMA Grant, Existing budget	8
53	Tuscarawas County	Drought	Create a public education campaign aimed at farmers and residents about best water practices during times of drought	Tuscarawas County Commission	$2,000	Long Term (4-5 years)	FEMA HMGP or BRIC funds, Existing budget	10
54	Tuscarawas County	Severe Thunderstorms	Install lightning prediction equipment near critical county facilities.	Tuscarawas County Commission	$20,000	Long Term (4-5 years)	FEMA BRIC, National Weather Service Grants	9
55	Tuscarawas County	Dam Failure	Coordinate with dam owners to ensure that their inundation mapping and response plans are being kept up to date	Tuscarawas County Commission	Staff time and resources	Long Term (4-5 years)	Tuscarawas County EMA Budget	9
56	Tuscarawas County	Severe Winter Storms	Acquire emergency generators for placement at critical facilities	Tuscarawas County Commission	$10,000	Long Term (4-5 years)	FEMA HMGP, existing budget	8
57	Tuscarawas County	Hazardous Materials Release/Spill	Develop a public education campaign about what procedures to take if there is a large hazardous materials release.	Tuscarawas County Commission	$500	Near Term (0-1 years)	FEMA BRIC, existing budget	10
58	Tuscarawas County	Hazardous Materials Release/Spill	Hold a training for all jurisdictions and their emergency personnel to improve hazardous material incident response time	Tuscarawas County Commission	$10,000	Near Term (0-1 years)	Existing budget	9
59	Tuscarawas County	Tornadoes	Build a tornado shelter at the county fairgrounds	EMA Director	$75,000	Long Term (4-5 years)	FEMA HMGP, local match	5

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
60	Tuscarawas County Commission	Flooding	Notify owners in writing of flood prone properties and recommend the need for flood insurance	Tuscarawas County Commission	$1,000	Long Term (4-5 years)	Existing budget	10
61	Tuscarawas County, all jurisdictions	Health-Related Emergencies	Develop and promote a public campaign for health-related emergencies and how to stop community spread of germs	County Commissioners, local jurisdiction mayors	$5,000	Long Term (4-5 years)	County and local budget	7
62	Tuscarawas County, all jurisdictions	Cyberterrorism	Develop online safeguards for the county and local jurisdictions' databases and online software programs to protect against cyberterrorism	County Commissioners, local jurisdiction mayors	Staff time and resources	Long Term (4-5 years)	County and local budget	7
63	Tuscarawas County, Baltic, Dennison, Dover, Gnadenhutten, Midvale, Mineral City, New Philadelphia, Newcomerstown, Port Washington, Roswell, Strasburg, Sugarcreek, Tuscarawas, Uhrichsville, Zoar	Flooding	Ensure that NFIP requirements are being met concerning repairs, renovations, and remodeling of structures located in the regulatory floodplain	Tuscarawas County Floodplain Administrator, Village of Baltic Mayor, Village of Dennison Mayor, City of Dover Mayor, Village of Gnadenhutten Mayor, Village of Midvale Mayor, Village of Mineral City Mayor, City of New Philadelphia Mayor, Village of Newcomerstown Mayor, Village of Port Washington Mayor, Village of Roswell Mayor, Village of Strasburg Mayor, Village of Sugarcreek Mayor, Village of Tuscarawas Mayor, City of Uhrichsville Mayor, Village of Zoar Mayor	Staff time and resources	Medium Term (2-3 years)	Existing budget	9
64	Uhrichsville	Flooding	Develop new storm water regulations	City of Uhrichsville Mayor	Staff time and resources	Long Term (4-5 years)	Existing budget	10

Mit. Action #	Community	Hazard(s) Addressed	Action	Responsible Party	Cost	Timeframe	Potential Funding Sources	Priority
65	Uhrichsville	Tornado	Construct a saferoom within City of Uhrichsville Parks	City of Uhrichsville Mayor	$150,000	Long Term (4-5 years)	FEMA BRIC or HMGP, existing budget	8
66	Uhrichsville	Flooding	Update and expand the list of houses that could be eligible for removal due to repetitive flooding issues	Director of City Services	Staff time and resources to update the list; Approx. $100,000 for each removal	Medium Term (2-3 years)	FEMA FMA/HMGP/BRIC, local match	7
67	Zoar	Dam Failure	Make repairs to levee near Village of Zoar alongside the Army Corps of Engineers.	Village of Zoar Council, Army Corps of Engineers	$15,000,000	Near Term (0-1 years)	FEMA BRIC, Muskingum Watershed Conservancy District	8
68	Zoar	Flooding, Hazardous Materials Release/Spill	Coordinate with the USACE to complete the last phase of repair construction on the levee	Mayor and Village Council, USACE	Staff time and resources, $14,000,000 for levee construction	Near Term (0-1 years)	USACE	10
69	Tuscarawas County	Dam Failure	Rehabilitate high-hazard potential dams in Tuscarawas County through updating or removing the structure, engineering methods, and/or land use solutions	Tuscarawas County EMA	$500,000	Long Term (4-5 years)	FEMA HHPD, local match	10
70	Tuscarawas County and all participating Jurisdictions	Flooding	Acquisition, demolition, and/or retrofit of flood prone properties for the county and all communities	Tuscarawas County EMA	$350,000	Long Term (4-5 Years)	FEMA FMA/HMGP/BRIC, local match	7
71	Tuscarawas County	Dam Failure	Obtain EAP and inundation mapping for Sugarcreek Sportsman Club Lake Dam.	Tuscarawas County EMA	Staff time and resources	Medium Term (2-3 years)	Existing budget	7

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SECTION 6. PLAN IMPLEMENTATION AND MAINTENANCE

As a living document, it is important that this plan becomes a tool for county resources to ensure possible damage from a hazard event is reduced. This section discusses plan adoption, implementation, monitoring, evaluating, and updating the HMP. Plan implementation and maintenance procedures will ensure that the HMP remains relevant and continues to address the changing environment in Tuscarawas County. This section describes the incorporation of the HMP into existing planning mechanisms, and how the planning committee will continue to engage the public.

1. PLAN ADOPTION

Tuscarawas County adopted the 2022 Tuscarawas County Hazard Mitigation Plan on September 14, 2022.

TABLE 6-1 DATES OF 2022 TUSCARAWAS COUNTY HMP ADOPTION

Jurisdiction	Adoption Date
Tuscarawas County	September 14, 2022
City of Dover	October 3, 2022
City of New Philadelphia	December 12, 2022
City of Uhrichsville	September 9, 2022
Village of Baltic	September 20, 2022
Village of Barnhill	September 10, 2022
Village of Bolivar	September 6, 2022
Village of Dennison	September 15, 2022
Village of Gnadenhutten	September 19, 2022
Village of Midvale	September 8, 2022
Village of Mineral City	August 25, 2022
Village of Newcomerstown	September 6, 2022
Village of Parral	September 19, 2022
Village of Port Washington	September 6, 2022
Village of Roswell	September 15, 2022
Village of Stone Creek	March 14, 2023
Village of Strasburg	September 6, 2022
Village of Sugarcreek	September 19, 2022
Village of Tuscarawas	October 27, 2022
Village of Zoar	September 13, 2022

The 2022 Tuscarawas County HMP expires on **December 12, 2027**.

2. EVALUATION, MONITORING AND UPDATING

Monitoring, evaluating, and updating this plan is critical to maintaining its value and success in completing identified mitigation efforts. The effective implementation of mitigation activities paves the way for continued momentum in the planning process and gives direction for the future. This section explains who will be responsible for maintenance activities and what those responsibilities entail. It also provides a methodology and schedule for maintenance activities and describes how the public will be involved on a continued basis.

The Tuscarawas County Hazard Mitigation Planning Committee (HMPC) established for this 2022 plan is designated to lead the plan maintenance processes of monitoring, evaluation and updating, with support and representation from all participating municipalities. The HMPC will coordinate maintenance efforts, but the input needed for effective periodic evaluations will come from county-wide representatives and other important stakeholders.

The HMPC will oversee the progress made on the identified action items and will modify actions, as needed, to reflect changing conditions. The HMPC will meet annually to evaluate the plan and discuss specific coordination efforts that may be needed.

The annual evaluation of the 2022 Plan will include not only an investigation of whether mitigation actions were completed, but also an assessment of how effective those actions were in mitigating losses. A review of the qualitative and quantitative benefits (or avoided losses) of mitigation activities will support this assessment. Results of the evaluation will then be compared to the goals and objectives established in the plan; The committee will lead decisions on whether to discontinue or modify actions in any way, in light of new developments. The Mitigation Planning Committee will document progress for use in the next Hazard Mitigation Plan update. Finally, the Mitigation Planning Committee will monitor and incorporate elements of this plan into other planning mechanisms.

This plan will be updated by the FEMA-approved 5-year anniversary date, as required by the Disaster Mitigation Act of 2000, or following a disaster event. Future plan updates will account for any new hazard vulnerabilities, special circumstances, or new information that becomes available. During the 5-year review process, the following questions will be considered as criteria for assessing the effectiveness of the HMP.

- Has the nature or magnitude of hazards affecting the county changed?
- Are there new hazards that have the potential to impact the county?
- Do the identified goals and actions address current and expected conditions?
- Have mitigation actions been implemented or completed?
- Has the implementation of identified mitigation actions resulted in expected outcomes?
- Are current resources adequate to implement the plan?

- Should additional resources be committed to address identified hazards?

Issues that arise during monitoring and evaluation which require changes to the local hazard, risk and vulnerability summary, mitigation strategy, and other components of the plan will be incorporated during future updates.

Update process for plan prior to 5-year update: Anyone interested in updating this plan sooner than the 5-year update will submit a request to the HMPC for consideration. The request should be accompanied by a detailed rationale. The request will be evaluated, and the committee will determine whether or not to act on the update request. If the decision is to act, an individual will be assigned to author the update. A draft of the updated section, along with a detailed rationale, will be submitted to the Mitigation Planning Committee. The committee will circulate the draft updated section for comment, and after an appropriate period of time, the committee will decide whether to update the plan, at least partially based on the feedback received.

3. PLAN UPDATE AND MAINTENANCE

This section describes the schedule and process for monitoring, evaluating, and updating the 2022 HMP.

6.3.1 SCHEDULE

Monitoring the progress of the mitigation actions will be ongoing throughout the 5-year period between the adoption of the HMP and the next update process. The HMPC will meet annually to monitor the status of the mitigation actions and to develop updates as necessary.

The HMP will be updated every 5 years, as required by DMA 2000. The update process will begin at least 1 year before the HMP expires. However, the HMPC will reconvene within 30 days of any significant disaster that affects the county, to review and update the HMP as appropriate.

6.3.2 PROCESS

The HMPC will coordinate with the responsible agencies/organizations identified for each mitigation action. These agencies/organizations will monitor and evaluate the progress made on the mitigation actions for which they are responsible and report to the HMPC annually. Working with the HMPC, these responsible agencies/organizations will be asked to assess the effectiveness of the mitigation actions and modify the mitigation actions as appropriate.

Future updates to the HMP will account for any new hazard vulnerabilities, special circumstances, or new information that become available. Issues that arise while monitoring and evaluating the HMP, which require changes to the risk assessment, mitigation strategy and other components of the HMP, will be incorporated into the next update of the HMP. The questions identified above would remain valid while the update is prepared.

Public Involvement

At all stages of the plan maintenance process, the public of Tuscarawas County will be invited to participate. Before the HMP's annual review and after major disaster events, when the HMP is

revisited, the public will be invited through *The Times-Reporter*, posts on social media, and flyers posted at the Tuscarawas County Court House.

Any comments received will be logged and then addressed within the main document of the plan. A new version of the plan will be created and saved for each round of major edits.

6.3.3 INCORPORATION INTO EXISTING PLANNING MECHANISMS

An important implementation mechanism is to incorporate the recommendation and underlying principles of the HMP into planning and development such as capital improvement budgeting, general plans and comprehensive plans. Mitigation is most successful when it is incorporated within the day-to-day functions and priorities of the entity attempting to implement risk-reducing actions. The integration of a variety of departments on the HMPC provides an opportunity for constant and pervasive efforts to network, identify, and highlight mitigation activities and opportunities. This collaborative effort is also important to monitor funding opportunities that can be leveraged for the mitigation actions.

Past Integration

- **Tuscarawas County Subdivision Regulations:** In 2019, the county updated the subdivision regulations. The previous hazard mitigation plan was integrated into the regulation update by including information regarding flood hazard areas and not permitting construction in the floodplains in the county.

Future Integration

- **Capital Improvement Plans:** Plans that involve the upgrade of existing infrastructure provide an excellent opportunity for the county to build in hazard mitigation. This may include roadways, stream embankments, riverfront upgrades, or public walkways, but is not limited to these.

- **Tuscarawas County Comprehensive Land Use Plan:** Adopted on March 9, 2004, the comprehensive land use plan for the county was developed to plan for future development and redevelopment within the unincorporated areas of the county. An update of the comprehensive land use plan would provide an opportunity to integrate the HMP hazards, vulnerability assessments, and mitigation actions into the land use plan.

- **Local Plans and Polices**: The HMP will provide information that can be incorporated into local master plans during the next plan development or update. Specific risk and vulnerability information from the HMP will help identify areas where development may be at risk to potential hazards.

- **Historic Building Inventory**: The HMP includes information on historic buildings that can help guide decisions on what actions to take with historic buildings.

- **Tuscarawas County Mass Casualty Plan:** Adopted in September 30, 2011, the Mass Casualty Plan is similar to a disaster recovery plan and emergency operations plan. Rather than focusing on actions on how to create a more resilient community, a mass casualty plan lays

out a set of policies, tools, and procedures on how to recover after an incident. Hazards identified in the Tuscarawas County HMP and other relevant information will be incorporated in the next update.

- **Tuscarawas County Emergency Evacuation Plan for Dover Dam:** The Tuscarawas County Emergency Evacuation Plan for Dover Dam was completed in June 2007. In the next update of the plan, the HMP will provided updated information on populations downstream of the dam that may require evacuation and the current efforts that are being made through the HMP to mitigate the dam failure's impacts that may lessen the need to evacuate.
- **Subdivision Regulations:** The HMP will provide important information regarding flooding, NFIP information and data, and best practices regarding a resilient built environment. The last update for the regulations was approved on January 1, 2019.
- **Tuscarawas County Flood Damage Reduction Regulations:** Adopted on October 1, 2007, and revised on May 13, 2010, the county's floodplain regulations outline the administration of floodplain regulation enforcement and use and development standards to reduce flood hazard risk. In the next revision of the Tuscarawas County Flood Damage Reduction Regulations, updated flood locations, extent, impact, and vulnerability information from the 2022 HMP will be integrated. Additionally, flood mitigation actions pertaining to regulatory enforcement will be reviewed during the update.

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APPENDIX A. MEETING MINUTES AND AGENDAS

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Tuscarawas County Hazard Mitigation Plan Update

Kickoff Meeting

October 27, 2021
10:00 AM – 11:00 AM, 5:30 PM – 6:30 PM

Place: Virtually through Cisco WebEx

ATTACHED: LIST OF ATTENDANCE

MEETING FACILITATORS:

Alex McCarthy, Director, Tuscarawas County Homeland Security & Emergency Management Agency

Noah Porter, Deputy Director, Tuscarawas County Homeland Security & Emergency Management Agency

Jason Farrell, Project Manager, Michael Baker International

Josh Vidmar, Planning Lead, Michael Baker International

Claire Fetters, Planner, Michael Baker International

1. Welcome and Introductions
2. Project Overview
3. Planning Process
4. Risk Assessment
5. Mitigation Strategy
6. Tuscarawas County HMP Website
7. Planning Timeline
8. Next Steps and Action Items

Director McCarthy opened the meeting by thanking everyone for coming and briefly introducing the overall project. He then turned the floor over to Josh Vidmar of Michael Baker International.

Josh explained the core concept of mitigation and why it is needed, and that the mitigation plan is required to receive certain funds through FEMA. In addition, he covered what is expected of the participants, both currently in attendance and those who will serve on the Tuscarawas County Hazard Mitigation Planning Committee in the next round of meetings.

Josh then provided those in attendance with a project timeline and an explanation of how Michael Baker International will complete the plan based on the proposed project schedule (looking at an approximate eight-month project schedule). He explained that it is a goal that the updated plan be delivered to Ohio for state review and then to FEMA for review in sufficient time for review and adoption.

Mr. Vidmar continued the meeting by discussing the benefits of hazard mitigation, and the components of a mitigation plan.

- Introduction
- Community Profile
- Planning Process
- Risk Assessment
- Capability Assessment
- Mitigation Strategy
- Plan Maintenance
- Adoption

After describing each component of the hazard mitigation plan, Mr. Vidmar went through the Tuscarawas County Hazard Mitigation Planning Website to illustrate how the jurisdictions would submit the required forms and information for the mitigation plan. The following forms were discussed:

RISK EVALUATION

Tuscarawas County - Risk Evaluation

This form includes an evaluation of any changes to the hazards that were profiled in the previous hazard mitigation form. Please fill out the form below to provide an evaluation of the change in hazards by identifying if the risk of hazard has increased, decreased, or remained the same in your community.

Sign in to Google to save your progress. Learn more

* Required

Please provide the name of your community / organization. *

Your answer

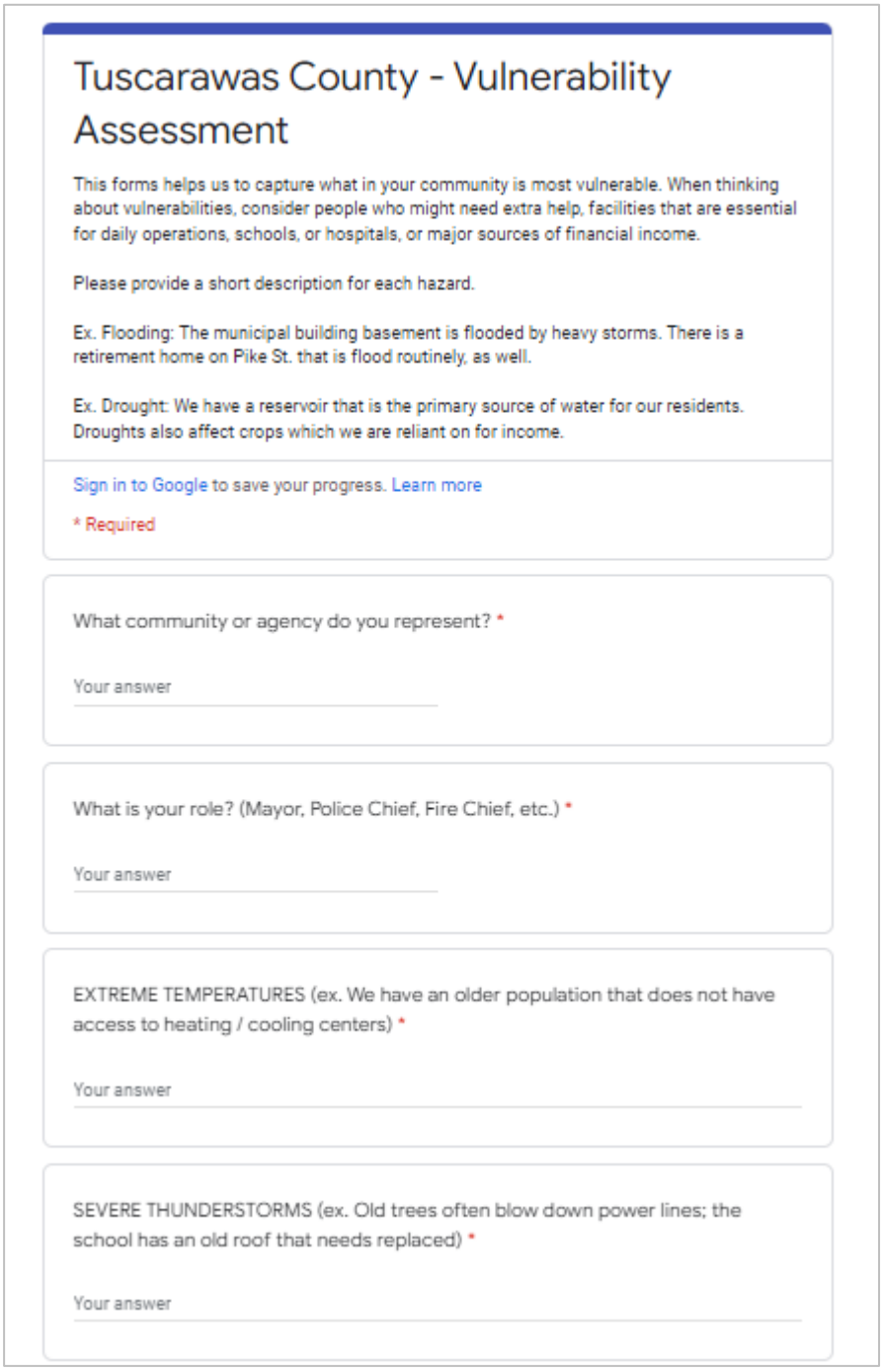
What is your role? (Mayor, Police Chief, Fire Chief, etc.) *

Your answer

Thinking about the following hazards, do you think that they have increased in frequency or impact, decreased, or had no change? *

	Increase	Decrease	No Change
Extreme Temperatures	○	○	○
Severe Thunderstorms	○	○	○
Severe Winter Storms	○	○	○
Flooding	○	○	○
Tornadoes	○	○	○
Drought	○	○	○
Earthquakes	○	○	○
Dam Failure	○	○	○
Hazardous Material Incidents	○	○	○

VULNERABILITY ASSESSMENT



Tuscarawas County - Vulnerability Assessment

This forms helps us to capture what in your community is most vulnerable. When thinking about vulnerabilities, consider people who might need extra help, facilities that are essential for daily operations, schools, or hospitals, or major sources of financial income.

Please provide a short description for each hazard.

Ex. Flooding: The municipal building basement is flooded by heavy storms. There is a retirement home on Pike St. that is flood routinely, as well.

Ex. Drought: We have a reservoir that is the primary source of water for our residents. Droughts also affect crops which we are reliant on for income.

Sign in to Google to save your progress. Learn more

* Required

What community or agency do you represent? *

Your answer

What is your role? (Mayor, Police Chief, Fire Chief, etc.) *

Your answer

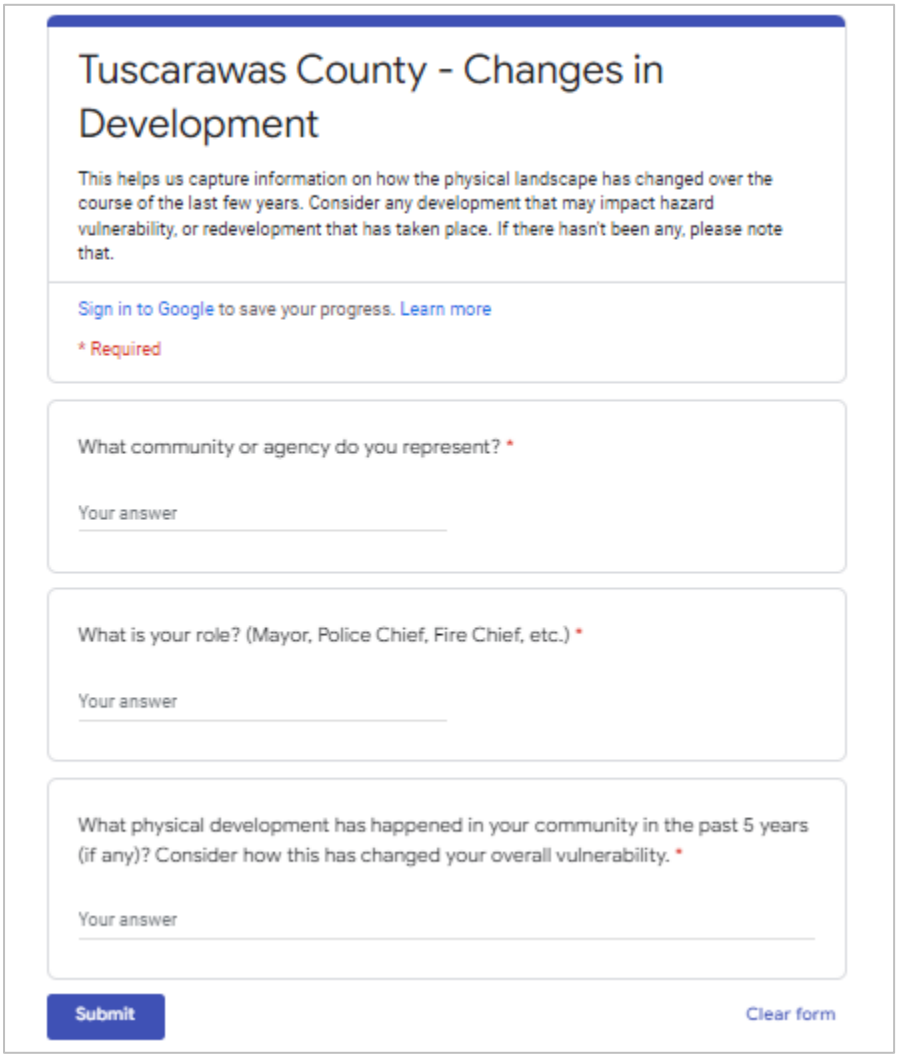
EXTREME TEMPERATURES (ex. We have an older population that does not have access to heating / cooling centers) *

Your answer

SEVERE THUNDERSTORMS (ex. Old trees often blow down power lines; the school has an old roof that needs replaced) *

Your answer

CHANGES IN DEVELOPMENT



Tuscarawas County - Changes in Development

This helps us capture information on how the physical landscape has changed over the course of the last few years. Consider any development that may impact hazard vulnerability, or redevelopment that has taken place. If there hasn't been any, please note that.

Sign in to Google to save your progress. Learn more

* Required

What community or agency do you represent? *

Your answer

What is your role? (Mayor, Police Chief, Fire Chief, etc.) *

Your answer

What physical development has happened in your community in the past 5 years (if any)? Consider how this has changed your overall vulnerability. *

Your answer

Submit

Clear form

CAPABILITY ASSESSMENT

Tuscarawas County - Capability Assessment

This form asks you to look at your existing capabilities to implement mitigation projects.

Sign in to Google to save your progress. Learn more

* Required

What community or agency do you represent? *

Your answer

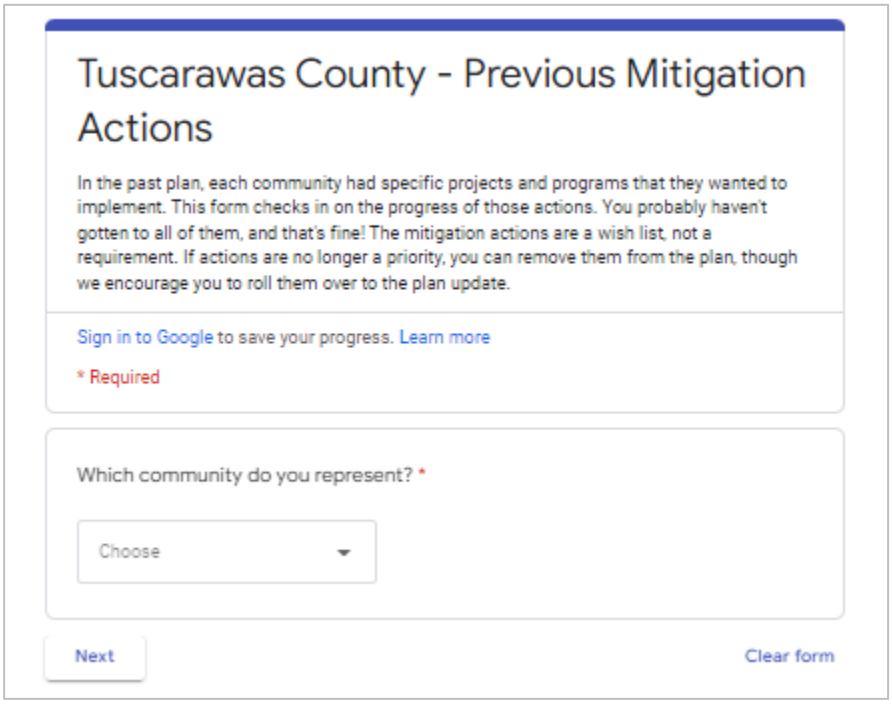
What is your role? (Mayor, Police Chief, Fire Chief, etc.) *

Your answer

Which of the following PLANNING capabilities do you have in your community? You will not have all of them! If you don't know what something is, skip it. *

	In Place	Under Development	Do Not Have
Building Codes	☐	☐	☐
Capital Improvement Plan	☐	☐	☐
Comprehensive Plan	☐	☐	☐
Continuity of Operations Plan	☐	☐	☐
Disaster Recovery Plan	☐	☐	☐
Economic Development Plan	☐	☐	☐
Emergency Operations Plan	☐	☐	☐

PREVIOUS MITIGATION ACTIONS



Tuscarawas County - Previous Mitigation Actions

In the past plan, each community had specific projects and programs that they wanted to implement. This form checks in on the progress of those actions. You probably haven't gotten to all of them, and that's fine! The mitigation actions are a wish list, not a requirement. If actions are no longer a priority, you can remove them from the plan, though we encourage you to roll them over to the plan update.

Sign in to Google to save your progress. Learn more

* Required

Which community do you represent? *

Choose

Next

Clear form

NEW MITIGATION ACTION

Tuscarawas County - New Mitigation Actions

Each community must fill out AT LEAST one of these forms! If you have more than one idea, please feel free to submit another!

Sign in to Google to save your progress. Learn more

* Required

What community or agency do you represent? *

Your answer

What is your role? (Mayor, Police Chief, Fire Chief, etc.) *

Your answer

What hazard does this action relate to (pick one or more)? *

- [ ] Extreme Temperatures
- [ ] Severe Thunderstorms
- [ ] Severe Winter Storms
- [ ] Flooding
- [ ] Tornadoes
- [ ] Drought
- [ ] Earthquakes
- [ ] Dam Failure
- [ ] Hazardous Materials Incidents
- [ ] Mine Subsidence/Abandoned Wells
- [ ] Natural Resource Extraction

What is your project? Please be as specific as possible. (ex. Widen the culvert on Park Avenue over Dodson Creek to 36 inches. It currently is 28 inches which is insufficient.) *

Your answer

CLOSING AND NEXT STEPS

Once the website review was complete, the final step was to go over the remainder of the project. This included a short discussion about the individual meetings that would be held with each jurisdiction for further engagement and the project team's next steps – distribute data requests and develop the Hazard Identification and Risk Assessment component of the plan. After reviewing the planning schedule, those in attendance were asked if there were any further questions before adjourning. No questions were asked, and the meeting was adjourned.

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APPENDIX B. COMPLETE HAZARD HISTORY

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TABLE 6-2 TUSCARAWAS COUNTY EXTREME TEMPERATURE EVENTS, JANUARY 1, 1996-NOVEMBER 30, 2021

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Countywide	1/5/2014	Extreme Cold/Wind Chill	0	0	0	0
Countywide	2/14/2015	Extreme Cold/Wind Chill	0	0	0	0
Countywide	2/19/2015	Extreme Cold/Wind Chill	0	0	0	0
Countywide	2/24/2015	Extreme Cold/Wind Chill	0	0	0	0
Countywide	1/30/2019	Extreme Cold/Wind Chill	0	0	0	0
Grand Total			**0**	**0**	**$ 0**	**$ 0**

TABLE 6-3 TUSCARAWAS COUNTY SEVERE THUNDERSTORM EVENTS, JANUARY 1, 1955-NOVEMBER 30, 2021

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Countywide	6/13/1957	Thunderstorm Wind	0	0	$ -	$ -
Countywide	3/23/1966	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/2/1967	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/12/1969	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/19/1971	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/10/1973	Thunderstorm Wind	0	0	$ -	$ -
Countywide	10/4/1973	Thunderstorm Wind	0	0	$ -	$ -
Countywide	4/14/1974	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/3/1980	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/8/1981	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/8/1981	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/7/1982	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/7/1982	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/4/1983	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/17/1983	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/21/1983	Thunderstorm Wind	0	0	$ -	$ -
Countywide	10/13/1983	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/18/1984	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/11/1984	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/8/1985	Thunderstorm Wind	0	0	$ -	$ -
Countywide	5/17/1986	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/16/1986	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/27/1986	Thunderstorm Wind	0	0	$ -	$ -
Countywide	9/30/1986	Thunderstorm Wind	0	0	$ -	$ -
Countywide	4/27/1987	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/13/1987	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/3/1989	Thunderstorm Wind	0	0	$ -	$ -
Countywide	8/29/1989	Thunderstorm Wind	0	0	$ -	$ -
Countywide	8/19/1990	Thunderstorm Wind	0	0	$ -	$ -
Countywide	4/9/1991	Thunderstorm Wind	0	0	$ -	$ -
Countywide	4/9/1991	Thunderstorm Wind	0	0	$ -	$ -
Countywide	5/30/1991	Thunderstorm Wind	0	0	$ -	$ -
Countywide	6/30/1991	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/7/1991	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/23/1991	Thunderstorm Wind	0	0	$ -	$ -
Countywide	7/5/1992	Thunderstorm Wind	0	0	$ -	$ -
Sugarcreek	6/16/1994	Thunderstorm Wind	0	0	$ 5,000	$ -
North Half	6/16/1994	Thunderstorm Wind	0	0	$ 50,000	$ -
North Of Dover	6/18/1994	Thunderstorm Wind	0	0	$ 5,000	$ -
New Philadelphia	6/21/1994	Thunderstorm Wind	0	0	$ 5,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Mineral City	6/29/1994	Thunderstorm Wind	0	0	$ 50,000	$ -
Countywide	6/29/1994	Thunderstorm Wind	0	0	$ 50,000	$ -
N Portion	8/2/1994	Thunderstorm Wind	0	0	$ 5,000	$ -
New Commerstown	9/25/1994	Thunderstorm Wind	0	0	$ -	$ -
Dover	5/10/1995	Thunderstorm Wind	0	0	$ 2,000	$ -
Urichsville	5/10/1995	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	5/24/1995	Thunderstorm Wind	0	0	$ 2,000	$ -
Dover	5/24/1995	Thunderstorm Wind	0	0	$ 2,000	$ -
Dundee	5/24/1995	Thunderstorm Wind	0	0	$ 20,000	$ -
New Philadelphia	6/21/1995	Thunderstorm Wind	0	0	$ 1,000	$ -
Bolivar	7/13/1995	Thunderstorm Wind	0	0	$ 1,000	$ -
Sugarcreek	7/13/1995	Thunderstorm Wind	0	0	$ 1,000	$ -
Countywide	7/13/1995	Thunderstorm Wind	0	0	$ 4,000	$ -
New Philadelphia	4/29/1996	Thunderstorm Wind	0	0	$ 10,000	$ -
New Philadelphia	6/24/1996	Thunderstorm Wind	0	0	$ 8,000	$ -
Uhrichsville	6/24/1996	Thunderstorm Wind	0	0	$ 35,000	$ -
Strasburg	8/8/1996	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	8/16/1997	Thunderstorm Wind	0	0	$ 3,000	$ -
New Philadelphia	4/8/1998	Thunderstorm Wind	0	4	$ 20,000	$ -
Bolivar	5/29/1998	Thunderstorm Wind	0	0	$ 3,000	$ -
Strasburg	5/31/1998	Thunderstorm Wind	0	0	$ 30,000	$ -
Dover	5/31/1998	Thunderstorm Wind	0	0	$ 2,000	$ -
Mineral City	5/31/1998	Thunderstorm Wind	0	0	$ 3,000	$ -
Zoar	5/31/1998	Thunderstorm Wind	0	0	$ 10,000	$ -
New Philadelphia	6/12/1998	Thunderstorm Wind	0	0	$ 20,000	$ -
West Chester	6/16/1998	Thunderstorm Wind	0	0	$ 5,000	$ -
Countywide	6/27/1998	Thunderstorm Wind	0	0	$ 10,000	$ -
Uhrichsville	6/27/1998	Thunderstorm Wind	0	0	$ 150,000	$ -
Countywide	6/28/1998	Thunderstorm Wind	0	0	$ 10,000	$ -
Newcomerstown	6/28/1998	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	6/29/1998	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	6/29/1998	Thunderstorm Wind	0	0	$ 2,000	$ -
Strasburg	7/19/1998	Thunderstorm Wind	0	0	$ 3,000	$ -
Stone Creek	7/21/1998	Thunderstorm Wind	0	0	$ 2,000	$ -
Gilmore	7/22/1998	Thunderstorm Wind	0	0	$ 2,000	$ -
Yorktown	7/22/1998	Thunderstorm Wind	0	0	$ 2,000	$ -
Dover	7/22/1998	Thunderstorm Wind	0	0	$ 4,000	$ -
Countywide	8/25/1998	Thunderstorm Wind	0	0	$ 30,000	$ -
New Philadelphia	11/10/1998	Thunderstorm Wind	0	0	$ 5,000	$ -
Newcomerstown	4/9/1999	Thunderstorm Wind	0	0	$ 1,000	$ -
Dover	7/9/1999	Thunderstorm Wind	0	0	$ 3,000	$ -
Newcomerstown	7/28/1999	Thunderstorm Wind	0	0	$ 3,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Dover	7/28/1999	Thunderstorm Wind	0	0	$ 5,000	$ -
Uhrichsville	8/13/1999	Thunderstorm Wind	0	0	$ 3,000	$ -
Mineral City	10/13/1999	Thunderstorm Wind	0	0	$ 3,000	$ -
Dover	4/20/2000	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	4/20/2000	Thunderstorm Wind	0	0	$ 5,000	$ -
New Philadelphia	6/2/2000	Thunderstorm Wind	0	0	$ 5,000	$ -
Countywide	8/6/2000	Thunderstorm Wind	0	0	$ 10,000	$ -
Zoar	9/20/2000	Thunderstorm Wind	0	0	$ 5,000	$ -
Countywide	5/17/2001	Thunderstorm Wind	0	0	$ 10,000	$ -
Sugar Creek	6/12/2001	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	7/1/2001	Lightning	0	1	$ -	$ -
New Philadelphia	7/1/2001	Thunderstorm Wind	0	0	$ 2,000	$ -
Port Washington	7/1/2001	Thunderstorm Wind	0	0	$ 2,000	$ -
Dennison	10/24/2001	Thunderstorm Wind	0	0	$ 5,000	$ -
Countywide	3/9/2002	Thunderstorm Wind	0	0	$ 10,000	$ -
New Philadelphia	5/12/2002	Thunderstorm Wind	0	0	$ 5,000	$ -
Bolivar	5/14/2002	Thunderstorm Wind	0	0	$ 5,000	$ -
Ragersville	6/5/2002	Thunderstorm Wind	0	0	$ 5,000	$ -
Newcomerstown	6/27/2002	Thunderstorm Wind	0	0	$ 5,000	$ -
Uhrichsville	9/3/2002	Thunderstorm Wind	0	0	$ 10,000	$ -
New Philadelphia	10/3/2002	Thunderstorm Wind	0	0	$ 5,000	$ -
Dennison	4/20/2003	Thunderstorm Wind	0	0	$ -	$ -
Port Washington	4/20/2003	Thunderstorm Wind	0	0	$ 2,000	$ -
Newcomerstown	4/20/2003	Thunderstorm Wind	0	0	$ 2,000	$ -
Uhrichsville	4/20/2003	Thunderstorm Wind	0	0	$ 2,000	$ -
Dover	6/8/2003	Thunderstorm Wind	0	0	$ 1,000	$ -
Countywide	7/4/2003	Thunderstorm Wind	0	0	$ 5,000	$ -
Gnadenhutten	7/7/2003	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	7/7/2003	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	7/8/2003	Thunderstorm Wind	0	0	$ 1,000	$ -
Gnadenhutten	7/8/2003	Thunderstorm Wind	0	0	$ -	$ -
Sugar Creek	7/8/2003	Thunderstorm Wind	0	0	$ 50,000	$ -
New Philadelphia	7/27/2003	Thunderstorm Wind	0	0	$ 5,000	$ -
Newcomerstown	8/26/2003	Thunderstorm Wind	0	0	$ 28,000	$ -
Countywide	11/12/2003	Thunderstorm Wind	0	0	$ 50,000	$ -
Strasburg	5/17/2004	Thunderstorm Wind	0	0	$ -	$ -
Dover	5/21/2004	Thunderstorm Wind	0	0	$ -	$ -
Uhrichsville	5/21/2004	Thunderstorm Wind	0	0	$ 5,000	$ -
Countywide	6/13/2004	Thunderstorm Wind	0	0	$ 10,000	$ -
New Philadelphia	6/14/2004	Thunderstorm Wind	0	0	$ 3,000	$ -
Dover	6/15/2004	Thunderstorm Wind	0	0	$ 5,000	$ -
Strasburg	6/24/2004	Thunderstorm Wind	0	0	$ 3,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Bolivar	8/4/2004	Thunderstorm Wind	0	0	$ 8,000	$ -
Gnadenhutten	8/19/2004	Thunderstorm Wind	0	0	$ 3,000	$ -
Newcomerstown	8/19/2004	Thunderstorm Wind	0	0	$ 3,000	$ -
Bolivar	8/19/2004	Thunderstorm Wind	0	0	$ 3,000	$ -
New Philadelphia	4/20/2005	Thunderstorm Wind	0	0	$ -	$ -
Newcomerstown	5/28/2005	Thunderstorm Wind	0	0	$ 5,000	$ -
New Philadelphia	6/14/2005	Thunderstorm Wind	0	0	$ 6,000	$ -
Newport	6/30/2005	Thunderstorm Wind	0	0	$ 3,000	$ -
New Philadelphia	7/13/2005	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	7/25/2005	Thunderstorm Wind	0	0	$ 40,000	$ -
Dover	7/26/2005	Thunderstorm Wind	0	0	$ 5,000	$ -
Port Washington	8/13/2005	Thunderstorm Wind	0	0	$ 5,000	$ -
Newcomerstown	8/20/2005	Thunderstorm Wind	0	0	$ 15,000	$ -
New Philadelphia	8/20/2005	Thunderstorm Wind	0	0	$ 8,000	$ -
Uhrichsville	8/20/2005	Thunderstorm Wind	0	0	$ 12,000	$ -
Stone Creek	8/20/2005	Thunderstorm Wind	0	0	$ 5,000	$ -
Gnadenhutten	11/6/2005	Thunderstorm Wind	0	0	$ 30,000	$ -
Sugar Creek	6/22/2006	Thunderstorm Wind	0	0	$ 15,000	$ -
Newcomerstown	6/22/2006	Thunderstorm Wind	0	0	$ 8,000	$ -
Dover	6/22/2006	Thunderstorm Wind	0	0	$ 15,000	$ -
Bolivar	8/3/2006	Thunderstorm Wind	0	0	$ 5,000	$ -
Countywide	8/3/2006	Thunderstorm Wind	0	0	$ 20,000	$ -
New Philadelphia	8/3/2006	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	10/4/2006	Thunderstorm Wind	0	0	$ -	$ -
Dundee	4/23/2007	Thunderstorm Wind	0	0	$ 1,500	$ -
New Cumberland	5/1/2007	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	5/27/2007	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	5/27/2007	Thunderstorm Wind	0	0	$ 1,000	$ -
Mineral City	6/13/2007	Thunderstorm Wind	0	0	$ -	$ -
Gnadenhutten	6/21/2007	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	6/21/2007	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	6/21/2007	Thunderstorm Wind	0	0	$ 3,000	$ -
Strasburg	8/9/2007	Thunderstorm Wind	0	0	$ 25,000	$ -
West Chester	8/9/2007	Thunderstorm Wind	0	0	$ 50,000	$ -
Shanesville	6/13/2008	Thunderstorm Wind	0	0	$ 25,000	$ -
Dover	6/26/2008	Thunderstorm Wind	0	0	$ 50,000	$ -
Winfield	6/28/2008	Thunderstorm Wind	0	0	$ 25,000	$ -
Strasburg	6/28/2008	Thunderstorm Wind	0	0	$ 200,000	$ -
New Philadelphia	7/8/2008	Thunderstorm Wind	0	0	$ 75,000	$ -
Port Washington	2/11/2009	Thunderstorm Wind	0	0	$ 50,000	$ -
Strasburg	6/17/2009	Thunderstorm Wind	0	0	$ 50,000	$ -
Dennison	6/17/2009	Thunderstorm Wind	0	0	$ 50,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Dover	6/19/2009	Thunderstorm Wind	0	0	$ 50,000	$ -
Winfield	6/25/2009	Thunderstorm Wind	0	0	$ 100,000	$ -
Uhrichsville	8/10/2009	Thunderstorm Wind	0	0	$ 50,000	$ -
Dover	4/16/2010	Thunderstorm Wind	0	0	$ 50,000	$ -
Gnadenhutten	4/16/2010	Thunderstorm Wind	0	0	$ 75,000	$ -
Midvale	4/25/2010	Thunderstorm Wind	0	0	$ 25,000	$ -
Shoenbrun	6/2/2010	Thunderstorm Wind	0	0	$ 40,000	$ -
Bolivar	6/23/2010	Thunderstorm Wind	0	0	$ 100,000	$ -
Uhrichsville	6/23/2010	Thunderstorm Wind	0	0	$ 50,000	$ -
Sugar Creek	9/22/2010	Thunderstorm Wind	0	0	$ 15,000	$ -
New Philadelphia	9/22/2010	Thunderstorm Wind	0	0	$ 15,000	$ -
Newcomerstown	9/22/2010	Thunderstorm Wind	0	0	$ 8,000	$ -
Wolf	4/20/2011	Thunderstorm Wind	0	0	$ 250,000	$ -
New Philadelphia	4/20/2011	Thunderstorm Wind	0	0	$ 75,000	$ -
New Philadelphia Arp	4/20/2011	Thunderstorm Wind	0	0	$ -	$ -
Glasgow	4/20/2011	Thunderstorm Wind	0	0	$ 50,000	$ -
Strasburg	6/4/2011	Thunderstorm Wind	0	0	$ 35,000	$ -
New Philadelphia	6/4/2011	Thunderstorm Wind	0	0	$ 25,000	$ -
Uhrichsville	6/4/2011	Thunderstorm Wind	0	0	$ 50,000	$ -
Strasburg	6/7/2011	Thunderstorm Wind	0	0	$ 50,000	$ -
Ragersville	6/21/2011	Thunderstorm Wind	0	0	$ 15,000	$ -
Mineral City	7/11/2011	Thunderstorm Wind	0	0	$ 5,000	$ -
Newport	7/18/2011	Thunderstorm Wind	0	0	$ 5,000	$ -
Ragersville	7/29/2011	Thunderstorm Wind	0	0	$ 5,000	$ -
Uhrichsville	8/9/2011	Thunderstorm Wind	0	0	$ 5,000	$ -
New Philadelphia	8/9/2011	Thunderstorm Wind	0	0	$ 25,000	$ -
Dundee	6/18/2012	Thunderstorm Wind	0	0	$ 500	$ -
Yorktown	6/18/2012	Thunderstorm Wind	0	0	$ 500	$ -
Stone Creek	6/18/2012	Thunderstorm Wind	0	0	$ 500	$ -
Newcomerstown	6/29/2012	Thunderstorm Wind	0	0	$ 10,000	$ -
Bolivar	7/1/2012	Thunderstorm Wind	0	0	$ 35,000	$ -
Bolivar	7/1/2012	Thunderstorm Wind	0	0	$ 35,000	$ -
Strasburg	7/1/2012	Thunderstorm Wind	0	0	$ 35,000	$ -
Dover	7/3/2012	Thunderstorm Wind	0	0	$ 5,000	$ -
New Philadelphia	7/3/2012	Thunderstorm Wind	0	0	$ 10,000	$ -
Bolivar	7/18/2012	Thunderstorm Wind	0	0	$ 35,000	$ -
Mineral City	7/18/2012	Thunderstorm Wind	0	0	$ 40,000	$ -
New Philadelphia	7/26/2012	Thunderstorm Wind	0	0	$ 100,000	$ -
New Philadelphia	7/26/2012	Thunderstorm Wind	0	0	$ 35,000	$ -
Gilmore	8/9/2012	Thunderstorm Wind	0	0	$ 500	$ -
Elm	8/9/2012	Thunderstorm Wind	0	0	$ 500	$ -
Countywide	10/29/2012	Strong Wind	0	0	$ 10,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Dover	4/10/2013	Thunderstorm Wind	0	0	$ 2,000	$ -
Strasburg	4/10/2013	Thunderstorm Wind	0	0	$ 1,000	$ -
Mineral City	4/10/2013	Thunderstorm Wind	0	0	$ 1,000	$ -
Rock	6/13/2013	Thunderstorm Wind	0	0	$ 500	$ -
Uhrichsville	6/13/2013	Thunderstorm Wind	0	0	$ 5,000	$ -
Rockford	6/13/2013	Thunderstorm Wind	0	0	$ 1,000	$ -
Newcomerstown	6/25/2013	Thunderstorm Wind	0	0	$ 2,000	$ -
Uhrichsville	6/25/2013	Thunderstorm Wind	0	0	$ 2,000	$ -
Uhrichsville	6/25/2013	Thunderstorm Wind	0	0	$ 2,000	$ -
Stone Creek	6/25/2013	Thunderstorm Wind	0	0	$ 1,000	$ -
Stone Creek	6/25/2013	Thunderstorm Wind	0	0	$ 2,000	$ -
Dennison	7/3/2013	Thunderstorm Wind	0	0	$ 10,000	$ -
Shanesville	7/10/2013	Thunderstorm Wind	0	0	$ 20,000	$ -
Dover	7/10/2013	Thunderstorm Wind	0	0	$ 15,000	$ -
Port Washington	7/10/2013	Thunderstorm Wind	0	0	$ 2,000	$ -
Stone Creek	7/19/2013	Thunderstorm Wind	0	0	$ 10,000	$ -
Tuscarawas	11/1/2013	Thunderstorm Wind	0	0	$ 25,000	$ -
Tuscarawas	12/22/2013	Thunderstorm Wind	0	0	$ 1,000	$ -
Valley Jct	4/4/2014	Thunderstorm Wind	0	0	$ 15,000	$ -
New Philadelphia	6/18/2014	Thunderstorm Wind	0	0	$ 2,000	$ -
New Philadelphia	6/18/2014	Thunderstorm Wind	0	0	$ 500	$ -
Glasgow	6/24/2014	Thunderstorm Wind	0	0	$ 5,000	$ -
Gnadenhutten	6/24/2014	Thunderstorm Wind	0	0	$ 8,000	$ -
Baltic	8/11/2014	Thunderstorm Wind	0	0	$ 2,000	$ -
Newcomerstown	12/24/2014	Thunderstorm Wind	0	0	$ 5,000	$ -
Seventeen	5/11/2015	Thunderstorm Wind	0	0	$ 250	$ -
Peoli	5/26/2015	Thunderstorm Wind	0	0	$ 5,000	$ -
Somerdale	6/12/2015	Thunderstorm Wind	0	0	$ 2,000	$ -
Sandyville	6/12/2015	Thunderstorm Wind	0	0	$ 2,000	$ -
Newcomerstown	6/30/2015	Thunderstorm Wind	0	0	$ 3,000	$ -
Stone Creek	6/30/2015	Thunderstorm Wind	0	0	$ 2,000	$ -
Newcomerstown	12/23/2015	Thunderstorm Wind	0	0	$ 2,000	$ -
Uhrichsville	5/1/2017	Thunderstorm Wind	0	0	$ 5,000	$ -
Uhrichsville	5/1/2017	Thunderstorm Wind	0	0	$ 500	$ -
New Cumberland	5/1/2017	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	5/1/2017	Thunderstorm Wind	0	0	$ 5,000	$ -
Ragersville	6/13/2017	Thunderstorm Wind	0	0	$ 10,000	$ -
Newcomerstown	7/7/2017	Thunderstorm Wind	0	0	$ 5,000	$ -
Strasburg	11/5/2017	Thunderstorm Wind	0	0	$ 2,000	$ -
Dover	11/5/2017	Thunderstorm Wind	0	0	$ 2,500	$ -
Dover	5/22/2018	Thunderstorm Wind	0	0	$ 8,000	$ -
New Philadelphia	5/22/2018	Thunderstorm Wind	0	0	$ -	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Goshen	5/22/2018	Thunderstorm Wind	0	0	$ 2,000	$ -
Shoenbrun	5/22/2018	Thunderstorm Wind	0	0	$ 500	$ -
Barnhill	5/22/2018	Thunderstorm Wind	0	0	$ 500	$ -
Roanoke	5/22/2018	Thunderstorm Wind	0	0	$ 2,000	$ -
Uhrichsville	5/22/2018	Thunderstorm Wind	0	0	$ -	$ -
Winfield	5/26/2018	Thunderstorm Wind	0	0	$ 5,000	$ -
Strasburg	5/28/2018	Thunderstorm Wind	0	0	$ 500	$ -
Sugar Creek	9/7/2018	Heavy Rain	0	0	$ -	$ -
Shanesville	9/21/2018	Thunderstorm Wind	0	0	$ -	$ -
Winfield	9/21/2018	Thunderstorm Wind	0	0	$ -	$ -
Strasburg	9/21/2018	Thunderstorm Wind	0	0	$ -	$ -
Dover	9/21/2018	Thunderstorm Wind	0	0	$ -	$ -
Dundee	3/14/2019	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	4/14/2019	Thunderstorm Wind	0	0	$ 10,000	$ -
Gnadenhutten	4/14/2019	Thunderstorm Wind	0	0	$ 2,000	$ -
Port Washington	5/25/2019	Thunderstorm Wind	0	0	$ -	$ -
Port Washington	6/5/2019	Thunderstorm Wind	0	0	$ -	$ -
Newcomerstown	6/24/2019	Thunderstorm Wind	0	0	$ 3,000	$ -
Newcomerstown	6/24/2019	Thunderstorm Wind	0	0	$ 5,000	$ -
Dover	7/2/2019	Thunderstorm Wind	0	0	$ -	$ -
Dover	7/2/2019	Thunderstorm Wind	0	0	$ 5,000	$ -
Elm	7/2/2019	Thunderstorm Wind	0	0	$ 5,000	$ -
New Cumberland	7/2/2019	Thunderstorm Wind	0	0	$ -	$ -
Stone Creek	8/20/2019	Thunderstorm Wind	0	0	$ 5,000	$ -
Uhrichsville	8/20/2019	Thunderstorm Wind	0	0	$ 10,000	$ -
Stillwater	8/20/2019	Thunderstorm Wind	0	0	$ 10,000	$ -
Dover	3/20/2020	Thunderstorm Wind	0	0	$ -	$ -
Zoar	4/7/2020	Thunderstorm Wind	0	0	$ 1,000	$ -
Bolivar	4/7/2020	Thunderstorm Wind	0	0	$ 20,000	$ -
Mineral City	4/7/2020	Thunderstorm Wind	0	0	$ 5,000	$ -
Mineral City	4/7/2020	Thunderstorm Wind	0	0	$ 10,000	$ -
Mineral City	4/7/2020	Thunderstorm Wind	0	0	$ 2,000	$ -
Goshen	4/8/2020	Thunderstorm Wind	0	0	$ 5,000	$ -
New Philadelphia	5/10/2020	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	5/10/2020	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	5/10/2020	Thunderstorm Wind	0	0	$ -	$ -
Shanesville	5/10/2020	Thunderstorm Wind	0	0	$ -	$ -
Strasburg	6/4/2020	Thunderstorm Wind	0	0	$ 5,000	$ -
Dennison	6/4/2020	Thunderstorm Wind	0	0	$ 5,000	$ -
Stone Creek	6/10/2020	Thunderstorm Wind	0	0	$ 50,000	$ -
Roswell	6/10/2020	Thunderstorm Wind	0	0	$ 50,000	$ -
Beartown	8/28/2020	Thunderstorm Wind	0	0	$ 25,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Shanesville	11/15/2020	Thunderstorm Wind	0	0	$ -	$ -
Dover	11/15/2020	Thunderstorm Wind	0	0	$ 5,000	$ -
Shanesville	11/15/2020	Thunderstorm Wind	0	0	$ -	$ -
New Philadelphia	11/15/2020	Thunderstorm Wind	0	0	$ 50,000	$ -
Uhrichsville	6/21/2021	Thunderstorm Wind	0	0	$ -	$ -
Dennison	7/16/2021	Thunderstorm Wind	0	0	$ 20,000	$ -
Stillwater	7/16/2021	Thunderstorm Wind	0	0	$ 10,000	$ -
New Philadelphia Arp	10/21/2021	Thunderstorm Wind	0	0	$ -	$ -
Grand Total			**0**	**5**	**$ 3,761,000**	**$ 0**

TABLE 6-4 TUSCARAWAS COUNTY FLOODING EVENTS, JANUARY 1, 1996-NOVEMBER 30, 2021

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Dover	1/18/1996	Flash Flood	0	0	$ -	$ -
Dover	1/18/1996	Flash Flood	0	0	$ -	$ -
New Philadelphia	1/19/1996	Flash Flood	0	0	$ -	$ -
Strasburg	5/11/1996	Flash Flood	0	0	$ -	$ -
New Philadelphia	6/24/1996	Flash Flood	0	0	$ -	$ -
Newcomerstown	5/25/1997	Flash Flood	0	0	$ -	$ -
Mineral City	6/18/1997	Flash Flood	0	0	$ 1,000	$ -
Countywide	1/7/1998	Flash Flood	0	0	$ -	$ -
Uhrichsville	1/9/1998	Flash Flood	0	0	$ -	$ -
Countywide	5/2/1998	Flash Flood	0	0	$ 5,000	$ -
Newcomerstown	6/26/1998	Flash Flood	0	0	$ -	$ -
South Portion	6/26/1998	Flash Flood	0	0	$ -	$ -
Gnadenhutten	6/27/1998	Flash Flood	0	0	$ -	$ -
Newcomerstown	6/27/1998	Flash Flood	0	0	$ -	$ -
Countywide	6/27/1998	Flash Flood	0	0	$ -	$ -
Countywide	6/28/1998	Flash Flood	0	0	$ 20,000,000	$ -
Countywide	7/1/1998	Flash Flood	0	0	$ -	$ -
Countywide	1/23/1999	Flash Flood	0	0	$ -	$ -
Countywide	4/4/2000	Flash Flood	0	0	$ -	$ -
New Philadelphia	4/8/2000	Flash Flood	0	0	$ -	$ -
Newcomerstown	8/23/2000	Flash Flood	0	0	$ -	$ -
Southeast Portion	1/31/2001	Flash Flood	0	0	$ -	$ -
Newcomerstown	8/12/2001	Flash Flood	0	0	$ 5,000	$ -
Bolivar	8/4/2003	Flash Flood	0	0	$ -	$ -
Roswell	8/7/2003	Flash Flood	0	0	$ -	$ -
New Philadelphia	8/30/2003	Flash Flood	0	0	$ 25,000	$ -
Countywide	1/4/2004	Flood	0	0	$ -	$ -
Countywide	1/4/2004	Flood	0	0	$ 100,000	$ -
Countywide	2/6/2004	Flood	0	0	$ -	$ -
Mineral City	5/18/2004	Flash Flood	0	0	$ -	$ -
Countywide	6/14/2004	Flood	0	0	$ 3,000	$ -
New Philadelphia	6/14/2004	Flash Flood	0	0	$ -	$ -
New Philadelphia	6/14/2004	Flash Flood	0	0	$ -	$ -
Strasburg	6/16/2004	Flash Flood	0	0	$ -	$ -
Countywide	6/17/2004	Flood	0	0	$ -	$ -
Countywide	7/11/2004	Flood	0	0	$ -	$ -
Zoar	8/19/2004	Flash Flood	0	0	$ -	$ -
Countywide	9/8/2004	Flood	1	0	$ 200,000	$ -
Countywide	1/5/2005	Flood	0	0	$ 150,000	$ -
New Philadelphia	6/22/2006	Flash Flood	0	0	$ -	$ -
New Philadelphia	6/22/2006	Flash Flood	0	0	$ 15,000	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
New Philadelphia	6/22/2006	Flood	0	0	$ -	$ -
Uhrichsville	3/15/2007	Flood	0	0	$ -	$ -
Bolivar	8/9/2007	Flash Flood	0	0	$ 10,000	$ -
Winfield	8/21/2007	Flash Flood	0	0	$ 25,000	$ -
Dover	8/21/2007	Flash Flood	0	0	$ 5,000	$ -
Bolivar	8/21/2007	Flood	0	0	$ 5,000	$ -
Bolivar	8/21/2007	Flood	0	0	$ 10,000	$ -
Dover	3/4/2008	Flood	0	0	$ 5,000	$ -
New Philadelphia	3/19/2008	Flood	0	0	$ 10,000	$ -
New Philadelphia	6/26/2008	Flood	0	0	$ 35,000	$ -
Roswell	6/17/2009	Flash Flood	0	0	$ 25,000	$ -
Barrs Mills	6/2/2010	Flood	0	0	$ 75,000	$ -
Newcomerstown	2/28/2011	Flood	0	0	$ 75,000	$ -
New Philadelphia	3/1/2011	Flood	0	0	$ 25,000	$ -
Dundee	3/11/2011	Flood	0	0	$ 2,000	$ -
Valley Jct	3/11/2011	Flood	0	0	$ 8,000	$ -
Newport	6/19/2011	Flood	0	0	$ 5,000	$ -
Yorktown	1/27/2012	Flood	0	0	$ 25,000	$ -
New Philadelphia	7/10/2013	Flash Flood	0	0	$ 25,000	$ -
Valley Jct	7/11/2013	Flood	0	0	$ 35,000	$ -
Dover	2/23/2014	Flood	0	0	$ 5,000	$ -
Valley Jct	4/30/2014	Flood	0	0	$ 2,000	$ -
Valley Jct	5/1/2014	Flood	0	0	$ 5,000	$ -
Dundee	6/24/2014	Flood	0	0	$ 5,000	$ -
Dundee	6/24/2014	Flood	0	0	$ 5,000	$ -
New Philadelphia	6/24/2014	Flood	0	0	$ 5,000	$ -
Uhrichsville	6/24/2014	Flood	0	0	$ 5,000	$ -
Fiat	8/11/2014	Flood	0	0	$ 1,000	$ -
Mineral City	8/20/2014	Flash Flood	0	0	$ 5,000	$ -
Zoar	8/20/2014	Flash Flood	0	0	$ 5,000	$ -
Zoar	8/20/2014	Flash Flood	0	0	$ 5,000	$ -
Newport	4/9/2015	Flash Flood	0	0	$ 3,000	$ -
Booth	4/9/2015	Flash Flood	0	0	$ 4,000	$ -
Dennison	7/26/2015	Flood	0	0	$ 1,000	$ -
New Philadelphia	7/23/2017	Flash Flood	0	0	$ 10,000	$ -
Roswell	6/8/2018	Flash Flood	0	0	$ -	$ -
Roswell	6/8/2018	Flash Flood	0	0	$ -	$ -
Roswell	6/8/2018	Flash Flood	0	0	$ -	$ -
Rockford	6/8/2018	Flash Flood	0	0	$ -	$ -
New Cumberland	6/8/2018	Flash Flood	0	0	$ -	$ -
Rockford	6/8/2018	Flash Flood	0	0	$ -	$ -
New Cumberland	6/8/2018	Flash Flood	0	0	$ -	$ -

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Roswell	6/8/2018	Flash Flood	0	0	$ -	$ -
Strasburg	8/10/2018	Flash Flood	0	0	$ -	$ -
Peoli	2/12/2019	Flood	0	0	$ -	$ -
New Philadelphia	5/29/2019	Flash Flood	0	0	$ 1,000	$ 1,000
Roswell	6/18/2019	Flood	0	0	$ -	$ -
New Philadelphia	7/7/2020	Flash Flood	0	0	$ -	$ -
Grand Total			1	0	$ 20, 976,000	$ 1,000

TABLE 6-5 TUSCARAWAS COUNTY SEVERE WINTER STORM EVENTS, JANUARY 1, 1996-NOVEMBER 30, 2021

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Countywide	1/2/1996	Heavy Snow	0	0	$ -	$ -
Countywide	1/2/1999	Winter Storm	0	0	$ -	$ -
Countywide	1/8/1999	Winter Storm	0	0	$ -	$ -
Countywide	1/13/1999	Winter Storm	0	0	$ 5,000	$ -
Countywide	3/9/1999	Heavy Snow	0	0	$ -	$ -
Countywide	12/13/2000	Winter Storm	0	0	$ -	$ -
Countywide	2/16/2003	Heavy Snow	0	0	$ -	$ -
Countywide	1/26/2004	Heavy Snow	0	0	$ -	$ -
Countywide	2/5/2004	Ice Storm	0	0	$ -	$ -
Countywide	1/22/2005	Heavy Snow	0	0	$ -	$ -
Countywide	3/7/2008	Winter Storm	0	0	$ -	$ -
Countywide	1/27/2009	Winter Storm	0	0	$ -	$ -
Countywide	2/5/2010	Heavy Snow	0	0	$ -	$ -
Countywide	2/9/2010	Heavy Snow	0	0	$ -	$ -
Countywide	2/15/2010	Heavy Snow	0	0	$ -	$ -
Countywide	1/31/2011	Ice Storm	0	0	$ -	$ -
Countywide	2/1/2011	Ice Storm	0	0	$ -	$ -
Countywide	2/21/2011	Heavy Snow	0	0	$ -	$ -
Countywide	1/20/2012	Winter Storm	0	0	$ -	$ -
Countywide	12/26/2012	Heavy Snow	0	0	$ -	$ -
Countywide	1/5/2014	Extreme Cold/Wind Chill	0	0	$ -	$ -
Countywide	2/4/2014	Winter Storm	0	0	$ -	$ -
Countywide	2/14/2015	Extreme Cold/Wind Chill	0	0	$ -	$ -
Countywide	2/19/2015	Extreme Cold/Wind Chill	0	0	$ -	$ -
Countywide	2/24/2015	Extreme Cold/Wind Chill	0	0	$ -	$ -
Countywide	1/12/2018	Winter Storm	0	0	$ -	$ -
Countywide	2/7/2018	Heavy Snow	0	0	$ -	$ -
Countywide	1/18/2019	Winter Storm	0	0	$ -	$ -
Countywide	1/30/2019	Extreme Cold/Wind Chill	0	0	$ -	$ -
Countywide	12/24/2020	Winter Storm	0	0	$ -	$ -
Countywide	2/15/2021	Winter Storm	0	0	$ -	$ -
Grand Total			**0**	**0**	**$ 5,000**	**$ 0**

TABLE 6-6 TUSCARAWAS COUNTY TORNADO EVENTS, JANUARY 1, 1955-NOVEMBER 30, 2021

Location	Date	Event	Magnitude	Deaths	Injuries	Property Damage	Crop Damage
Countywide	4/13/1952	Tornado	F1	0	4	$ 250,000	$ -
Countywide	3/11/1955	Tornado	F2	0	1	$ 250,000	$ -
Countywide	7/22/1958	Tornado	F2	0	3	$ 25,000	$ -
Countywide	5/8/1961	Tornado	F1	0	0	$ 25,000	$ -
Countywide	7/10/1973	Tornado	F0	0	0	$ 250	$ -
Countywide	6/7/1978	Tornado	F1	0	1	$ 250,000	$ -
Countywide	6/7/1980	Tornado	F1	0	0	$ 2,500,000	$ -
Sugar Creek	6/29/1998	Tornado	F0	0	0	$ 5,000	$ -
New Philadelphia	11/12/2003	Tornado	F2	0	1	$ 160,000	$ -
Strasburg	6/22/2006	Tornado	F1	0	0	$ 50,000	$ -
Shanesville	6/5/2010	Tornado	EF1	0	0	$ 350,000	$ -
Yorktown	9/16/2010	Tornado	EF1	0	0	$ 75,000	$ -
Bolivar	7/10/2013	Tornado	EF1	0	0	$ 75,000	$ -
Winfield	4/14/2019	Tornado	EF0	0	0	$ -	$ -
Sandyville	4/7/2020	Tornado	EF0	0	0	$ -	$ -
Grand Total				**0**	**10**	**$ 4,015,000**	**$ 0**

TABLE 6-7 TUSCARAWAS COUNTY DROUGHT EVENTS, JANUARY 1, 1996-NOVEMBER 30, 2021

Location	Date	Event	Deaths	Injuries	Property Damage	Crop Damage
Countywide	8/1/1999	Drought	0	0	0	0
Countywide	9/1/1999	Drought	0	0	0	0
Grand Total			**0**	**0**	**$ 0**	**$ 0**

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APPENDIX C. NATIONAL PARK SERVICE'S NATIONAL REGISTER OF HISTORIC PLACES IN TUSCARAWAS COUNTY

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Ref#	Property Name	City	Street & Number	Listed Date	Category Of Property
70000518	Fort Laurens Site	Bolivar	Near OH 212, 0.5 mi. S of Bolivar	11/10/1970	Site
82003660	Lebol, John, House, Smokehouse and Springhouse	Bolivar	Rt. 1	7/15/1982	Building
99001194	Fisher, E.D., House	Bolivar	432 S. Park Ave.	9/24/1999	Building
00000420	Lanning, T., & Co. Department Store	Dennison	226-228 Grant St.	4/28/2000	Building
05001573	Dennison High School	Dennison	220 N. Third St.	2/1/2006	Building
09000212	Railway Chapel, The	Dennison	301 Grant St.	4/15/2009	Building
76001536	Pennsylvania Railroad Depot And Baggage Room	Dennison	400 Center St.	9/8/1976	Building
82003661	Reeves, Jeremiah, House and Carriage House	Dover	325 E. Iron Ave.	7/15/1982	Building
84003808	Johnson Site II	Dover	Address Restricted	2/9/1984	Site
88000980	Deis, John, House	Dover	203 W. Sixth St.	6/30/1988	Building
88002748	Bernhard, Frederick, House	Dover	211 E. Front St.	12/9/1988	Building
91000972	Rinderknecht, Christian H., House	Dover	602 N. Wooster Ave.	7/31/1991	Building
92000172	Pershing, Christian, Barn	Dover	Off OH 39 W of Dover	3/19/1992	Building
95001487	Cooper, Katherine, House	Dover	118 W. 7th St.	1/4/1996	Building
98001384	Slingluff, Dr. Joseph, House	Dover	606 N. Wooster Ave.	11/19/1998	Building
70000519	Gnadenhutten Massacre Site	Gnadenhutten	S of Gnadenhutten on county rte.	11/10/1970	Site
70000520	Schoenbrunn Site	New Philadelphia	U.S. 250	11/10/1970	Site
73001544	Tuscarawas County Courthouse	New Philadelphia	Courthouse Sq.	7/16/1973	Building
79001971	Port Washington Town Hall	Port Washington	Main St.	2/22/1979	Building
94000777	Ragersville School	Ragersville	8807 Co. Rd. 52 SW. (Crooked Run Rd.)	7/22/1994	Building
80003238	Garver Brothers Store	Strasburg	134 N. Wooster Ave.	11/26/1980	Building
75002124	Zoar Historic District (Boundary Increase)	Village of Zoar along OH 212	Village of Zoar along OH 212	8/11/1975	District
13000701	Zoar Historic District (Boundary Increase)	Zoar	Roughly bounded by Zoar Cemetery, Cemetery Rd., Lake Dr., Tuscarawas R., NC 212, 5th, E. 2nd & East Sts.	9/10/2013	District
16000859	Zoar Historic District	Zoar	Roughly bounded by Fifth St., Zoar Cemetery, Cemetery Rd. - Lake Dr., Tuscarawas R., OH	10/31/2016	District

Ref#	Property Name	City	Street & Number	Listed Date	Category Of Property
			212, East Second and East Sts.		
69000150	Zoar Historic District	Zoar	Bounded by 5th, Foltz, and 1st Sts. and by rear property lines of properties	6/23/1969	District
97000199	Zoarville Bridge	Zoarville	Across the Conotton Cr., E of jct. of OH 212 and OH 800	3/13/1997	Structure

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APPENDIX D. ADOPTION RESOLUTIONS

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TUSCARAWAS COUNTY COMMISSIONERS

Chris Abbuhl — Al Landis — Kerry Metzger

COMMISSIONER'S JOURNAL 85
SEPTEMBER 14, 2022

RESOLUTION (775-2022) 2022 Tuscarawas County Hazard Mitigation Plan - County Adoption Resolution

It was moved by Commissioner Landis, seconded by Commissioner Abbuhl, to adopt the following Mitigation Plan:

WHEREAS, Tuscarawas County, Ohio is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *Tuscarawas County* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the 2022 Tuscarawas County Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, officials and citizens of *Tuscarawas County*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the 2022 Tuscarawas County Hazard Mitigation Plan, and

WHEREAS, the 2022 Tuscarawas County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *Tuscarawas County*:

- The 2022 Tuscarawas County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *Tuscarawas County* and
- The respective officials and agencies identified in the implementation strategy of the 2022 Tuscarawas County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 14th day of September, 2022

ATTEST: Rhonda Jordan, Clerk

Tuscarawas County
Commissioner: Chris Abbuhl
Commissioner: Absent
Commissioner: Al Landis

VOTE: Chris Abbuhl, yes;
Kerry Metzger, absent;
Al Landis, yes;

125 East High Avenue, Room 205, New Philadelphia, Ohio 44663
(330) 365-3240 commissioners@co.tuscarawas.oh.us

RESOLUTION (775-2022) 2022 Tuscarawas County Hazard Mitigation Plan - County Adoption Resolution

It was moved by Commissioner Landis, seconded by Commissioner Abbuhl, to adopt the following Mitigation Plan:

WHEREAS, Tuscarawas County, Ohio is most vulnerable to natural and human-made hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *Tuscarawas County* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the 2022 Tuscarawas County Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, officials and citizens of *Tuscarawas County,* and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the 2022 Tuscarawas County Hazard Mitigation Plan, and

WHEREAS, the 2022 Tuscarawas County Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural and human-made hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *Tuscarawas County:*

- The 2022 Tuscarawas County Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *Tuscarawas County* and
- The respective officials and agencies identified in the implementation strategy of the 2022 Tuscarawas County Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 14th day of September, 2022

ATTEST:
Rhonda Jordan
Clerk

Tuscarawas County
Commissioner:
Commissioner: Absent
Commissioner:

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Emergency Resolution No. 26-22
City of Dover, Tuscarawas County, Ohio

WHEREAS, the city of Dover, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the city of Dover, acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the city of Dover, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the council of the city of Dover:

I.

The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the city of Dover.

II.

The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

III.

That it is found and determined that all formal actions of this Council concerning and relating to the passage of this resolution were taken in conformance with all applicable open meeting laws and that all deliberations of this Council and of any of its committees that resulted in those formal actions were in compliance with all legal requirements including open meeting requirements.

IV.

This resolution is declared an emergency resolution necessary to preserve the health, safety, and welfare of the citizens of the City of Dover and shall take effect immediately upon its passage. Otherwise, it shall be effective on the earliest date allowed by law. The need to approve this hazardous mitigation plan constitutes an emergency.

Attest:

Julie Leggett
Clerk of Council

Passed this 3rd day of October 2022.

Justin Perkowski
President of Council

Approved this 3rd day of October, 2022

Shane Gunnoe
Mayor

RESOLUTION NO. 28-2022

A RESOLUTION BY THE COUNCIL OF THE CITY OF NEW PHILADELPHIA, TUSCARAWAS COUNTY, OHIO ADOPTING THE TUSCARAWAS COUNTY 2022 HAZARD MITIGATION PLAN AS THE OFFICIAL HAZARD MITIGATION PLAN OF THE CITY OF NEW PHILADELPHIA, OHIO, AND DECLARING AN EMERGENCY.

WHEREAS, the City of New Philadelphia, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the City of New Philadelphia acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the City of New Philadelphia, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the Council of the City of New Philadelphia, Ohio:

SECTION 1. The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the City of New Philadelphia and

SECTION 2. The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

SECTION 3. This Ordinance is here declared to be an emergency measure and its immediate passage is necessary in order to preserve, protect, and maintain the health, safety, and welfare of the citizens of the City of New Philadelphia, Ohio.

SECTION 4. This Ordinance shall take effect and be in force from and after the earliest period allowed by law.

PASSED: Dec 12, 2022

DONALD C. KEMP
PRESIDENT OF COUNCIL

ATTEST:

JULIE COURTWRIGHT
CLERK OF COUNCIL

APPROVED:

MAYOR JOEL B. DAY

SPONSORED BY: SAFETY, HEALTH AND SERVICE COMMITTEE

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 1919
[CITY OF UHRICHSVILLE], Tuscarawas County, Ohio

WHEREAS, *the [CITY OF UHRICHSVILLE],* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [CITY OF UHRICHSVILLE]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [CITY OF UHRICHSVILLE],* and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [CITY OF UHRICHSVILLE]:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [CITY OF UHRICHSVILLE]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 9th day of Sept., 2022

ATTEST:

[CITY OF UHRICHSVILLE]

By _____

By _____

By _____

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2022-1212
VILLAGE OF BALTIC, Tuscarawas County, Ohio

WHEREAS, *the VILLAGE OF BALTIC*, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the D saster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the VILLAGE OF BALTIC* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigaton Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the VILLAGE OF BALTIC*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the VILLAGE OF BALTIC*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the VILLAGE OF BALTIC* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 20th day of September, 2022

ATTEST:

VILLAGE OF BALTIC

By _____ Mayor

By _____

By _____ Council President

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2022-9
[VILLAGE OF BARNHILL], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF BARNHILL]*, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF BARNHILL]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF BARNHILL]*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF BARNHILL]*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF BARNHILL]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 10th day of Sept, ~~202~~2022

ATTEST:

[VILLAGE OF BARNHILL]

By Robert Hunter

By Kyle Hillie

By Chris Ferguson

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 12-2022
[VILLAGE OF BOLIVAR], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF BOLIVAR]*, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF BOLIVAR]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF BOLIVAR]*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF BOLIVAR]*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF BOLIVAR]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 06 day of September, 2022

ATTEST:

Barbara Kline, Fiscal Officer

[VILLAGE OF BOLIVAR]

Mayor of Village of Bolivar

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2827
[VILLAGE OF DENNISON], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF DENNISON],* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF DENNISON]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF DENNISON],* and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF DENNISON]:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF DENNISON]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 15th day of September, 2022

ATTEST:

[VILLAGE OF DENNISON]
By _____, Mayor
By Katherine M Brown, Fiscal Officer
By Helen L Borland President of Council

Resolution No. 4-2022

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

WHEREAS, *the Village of Gnadenhutten,* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the Village of Gnadenhutten* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the Village of Gnadenhutten* and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the Village of Gnadenhutten:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the Village of Gnadenhutten* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 19 day of September, 2022

Dean Steer, Council President

Attest: September 19, 2022
Kim Stull, Fiscal Officer

Approved: September 19, 2022
Rich Gilmore, Mayor

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 21-2022
[VILLAGE OF MIDVALE], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF MIDVALE],* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF MIDVALE]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF MIDVALE],* and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF MIDVALE]:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF MIDVALE]* and

- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 8th day of September 2022

ATTEST: Georgiana Turner

[VILLAGE OF MIDVALE]
By Randall J. Cadle
By Donna Kohler
By

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2022-19
VILLAGE OF MINERAL CITY, Tuscarawas County, Ohio

***WHEREAS**, the VILLAGE OF MINERAL CITY,* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

***WHEREAS**,* Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

***WHEREAS**, the VILLAGE OF MINERAL CITY* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

***WHEREAS**,* the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the VILLAGE OF MINERAL CITY,* and

***WHEREAS**,* a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

***WHEREAS**,* the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the VILLAGE OF MINERAL CITY:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the VILLAGE OF MINERAL CITY* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 25th day of August, 2022

ATTEST:
Clarissa R Lutz
Fiscal Officer

VILLAGE OF MINERAL CITY
By Lawrence M Green mayor
By Terry L Miller council president
By _____

VILLAGE OF NEWCOMERSTOWN

Resolution No. 15-2022 **PASSED: September 6, 2022**

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

WHEREAS, *the [VILLAGE OF NEWCOMERSTOWN],* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF NEWCOMERSTOWN]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF NEWCOMERSTOWN]*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF NEWCOMERSTOWN]*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF NEWCOMERSTOWN]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this _6th_____ day of September_____, 2022

ATTEST:

Attest: **Approved:**

Lisa M. Stiteler

Lisa M. Stiteler, Fiscal Officer

Patrick M. Cadle

Patrick M. Cadle, Mayor

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2022-5
[VILLAGE OF PARRAL], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF PARRAL],* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF PARRAL]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF PARRAL],* and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF PARRAL]:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF PARRAL]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 19th day of September, 2022

ATTEST:

[VILLAGE OF PARRAL]

By Barbara Lengler

By Greg Fellers

By Barbara Bosworth

Travis Roth

Renay Heslop

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 15-2022
VILLAGE OF PORT WASHINGTON, Tuscarawas County, Ohio

***WHEREAS**, the VILLAGE OF PORT WASHINGTON,* Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

***WHEREAS**,* Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

***WHEREAS**, the VILLAGE OF PORT WASHINGTON* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

***WHEREAS**,* the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the VILLAGE OF PORT WASHINGTON,* and

***WHEREAS**,* a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

***WHEREAS**,* the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the VILLAGE OF PORT WASHINGTON:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the VILLAGE OF PORT WASHINGTON* and

- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 6th day of September, 2022

ATTEST:

_____

VILLAGE OF PORT WASHINGTON

By Thomas J Gerstner Mayor

By Lee A. Brown Council President

By Darlene R. Lutes Fiscal officer

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2022-3
[VILLAGE OF ROSWELL], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF ROSWELL]*, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF ROSWELL]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF ROSWELL]*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF ROSWELL]*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF ROSWELL]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 15 day of September, 2022

ATTEST: Kim Mack-Obed
Fiscal Officer

[VILLAGE OF ROSWELL]
By Mitch Belling Mayor
By Jeff Eggett Council President
By _____

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

RESOLUTION NO. 04-2023
Village of Stone Creek, Tuscarawas County, Ohio

WHEREAS, the Village of Stone Creek, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, the Village of Stone Creek acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the Village of Stone Creek, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for the Village of Stone Creek as follows:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the Village of Stone Creek and

- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

PASSED: **MARCH 14, 2023**

APPROVED:

President of Council

Mayor

VILLAGE OF STRASBURG
TUSCARAWAS COUNTY, OHIO
RESOLUTION NO. 2022-11

RESOLUTION AUTHORIZING ADOPTION OF TUSCARAWAS COUNTY 2022 HAZARD MITIGATION PLAN

Whereas, the Village of Strasburg is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

Whereas, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

Whereas, the Village of Strasburg acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

Whereas, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency, in cooperation with other county departments, and officials and citizens of the Village of Strasburg, and

Whereas, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

Whereas, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal government.

Now Therefore, Village Council Resolves as follows –

Section 1 – The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of the Village of Strasburg, and

Section 2 – The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

Passed with sufficient votes to waive three reading requirement – September 6, 2022

APPROVED: _____
MAYOR Steven C. Smith

Attest: _____
FISCAL OFFICER

RECORD OF ORDINANCES

BARRETT BROTHERS, PUBLISHERS, SPRINGFIELD, OHIO Form 6220

Ordinance No. 22-2338 Passed Sept 19 2022

Tuscarawas County 2022 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. 22-2338

[VILLAGE OF SUGARCREEK], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF SUGARCREEK]*, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF SUGARCREEK]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF SUGARCREEK]*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF SUGARCREEK]*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF SUGARCREEK]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 19 day of Sept, 2022

ATTEST:

Marie Bowen

Fiscal Officer

[VILLAGE OF SUGARCREEK]

By

By

By

Mayor

Tuscarawas County 2022 Hazard Mitigation Plan

Municipal Adoption Resolution

Resolution No. 1091

[VILLAGE OF TUSCARAWAS], Tuscarawas County, Ohio

WHEREAS, *the [VILLAGE OF TUSCARAWAS]*, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and

WHEREAS, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and

WHEREAS, *the [VILLAGE OF TUSCARAWAS]* acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of *the [VILLAGE OF TUSCARAWAS]*, and

WHEREAS, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and

WHEREAS, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,

NOW THEREFORE BE IT RESOLVED by the governing body for *the [VILLAGE OF TUSCARAWAS]*:

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the [VILLAGE OF TUSCARAWAS]* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

ADOPTED, this 27 day of October, 2022

ATTEST:

[VILLAGE OF TUSCARAWAS]

By Kristy L. Sullivan

By Dana D. Moore

By [signature]

Tuscarawas County 2022 Hazard Mitigation Plan
Municipal Adoption Resolution

Resolution No. 2022-11
***VILLAGE OF ZOAR*, Tuscarawas County, Ohio**

***WHEREAS**, the VILLAGE OF ZOAR, Tuscarawas County, Ohio is most vulnerable to natural hazards which may result in loss of life and property, economic hardship, and threats to public health and safety, and*

***WHEREAS**, Section 322 of the Disaster Mitigation Act of 2000 (DMA 2000) requires state and local governments to develop and submit for approval to the President a mitigation plan that outlines processes for identifying their respective natural hazards, risks, and vulnerabilities, and*

***WHEREAS**, the VILLAGE OF ZOAR acknowledges the requirements of Section 322 of DMA 2000 to have an approved Hazard Mitigation Plan as a prerequisite to receiving post-disaster Hazard Mitigation Grant Program funds, and*

***WHEREAS**, the Tuscarawas County 2022 Hazard Mitigation Plan has been developed by the Tuscarawas County Emergency Management Agency in cooperation with other county departments, and officials and citizens of the VILLAGE OF ZOAR, and*

***WHEREAS**, a public involvement process consistent with the requirements of DMA 2000 was conducted to develop the Tuscarawas County 2022 Hazard Mitigation Plan, and*

***WHEREAS**, the Tuscarawas County 2022 Hazard Mitigation Plan recommends mitigation activities that will reduce losses to life and property affected by both natural hazards that face the County and its municipal governments,*

***NOW THEREFORE BE IT RESOLVED** by the governing body for the VILLAGE OF ZOAR:*

- The Tuscarawas County 2022 Hazard Mitigation Plan is hereby adopted as the official Hazard Mitigation Plan of *the VILLAGE OF ZOAR* and
- The respective officials and agencies identified in the implementation strategy of the Tuscarawas County 2022 Hazard Mitigation Plan are hereby directed to implement the recommended activities assigned to them.

***ADOPTED**, this ___13___ day of _September_, 2022*

ATTEST: ***VILLAGE OF ZOAR***

Patty Smith, Fiscal Officer

Scott Gordon, Mayor

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APPENDIX E. PLAN REVIEW TOOL

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LOCAL MITIGATION PLAN REVIEW TOOL

The *Local Mitigation Plan Review Tool* demonstrates how the Local Mitigation Plan meets the regulation in 44 CFR §201.6 and offers States and FEMA Mitigation Planners an opportunity to provide feedback to the community.

- The Regulation Checklist provides a summary of FEMA's evaluation of whether the Plan has addressed all requirements.
- The Plan Assessment identifies the plan's strengths as well as documents areas for future improvement.
- The Multi-jurisdiction Summary Sheet is an optional worksheet that can be used to document how each jurisdiction met the requirements of the each Element of the Plan (Planning Process; Hazard Identification and Risk Assessment; Mitigation Strategy; Plan Review, Evaluation, and Implementation; and Plan Adoption).

The FEMA Mitigation Planner must reference this *Local Mitigation Plan Review Guide* when completing the *Local Mitigation Plan Review Tool*.

Jurisdiction: Tuscarawas County	**Title of Plan:** Tuscarawas County, Ohio 2022 Hazard Mitigation Plan	**Date of Plan:** June 2022 7/8/2022
Local Point of Contact: Alex McCarthy	**Address:**	
Title: Director	2295 Reiser Ave SE New Philadelphia, OH 44663	
Agency: Tuscarawas County HS& EMA		
Phone Number: (330) 440-1101	**E-Mail:** McCarthy@co.tuscarawas.oh.us	

State Reviewer: Luan Nguyen	**Title:** State Hazard Mitigation Planner	**Date:** 6/30/2022 7/18/2022

FEMA Reviewer:	**Title:**	**Date:**
Date Received in FEMA Region V		
Plan Not Approved		
Plan Approvable Pending Adoption		
Plan Approved		

SECTION 1:
REGULATION CHECKLIST

INSTRUCTIONS: The Regulation Checklist must be completed by FEMA. The purpose of the Checklist is to identify the location of relevant or applicable content in the Plan by Element/sub-element and to determine if each requirement has been 'Met' or 'Not Met.' The 'Required Revisions' summary at the bottom of each Element must be completed by FEMA to provide a clear explanation of the revisions that are required for plan approval. Required revisions must be explained for each plan sub-element that is 'Not Met.' Sub-elements should be referenced in each summary by using the appropriate numbers (A1, B3, etc.), where applicable. Requirements for each Element and sub-element are described in detail in this *Plan Review Guide* in Section 4, Regulation Checklist.

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
ELEMENT A. PLANNING PROCESS			
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))	Sec. 3, pp. 18-38; App. A, pp. I-XI	X	
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))	Sec. 3, pp. 20-24, 34-36; App. A, pp. I-XI	X	
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))	Sec. 3, pp. 24-36	X	
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))	Sec. 3, p. 36; References included throughout the plan; App. F	X	
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))	Sec. 6, pp. 256-257	X	
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))	Sec. 6, pp. 257-258	X	
ELEMENT A: REQUIRED REVISIONS			
ELEMENT B. HAZARD IDENTIFICATION AND RISK ASSESSMENT			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement §201.6(c)(2)(i))	Sec. 4, pp. 39-229; App. B, pp. XIII-XXIX; App. F; App. G	X	
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i))	Sec. 4, pp. 39-229; App. B, pp. XIII-XXIX	X	
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))	Sec. 4, pp. 39-229; App. B, pp. XIII-XXIX; App. C, pp. XXXII-XXXIV; App. F; App. G	X	
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))	Sec. 4, p. 120-121	X	
ELEMENT B: REQUIRED REVISIONS			
ELEMENT C. MITIGATION STRATEGY			
C1. Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))	Sec. 5, pp. 235-239	X	
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))	Sec. 4, pp. 117-119; Sec. 5, pp. 247, 253	X	
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))	Sec. 4, p. 43; Sec. 5, pp. 230-231	X	
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))	Sec. 5, pp. 231-232, 246-254	X	
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))	Sec. 5, pp. 232-234, 247-255	X	
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))	Sec. 6, pp. 259-260	X	

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan (section and/or page number)**	**Met**	**Not Met**
ELEMENT C: REQUIRED REVISIONS			
ELEMENT D. PLAN REVIEW, EVALUATION, AND IMPLEMENTATION (applicable to plan updates only)			
D1. Was the plan revised to reflect changes in development? (Requirement §201.6(d)(3))	Sec. 2, pp. 5-17	X	
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement §201.6(d)(3))	Sec. 5, pp. 239-244	X	
D3. Was the plan revised to reflect changes in priorities? (Requirement §201.6(d)(3))	Sec. 4, pp. 43, 46; Sec. 5, pp. 232-234	X	
ELEMENT D: REQUIRED REVISIONS •			
ELEMENT E. PLAN ADOPTION			
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5))	Sec. 6, p. 255; App. D, p. XXXVII	X	
E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))	Sec. 6, p. 255; App. D, p. XXXVII	X	
ELEMENT E: REQUIRED REVISIONS			
OPTIONAL: HIGH HAZARD POTENTIAL DAM RISKS			
HHPD1. Did Element A4 (planning process) describe the incorporation of existing plans, studies, reports, and technical information for high hazard potential dams?	Sec. 4, pp. 51-68; App. F	X	
HHPD2. Did Element B3 (risk assessment) address HHPDs?	Sec. 4, pp. 51-68; App. F	X	
HHPD3. Did Element C3 (mitigation goals) include mitigation goals to reduce long-term vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?	Sec. 5, p. 231	X	
HHPD4. Did Element C4-C5 (mitigation actions) address HHPDs prioritize mitigation actions to reduce vulnerabilities from high hazard potential dams that pose an unacceptable risk to the public?	Sec. 5, pp. 247, 254	X	
REQUIRED REVISIONS			
ELEMENT F. ADDITIONAL STATE REQUIREMENTS (OPTIONAL FOR STATE REVIEWERS ONLY; NOT TO BE COMPLETED BY FEMA)			

1. REGULATION CHECKLIST **Regulation** (44 CFR 201.6 Local Mitigation Plans)	**Location in Plan** (section and/or page number)	**Met**	**Not Met**
F1.			
F2.			
ELEMENT F: REQUIRED REVISIONS			

SECTION 2:
PLAN ASSESSMENT

INSTRUCTIONS: The purpose of the Plan Assessment is to offer the local community more comprehensive feedback to the community on the quality and utility of the plan in a narrative format. The audience for the Plan Assessment is not only the plan developer/local community planner, but also elected officials, local departments and agencies, and others involved in implementing the Local Mitigation Plan. The Plan Assessment must be completed by FEMA. The Assessment is an opportunity for FEMA to provide feedback and information to the community on: 1) suggested improvements to the Plan; 2) specific sections in the Plan where the community has gone above and beyond minimum requirements; 3) recommendations for plan implementation; and 4) ongoing partnership(s) and information on other FEMA programs, specifically RiskMAP and Hazard Mitigation Assistance programs. The Plan Assessment is divided into two sections:

1. Plan Strengths and Opportunities for Improvement
2. Resources for Implementing Your Approved Plan

Plan Strengths and Opportunities for Improvement is organized according to the plan Elements listed in the Regulation Checklist. Each Element includes a series of italicized bulleted items that are suggested topics for consideration while evaluating plans, but it is not intended to be a comprehensive list. FEMA Mitigation Planners are not required to answer each bullet item, and should use them as a guide to paraphrase their own written assessment (2-3 sentences) of each Element.

The Plan Assessment must not reiterate the required revisions from the Regulation Checklist or be regulatory in nature, and should be open-ended and to provide the community with suggestions for improvements or recommended revisions. The recommended revisions are suggestions for improvement and are not required to be made for the Plan to meet Federal regulatory requirements. The italicized text should be deleted once FEMA has added comments regarding strengths of the plan and potential improvements for future plan revisions. It is recommended that the Plan Assessment be a short synopsis of the overall strengths and weaknesses of the Plan (no longer than two pages), rather than a complete recap section by section.

Resources for Implementing Your Approved Plan provides a place for FEMA to offer information, data sources and general suggestions on the overall plan implementation and maintenance process. Information on other possible sources of assistance including, but not limited to, existing publications, grant funding or training opportunities, can be provided. States may add state and local resources, if available.

A. Plan Strengths and Opportunities for Improvement

This section provides a discussion of the strengths of the plan document and identifies areas where these could be improved beyond minimum requirements.

+ Integration of the National Risk Index
+ Jurisdictional specific Vulnerability Assessment Responses per hazard.

Element A: Planning Process

How does the Plan go above and beyond minimum requirements to document the planning process with respect to:

- *Involvement of stakeholders (elected officials/decision makers, plan implementers, business owners, academic institutions, utility companies, water/sanitation districts, etc.);*
- *Involvement of Planning, Emergency Management, Public Works Departments or other planning agencies (i.e., regional planning councils);*
- *Diverse methods of participation (meetings, surveys, online, etc.); and*
- *Reflective of an open and inclusive public involvement process.*

Element B: Hazard Identification and Risk Assessment

In addition to the requirements listed in the Regulation Checklist, 44 CFR 201.6 Local Mitigation Plans identifies additional elements that should be included as part of a plan's risk assessment. The plan should describe vulnerability in terms of:

1) *A general description of land uses and future development trends within the community so that mitigation options can be considered in future land use decisions;*
2) *The types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas; and*
3) *A description of potential dollar losses to vulnerable structures, and a description of the methodology used to prepare the estimate.*

How does the Plan go above and beyond minimum requirements to document the Hazard Identification and Risk Assessment with respect to:

- *Use of best available data (flood maps, HAZUS, flood studies) to describe significant hazards;*
- *Communication of risk on people, property, and infrastructure to the public (through tables, charts, maps, photos, etc.);*
- *Incorporation of techniques and methodologies to estimate dollar losses to vulnerable structures;*
- *Incorporation of Risk MAP products (i.e., depth grids, Flood Risk Report, Changes Since Last FIRM, Areas of Mitigation Interest, etc.); and*
- *Identification of any data gaps that can be filled as new data became available.*

Element C: Mitigation Strategy

How does the Plan go above and beyond minimum requirements to document the Mitigation Strategy with respect to:

- *Key problems identified in, and linkages to, the vulnerability assessment;*
- *Serving as a blueprint for reducing potential losses identified in the Hazard Identification and Risk Assessment;*
- *Plan content flow from the risk assessment (problem identification) to goal setting to mitigation action development;*
- *An understanding of mitigation principles (diversity of actions that include structural projects, preventative measures, outreach activities, property protection measures, post-disaster actions, etc);*
- *Specific mitigation actions for each participating jurisdictions that reflects their unique risks and capabilities;*
- *Integration of mitigation actions with existing local authorities, policies, programs, and resources; and*
- *Discussion of existing programs (including the NFIP), plans, and policies that could be used to implement mitigation, as well as document past projects.*

Element D: Plan Update, Evaluation, and Implementation (*Plan Updates Only*)

How does the Plan go above and beyond minimum requirements to document the 5-year Evaluation and Implementation measures with respect to:

- *Status of previously recommended mitigation actions;*
- *Identification of barriers or obstacles to successful implementation or completion of mitigation actions, along with possible solutions for overcoming risk;*
- *Documentation of annual reviews and committee involvement;*
- *Identification of a lead person to take ownership of, and champion the Plan;*
- *Reducing risks from natural hazards and serving as a guide for decisions makers as they commit resources to reducing the effects of natural hazards;*
- *An approach to evaluating future conditions (i.e. socio-economic, environmental, demographic, change in built environment etc.);*
- *Discussion of how changing conditions and opportunities could impact community resilience in the long term; and*
- *Discussion of how the mitigation goals and actions support the long-term community vision for increased resilience.*

B. Resources for Implementing Your Approved Plan

Ideas may be offered on moving the mitigation plan forward and continuing the relationship with key mitigation stakeholders such as the following:

- *What FEMA assistance (funding) programs are available (for example, Hazard Mitigation Assistance (HMA)) to the jurisdiction(s) to assist with implementing the mitigation actions?*
- *What other Federal programs (National Flood Insurance Program (NFIP), Community Rating System (CRS), Risk MAP, etc.) may provide assistance for mitigation activities?*
- *What publications, technical guidance or other resources are available to the jurisdiction(s) relevant to the identified mitigation actions?*
- *Are there upcoming trainings/workshops (Benefit-Cost Analysis (BCA), HMA, etc.) to assist the jurisdictions(s)?*
- *What mitigation actions can be funded by other Federal agencies (for example, U.S. Forest Service, National Oceanic and Atmospheric Administration (NOAA), Environmental Protection Agency (EPA) Smart Growth, Housing and Urban Development (HUD) Sustainable Communities, etc.) and/or state and local agencies?*

SECTION 3:
MULTI-JURISDICTION SUMMARY SHEET (OPTIONAL)

INSTRUCTIONS: For multi-jurisdictional plans, a Multi-jurisdiction Summary Spreadsheet may be completed by listing each participating jurisdiction, which required Elements for each jurisdiction were 'Met' or 'Not Met,' and when the adoption resolutions were received. This Summary Sheet does not imply that a mini-plan be developed for each jurisdiction; it should be used as an optional worksheet to ensure that each jurisdiction participating in the Plan has been documented and has met the requirements for those Elements (A through E).

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
1	Tuscarawas County	County	Alex McCarthy									
2	Dover	City	Russ Volkert									
3	New Philadelphia	City	Joel Day									
4	Uhrichsville	City	Justin Edwards									
5	Baltic	Village	Rose Baxter									
6	Barnhill	Village	Mike Ohler									
7	Bolivar	Village	Tim Lang									
8	Dennison	Village	Greg DiDonato									

MULTI-JURISDICTION SUMMARY SHEET													
#	Jurisdiction Name	Jurisdiction Type (city/borough/ township/ village, etc.)	Plan POC	Mailing Address	Email	Phone	Requirements Met (Y/N)					
							A. Planning Process	B. Hazard Identification & Risk Assessment	C. Mitigation Strategy	D. Plan Review, Evaluation & Implementation	E. Plan Adoption	F. State Require-ments
9	Gnadenhutten	Village	Kim Stull									
10	Midvale	Village	Dave McDonnell									
11	Mineral City	Village	Laurie Green									
12	Newcomerstown	Village	Pat Cadle									
13	Parral	Village	Crystal DiGenova									
14	Port Washington	Village	Jeff Stearns									
15	Roswell	Village	Mitch Belknap									
16	Stone Creek	Village	Leslie Kissinger									
17	Strasburg	Village	Steven Smith									
18	Sugarcreek	Village	Connie Bowen									
19	Tuscarawas	Village	Dana Moore									
20	Zoar	Village	Gayle Potelicki									

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APPENDIX F. TUSCARAWAS COUNTY EMERGENCY EVACUATION PLAN FOR DOVER DAM

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TUSCARAWAS COUNTY
EMERGENCY EVACUATION PLAN
FOR
DOVER DAM

DOVER DAM

Prepared by:

Tuscarawas County Evacuation Planning Team
&
Tuscarawas County
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2295 Reiser Avenue SE
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Patty Levengood, Director
(330) 308-6670

June 2007

Preface

The Tuscarawas County Homeland Security & Emergency Management Agency (TCHS & EMA) in conjunction with the Tuscarawas County Flood Evacuation Planning Team, initiated a program in November 2006 to develop evacuation plans for isolation areas up stream and affected areas downstream from the Dover Dam. This planning was initiated because of the January 5, 2005 Presidential Declared Disaster in Tuscarawas County due to heavy rainfall which caused downstream flooding and isolated areas in the Bolivar, Wilkshire and Zoar areas in Tuscarawas County.

This plan should be used in conjunction with the Tuscarawas County All Hazards Emergency Operations Plan.

Tuscarawas County Emergency Evacuation Plan
For
Dover Dam

Table of Contents

Tuscarawas County Emergency Evacuation Plan
For
Dover Dam

I. PURPOSE:

The purpose of this plan is to provide for the safety of the citizens of Tuscarawas County by establishing guidelines for warning, evacuating, and sheltering persons who would be endangered and/or isolated in the event of flooding upstream and/or downstream of Dover Dam. It also addresses similar emergency response actions which might be required in the event of flooding, caused by emergency releases from Dover Dam. The plan is designed to accomplish these functions with minimum confusion and maximum speed.

II. SCOPE:

A. This plan is regional in application and pertains to the possible failure or high discharge from Dover Dam. It describes actions necessary to accomplish the warning, evacuation and sheltering of areas that would be affected in Tuscarawas County.

B. This plan has been developed within the authority and guidance contained in the Tuscarawas County Emergency Operations Plan (EOP) which outlines responsibilities and response actions of County agencies in an emergency or disaster situation.

C. This plan accentuates unique procedures necessary to respond to a dam emergency situation. The plan is designed to:

1. Establish warning procedures.
2. Outline evacuation procedures.
3. Identify potential evacuation routes.
4. Identify reception centers and shelters to be activated for the care of evacuees.
5. Identify procedures for the security of the perimeter and the interior of the affected area during and after evacuation.
6. Identify procedures for allowing evacuees to return to their homes.
7. Assign specific functions and responsibilities to local emergency response agencies and other organizations.

III. SITUATION & ASSUMPTIONS:

A. Situation: Dover Dam is located in Tuscarawas County, Ohio, in the Tuscarawas River, approximately three and one-half miles northeast of Dover, Ohio. Dover Dam is located approximately 62.6 miles above the

mouth of the Tuscarawas River and about 173.6 miles above the mouth of the Muskingum River. Dover Dam was completed in 1938, and is a concrete gravity structure with a maximum height of 83 feet above streambed. The top overall length is 824 feet at elevation 931. An uncontrolled ogee spillway is situated in the center channel section. The crest length is 338 feet at elevation 916. The outlet works, located at the base of the spillway section, consist of 18 gate-controlled conduits arranged in groups of six each at three different levels. To assure appropriate and prompt response to an emergency situation at any of the dams located in Tuscarawas County, the U.S. Army Corps of Engineers has developed a Dam Safety Emergency Action Plan which includes the following: Priority Notification Section, Emergency Action Plan, Emergency Notification Procedures, Identification of Potential Emergency Situations, Emergency Operations and Repairs, Inundation Maps and Guide to Flood Arrival Times at Downstream Communities, and General Project Data.

B. Assumption:

1. It is the responsibility of the U.S. Army Corps of Engineers to monitor the Dover Dam for potential risks.
2. It is the responsibility of the U.S. Army Corps of Engineers to remain in contact with the Tuscarawas County Homeland Security & Emergency Management Agency (TCHS & EMA) with updates on the status of the dam.
3. It is the responsibility of the U.S. Army Corps of Engineers to notify the TCHS & EMA of any threat to the community.
4. Both response and recovery operations will be hampered by blocked roads, damaged bridges or roads and downed trees.
5. In extreme conditions – Tuscarawas County will require State and Federal assistance.
6. Demand for resources will be critical.
7. Enhanced public awareness information such as handouts, media campaigns, evacuation routes and mapping information will be available.
8. Advanced preplanning is ongoing by all government entities, health care facilities, businesses, industries, and utilities in the inundation areas and is essential to maintain needed services during response and recovery operations.
9. It is assumed when citizens are asked to evacuate there will be a percentage who will not comply.

IV. Concept of Operation:

A. General:

1. To assure appropriate and prompt response to an emergency situation, the U.S. Army Corps of Engineers has classified potential emergency situation or conditions according to the relative urgency as follows:

    A. Possible Dam Failure
    B. Dam Failure

The Project Manager or designated representative of the US Army Corps of Engineers will, in the event of any emergency, take immediate action necessary to prevent dam failure and to prevent or minimize loss of life and property. He/She will initiate emergency notification procedures as outlined in the Dover Dam Emergency Action Plan. When the Corps of Engineers classifies the situation as a Possible Dover Dam failure, the National Weather Service will issue a Flash Flood Watch for potential dam failure. When the Corps of Engineers classifies the situation as a Dover Dam failure, the National Weather Service will issue a Flash Flood Warning for a dam failure.

2. Evacuations will be implemented on advice from the U. S. Army Corps of Engineers on progressive or instantaneous failure of the dam and/or increased flooding events. The ultimate responsibility for ordering an evacuation rests with local government.

3. By monitoring the progress of the evacuation, any impediments to the evacuation can be recognized and contingency options per individual organizations, agencies, groups Standard Operating Guidelines (SOG's) can be implemented.

B. Authority:

1. Evacuation Order

   a. The Ohio Revised Code authorizes Township and Municipal Police, Fire Departments and the County Sheriff the power to protect lives and property of the citizens in their jurisdiction. This will be accomplished with decisions that will be made jointly in the County Emergency Operations Center.

   b. The following positions have equal authority to order an evacuation during an emergency (Ohio General Attorney's Opinion #1532 - Nov. 1964)

      1.) Chief Elected Officials (CEO's)
      2.) County Sheriff
      3.) Municipal Chiefs of Police
      4.) Fire Chiefs
      5.) County EMA Director

C. 24 Hour Warning Point:

1. Tuscarawas County Sheriff's Office (330-339-2000)

D. Notification & Communications:

1. Corps of Engineers will initiate the warning notification to the Tuscarawas County Sheriff's Office Dispatch Center (TCSO) & TCHS & EMA.

2. TCSO Dispatch will issue notification to all appropriate response agencies (per county call out as indicated in county plan) upon notification by Corps of Engineers.

3. An Incident Communication Plan (identifying specific emergency response channels) will be developed by the Incident Commander for use during the response phase.

4. Direct communications will be established between the Incident Command Post and the Tuscarawas County Emergency Operations Center (EOC) by use of the Tuscarawas County-wide communications system.

5. Tusco Amateur Radio Club personnel may be assigned to appropriate Respite/Evacuation Centers and Mass Care Shelters, as a minimum for communication purposes with the Tuscarawas County EOC.

E. Direction & Control:

1. The Tuscarawas County EOC is located within the Sheriff's Office at 2295 Reiser Ave. SE, New Philadelphia, Ohio and/or an alternate Tuscarawas County EOC located within the County Annex Building at 125 E. High Avenue, New Philadelphia, Ohio will be activated to the appropriate level, and will coordinate all management of the emergency. A list of alternate EOC locations are on file at the EMA office.

2. To ensure effective coordination of the emergency response throughout the emergency, the senior fire officials of the impacted areas will act as Incident Commanders for their jurisdiction, unless this authority is transferred to another official.

3. All response operations will use the National Incident Management System which includes the Incident Command System to coordinate all response activities. The Incident Commander will establish an Incident Command Post for his area of responsibilities.

4. The On-Scene Incident Commander will coordinate operational decisions with the County EOC.

5. The County EOC Resource Coordinator in conjunction with the Executive Group in the County EOC will establish resource priorities.

6. The Tuscarawas County EOC will be the coordination point between all state agencies and local government operations and will establish communications with Ohio EMA and EMA offices of surrounding counties.

7. Each agency shall retain its authority during operations.

F. Public Alert & Warning:

1. Warning residents within the risk area will be initiated by the following means:
   a. Reverse 911: Notification lists have been established and evacuation messages have been pre-recorded for dispatchers to activate. (Note: Notification lists are limited to published phone numbers and are dependent upon public phone service.)

   b. Emergency Alert System (EAS) Broadcast: The County Sheriff or the County EMA Director can activate the EAS System which is located in the 911 dispatch center, to alert residents of imminent dangers. Draft messages can be viewed in Attachment 6.

   c. National Oceanic and Atmospheric Administration (NOAA) Weather Radio: The National Weather Service will issue a Flash Flood Watch for potential dam failure when the Corps of Engineers classifies the situation as a Possible Dover Dam failure. The National Weather Service will issue a Flash Flood Warning for dam failure when the Corps of Engineers classifies the situation as a Dam Failure. These notifications will be tone alerted over NOAA Weather Radios and sent over EAS.

   d. Mobile public address systems and sirens: First Responders using vehicle loud speakers and sirens may slowly drive roads in the affected area announcing the need to evacuate and indicating the best available routes for evacuation. Area fire departments will be responsible for writing a SOG for evacuating their jurisdictions.

   e. Door to Door notification: Responders will systematically notify residents in the affected area. List of addresses notified will be kept and homes will be marked with a large X with tape on the front door to prevent duplication of efforts. Any resident that refuses to evacuate will be notified of the severity of the situation and required to supply name and phone number of a relative.

G. Protective Actions: (County Commissioners, Mayors, Incident Commanders Township Trustees, Tuscarawas County Sheriff's Office)

1. The impact of protective actions on the area has far reaching effects on the individuals being evacuated and those agencies supporting the process. The risk area would include not only flood prone areas, but also areas that would become isolated due to flooding and damage to area roads.

2. Potential evacuation routes have been identified on the basis of the best available information (See attachment 1). This information will be broadcast on the designated radio stations and distributed by all other means available.

H. Public Information (Tuscarawas County PIO)

1. The Tuscarawas County HS & EMA with assistance from the County Public Information Officer (PIO) and organizations knowledgeable in disaster preparedness education will be responsible for all pre-emergency public education and information.

2. The Tuscarawas County PIO, as designated by the County EMA Director, will provide all public information.

3. After the EOC is activated, elected officials of the affected jurisdictions will be encouraged to send a PIO for their jurisdiction to the Joint Public Information Center (JPIC) along with the County PIO to coordinate the dissemination of public information.

4. The local radio stations will broadcast immediate updates on the situation. (Designated stations include WJER (1450 AM), WTUZ (99.9 FM), and WBTC (1540AM). Information will also be available on additional radio stations when the EAS System has been activated.

I. Traffic Control: Tuscarawas County Sheriff's Office (SO), Ohio State Patrol (OSP), Local Police Departments, County Engineer, Ohio Department of Transportation (ODOT) and Township Trustees.

1. The County Sheriff's Office, OSP, and Local Police Departments will coordinate traffic control issues.

2. The County Engineer and ODOT will be responsible for traffic control signage.

J. Evacuation of Special Needs Population: (Nursing Homes, MRDD Facilities, and Special Care Individuals)

1. Nursing Homes and Special Needs facilities within the risk area should develop procedures to meet the needs of their individual facility. These plans should be coordinated with the county HS & EMA.

2. All resources requested for special needs will be requested through the County EOC.

K. Mass Care: (Red Cross, Salvation Army, Job & Family Services)

1. Respite/Evacuation Centers will be established in various locations. All evacuees will be instructed to check in at a respite/evacuation center even if they do not require sheltering assistance. Information left at the respite/evacuation center will:

    a. Help determine residents safely evacuated.
    b. Assist those residents that may require assistance with sheltering.
    c. Aid in finding residents in the event that someone needs to get in touch with them.

2. Shelter assistance will be provided for those evacuees that may require assistance. A special needs area can be incorporated into an existing shelter, however that section will need to be staffed by the special needs facility. Red Cross Shelters have been identified in Attachment #2.

V. Area Security:

1. Security for the affected areas will be coordinated by County Sheriff's Office, OSP, and Local Police Departments. All additional personnel for Security will be coordinated through the EOC. (i.e.: Ohio National Guard)

VI. Search & Rescue:

Fire, EMS, ODNR – Division of Watercraft, Dover FD-New Philadelphia FD Dive Team, Ohio Fire Chief's Plan, Army Corps. of Engineers, Civil Air Patrol, DMORT, Ohio Funeral Directors, Ohio National Guard)

A. On scene search and rescue operations will be coordinated between the Incident Commander and the County EOC.

B. Tuscarawas County EOC will request a fly-over conducting a search of the affected areas for stranded evacuees and identification of heavily damaged areas.

C. Additional resources for search and rescue operations will be coordinated through the County EOC.

D. Time required for the floodwaters to recede after flooding will vary. The County EOC will remain in close contact with the Army Corps of Engineers concerning the time frame for flooding to recede.

VII. Recovery:

A. Damage Assessment: (Tuscarawas County EMA Damage Assessment Team, County Engineer, Township Trustees, Mayors, ODOT, American Red Cross, Tuscarawas County Health Department, New Philadelphia Health Department, Tuscarawas County Citizen Corps Volunteers, Fire Departments, Law Enforcement).

1. Local government officials of the affected jurisdictions will conduct an initial damage assessment using all available resources (fire, law enforcement etc.) as soon as possible, following the disaster and report this information to the EOC. Early ` identification of problems affecting the population will enable the County EOC to make prompt and efficient decisions concerning availability of needed resources.

2. The Tuscarawas County Engineer/Township Trustees/Public Works (i.e. ODOT) will determine the safety of all roads and bridges before any damage assessment teams may enter the impacted area.

B. **Return of Evacuees:**

1. The Incident Commander, County Engineer, ODOT, Township Trustees, Public Health, and Utility Providers will monitor the area in order to determine when the area is safe for return.

2. The Incident Commander will coordinate the order to return with the EOC.

3. Designated return routes and appropriate public information will be provided to evacuees through local media.

4. The EOC will coordinate with utility providers for resumption of services once the residents have returned home.

VIII. Responsibilities:

A. Specific responsibilities for emergency response and coordination are outlined in the Tuscarawas County Emergency Operations Plan (EOP).

B. Each individual organization should establish specific policies and guidelines on how they will accomplish assigned responsibilities.

IX. Plan Development and Maintenance:

A. TCHS & EMA is responsible for coordinating with the appropriate municipal, county and state-level organizations in order to make necessary changes and revisions to this plan. This plan is a living document and will undergo revisions as a result of feedback from After-Action Review Reports (AAR's) from actual incidents, disaster related exercises, testing and training.

B. TCHS & EMA will forward plan revisions to all organizations on the distribution list (Attachment 5). It will be the responsibility of all organizations to update their copy of this plan once they receive an update.

C. Organizations are responsible for sending changes (i.e. name, address and phone numbers or any other necessary changes) to TCHS & EMA for incorporation into this plan.

D. All organizations and agencies are responsible for developing and maintaining departmental Standard Operating Guidelines (SOG's), mutual-aid agreements, personnel rosters (including 24 hour emergency notification telephone numbers), and equipment inventories.

X. Supporting Plans & Guidelines:

Tuscarawas County Emergency Operations Plan
Tuscarawas County HS & EMA

Dover Dam Safety Emergency Action Plan
US Army Corps. Of Engineers

National Weather Service – Pittsburgh Office

Attachment 1 **Potential Evacuation Routes** **Page 1 of 3**

All evacuation routes are considered potential because each disaster is considered Incident Specific, therefore all routes may not be available. These potential routes are based on maps prepared for 36,000 cubic foot per second (cfs) from Dover Dam discharge.

AREA	EVACUATION ROUTES
Dover - North	CR 74 N to Strasburg SR 39 W to Sugarcreek SR 516 NW to Winfield/Dundee
Dover - South & NP Central	Tuscarawas Avenue N (to Dover N area) CR 24 S to Stonecreek I-77 Interchange E. High Ave. to US 250 E SR 39 E - (Possible route if not affected by Carroll County flooding which is incident specific)
NP - South	CR 24 S. to Stonecreek I-77 Interchange
Dennison/Uhrichsville	US 250 E CR 66 to SR 39 E -(Possible route if not affected by Carroll County flooding which is incident specific) US 36 E to SR 416 N to CR 22 W to CR 21 N to Stonecreek or S to US 36 W (**See Coshocton note below**)
Tuscarawas	SR 416 S to US 36 E to US 250 E SR 416 S to CR 22 W to CR 21 N to Stonecreek or S to US 36 W (**See Coshocton note below**)

Attachment 1 **Potential Evacuation Routes** **Page 2 of 3**

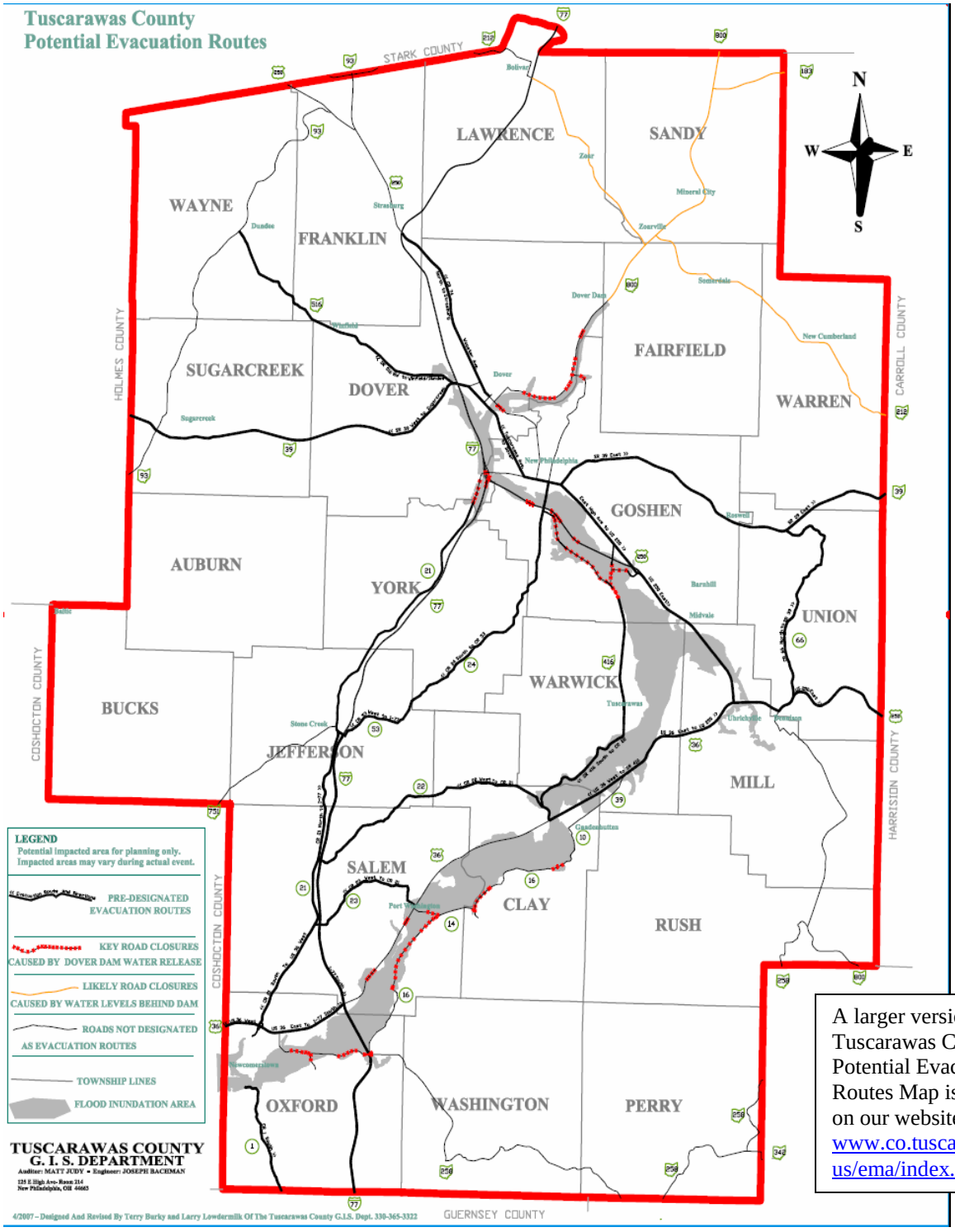
Gnadenhutten	US 36 E to US 250 E US 36 E to SR 416 N to CR 22 W to CR 21 N to Stonecreek or S to US 36 W (**See Coshocton note below**)
Port Washington	US 36 E to US 250 E CR 23 to CR 21 N to Stonecreek or S to US 36 W (**See Coshocton note below**)
Newcomerstown	US 36 W (**See Coshocton note below**) CR 21 N CR 1 S I-77 S

Note: This list addresses concentrated population areas only. Since we cannot address every area that will be isolated, the assumption is that the rural population in the general area of the concentrated population areas will make their way to the concentrated areas and then follow one of the above routes.

US 36 W in Coshocton County may be open, but will be determined by Incident Specific rainfalls.

Tuscarawas County Emergency Evacuation Plan
For
Dover Dam

Attachment 1	Potential Evacuation Routes	Page 3 of 3



A larger version of the Tuscarawas County Potential Evacuation Routes Map is available on our website: www.co.tuscarawas.oh.us/ema/index.htm

Tuscarawas County Emergency Evacuation Plan
For
Dover Dam

Attachment 2 **Potential Shelters**

Shaded Cells are Post Registration Centers and Shelter

Dover North

Shelter Name	Gen.	Cap.	Address	City
Union Hill United Church		25	7877 Union Hill Rd NW	Sugarcreek
Shanesville Lutheran Church		25	Corner of St Rt 39 & St Rt 93	Sugarcreek
Garaway Local Schools High and Middle Schools		75	146 Dover Rd	Sugarcreek
First Mennonite Church		25	113 Main St	Sugarcreek
Strasburg-Franklin Local Schools		75	140 North Bodmer Ave	Strasburg
First Evangelical Lutheran Church		25	204 Eighth St SW	Strasburg

Dover South/NP Central

First United Church of Christ		25	201 Fair Ave NW	New Philadelphia
Broadway United Methodist		25	120 Church Ave SE	New Philadelphia
Schoenbrunn Moravian Church		25	2200 East High Ave	New Philadelphia
Jerusalem Church		25	1417 Stone Creek Rd SW	New Philadelphia

All New Phila. Elementary Schools (Gymnasiums)		75 per school Total 450	Central Elem.: 145 Ray Ave., East Elem.: 470 Fair Ave. N.E, South Elem.: 132 Providence Ave S.W, Tuscarawas Ave. Elem.: 935 Tusc Ave N.W, West Elem.: 232 Tusc Ave N.W, and York Elem.: 938 Stone Creek RD SW	New Philadelphia
Welty Middle School (Multi-Purpose Room)		75	315 Fourth Street NW	New Philadelphia
New Phila High School (Gym)		75	315 Fourth Street NW	New Philadelphia
American Red Cross			1451 4th St NW	New Philadelphia

Tuscarawas County Emergency Evacuation Plan
For
Dover Dam

Attachment 2 **Potential Shelters** **Page 2 of 2**

Dennison/Uhrichsville				
Roxford United Methodist Church Family Life Center		25	661 Roxford Church Road SE	Dennison
Claymont High School	X	75	4205 Indian Hill RD	Uhrichsville
Gnadenhutten				
Gnadenhutten Moravian Church		25	145 South Walnut	Gnadenhutten
Port Washington				
St Paul's Church		25	114 N High St	Port Washington
Newcomerstown				
St. Francis De Sales Church		25	440 River St	Newcomerstown
Newcomerstown West School		75	517 S. Beaver St	Newcomerstown
First Presbyterian Church		25	205 Canal St	Newcomerstown
Newcomerstown Middle School		75	659 S. Beaver St	Newcomerstown
Newcomerstown High School		75	659 S. Beaver St	Newcomerstown
Elementary East Elementary School		75	137 S. College St	Newcomerstown
Stark County Shelters				
Fairless Middle & High School		280	11885 Navarre Road	Navarre
Northwood Elementary		120	1500 School Ave. NE	North Canton
East Canton High School		250	310 Browning	Canton
Estimated total shelter Population		2100		

Special Needs Facilities

Nursing Homes & Nursing Care Communities:			Phone Numbers
Amberwood Manor	36 Residents	245 South Broadway New Philadelphia, OH 44663	330 339-2151
Beacon Point Rehab Center	62 Residents	5166 Spanson Dr. SE Uhrichsville http://www.beacon-pointe.net/	740-922-2208
Country Club Retirement Campus	65 Residents	860 E Iron Ave. Ext Dover www.countryclubretirementcampus.com	330-343-5568
Hennis Care & Assisted Living Centre of Bolivar	97 Residents	300 Yant Street Bolivar http://www.henniscarecentre.com	330-874-9999
Hennis Care Centre	136 Residents	1720 Cross Street Dover 1720 Cross Street Dover	330-343-6661 330-364-8849
New Dawn Retirement Community	98 Residents	865 E Iron Ave. Dover http://www.new-dawn.net	330-343-5521
Park Village Health Care Center	95 Residents	1525 Crater Ave. Dover	330-364-4436
**Riverside Manor Nursing & Rehabilitation Center	82 Residents	1100 E State Rd. Newcomerstown	740-498-5165
Schoenbrunn Healthcare	94 Residents	2594 East High Ave. New Philadelphia www.schoenbrunnhealthcare.com	330-339-3595
Walnut Hills Nursing Home		4748 Olde Pump Walnut Creek	330-852-2457
Walnut Hills Assisted Living		2708 Olde Pump St. Walnut Creek http://www.walnuthillsliving.com/index.htm	330-893-3200
Lanning House		228 Grant St. Dennison Ohio www.occh.org/projects/project_display.cfm?ProjectID=110	614-396-3200

** Indicates Facilities potentially affected by Dam Failure

Special Needs Facilities Continued

MRDD:		
**Starlight School & Transportation	518 Church Ave. SW New Philadelphia	330-399-3577
**Adult Services	638 Commercial Ave. New Philadelphia	330-339-3578
The Residential Program/ Office of Superintendent	1260 Monroe St. NW P.O. Box6190 New Philadelphia	330-339-5145
Business Operations	223 Fairview Ave. NW New Philadelphia	330-339-5145

MRDD Staff Directory		
Superintendent	Natalie Lupi	330-339-9779
Adult Services Director	Cassie Elvin	330-339-9669
School Principal	Sue Kloc	330-339-9559
Director of Business Operations	Trevor Buehler	330-339-9772
Service Facilitation Manager	Bob Mathews	330-308-7175
Administrative Assistant to the Superintendent	Lisa Sidoti	330-339-9757
Human Resources Coordinator	Patrick Silva	330-339-9753
Medical/Residential Manager	John Saylor	330-339-9756
Information Technology Coordinator	Keith Stoneman	330-339-9668
Reporting Systems Manager	Deb Ireland	330-339-9769
Community Relations/ Special Projects Coordinator	Erin Jones	330-339-9573
Transportation Manager	**David Duncan**	**330-339-8714**

MRDD Board Members:
Craig Barnett- President
Jim Cugliari - Vice President
Kendra Burger- Recording Secretary
Barbara Ernest-
Tricia Herzig-McKinnon
Robert Preston-
Penny Stull-

** Indicates Facilities potentially affected by Dam Failure

Special Needs Facilities Continued

Visiting Nurse Services:		
A Better Home Health Care	1235 4th St. New Philadelphia	1-800-322-1575 330-364-3399
A Better Home Health Care	1130 N. Wooster Ave. Strasburg	330-878-3399
All American Health Care	255 2nd St. NE Ste B New Philadelphia	330-365-2196
Cambridge Home Health Care	525 West High Ave. New Philadelphia	330-339-5079
**Union Hospital Home Health Care	300 Medical Park Dr. Dover	330-343-6909

Hospitals:		
**Union Hospital	659 Boulevard Dover	330-343-3311
Twin City Hospital	819 N 1st St. Dennison	740-922-2800
** Indicates Facilities potentially affected by Dam Failure		

Attachment 3 **SPECIAL NEEDS FACILITIES CONTINUED** **Page 4 of 12**

TUSCARAWAS COUNTY DAY CARE FACILITIES

NAME	ADDRESS	PHONE	AVERAGE NO. CHILDREN	SPECIAL NEEDS CHILDREN IN FAC.	EVACUATION PLAN
Intentionally Left Blank – List on file at EMA					

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Intentionally Left Blank – List on file at EMA					

Intentionally Left Blank – List on file at EMA					

MRDD (Board of Mental Retardation & Developmental Disabilities)

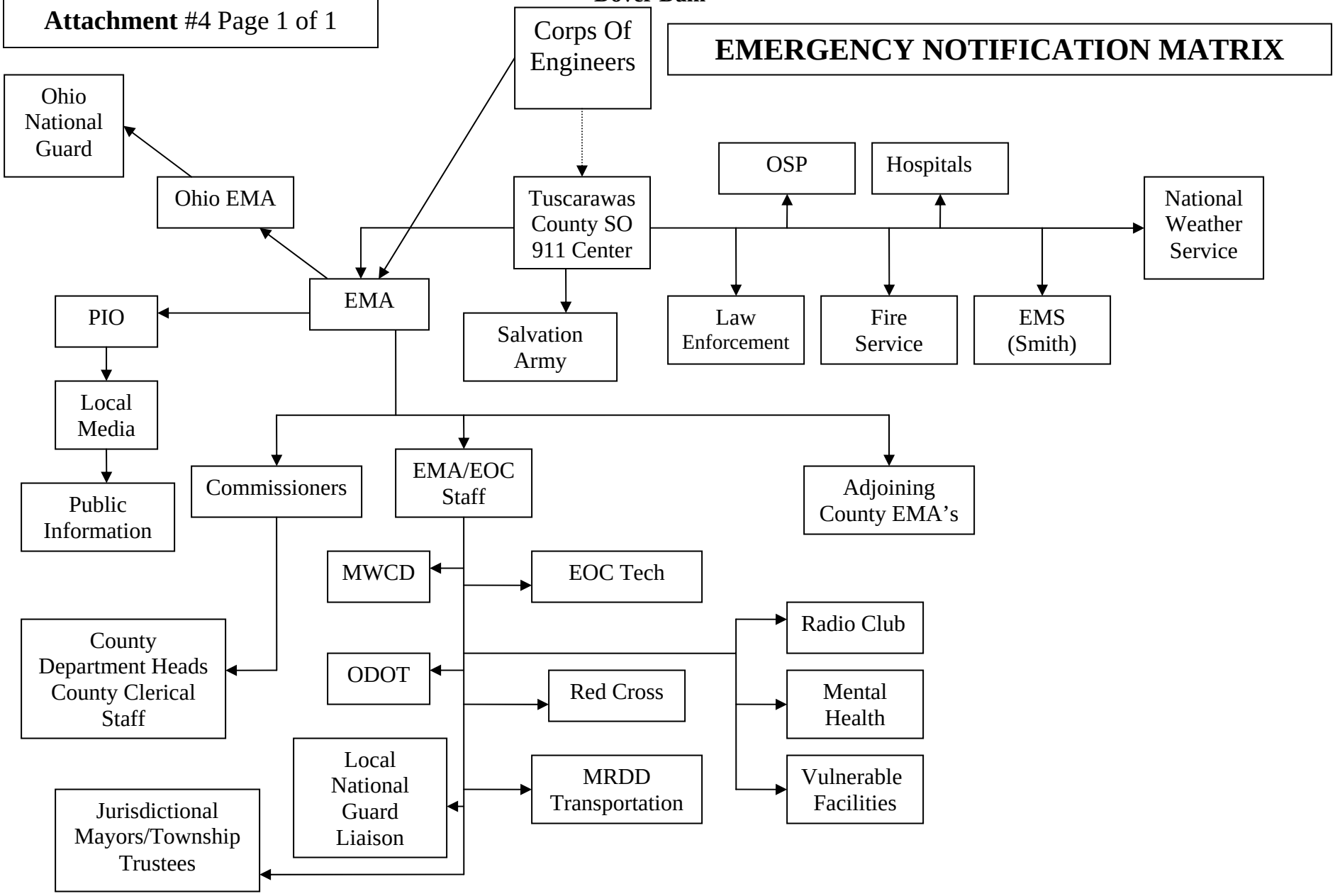
RESIDENTIAL HOUSES WITH (APPROXIMATE NUMBER OF RESIDENTS)

Starlight Enterprises Incorporated, Non-profit Board housing list

Lockport home	(3)
East High home	(4)
Ray home	(3)
Cedar Home	(4)
Lincoln home	(2)
Iron home	(3)
Front St home	(4)

Attachment #4 Page 1 of 1

EMERGENCY NOTIFICATION MATRIX



Attachment 5 Tuscarawas County Plan Distribution List

DEPARTMENT/AGENCY	DATE	ACKNOWLEDGMENT SIGNATURE
Board of County Commissioners		
Homeland Security & Emergency Management Agency		
County Sheriff's Office		
County Engineer		
Public Information Officer		
County Health Department		
City Health Department		
County Coroner		
Department of Job & Family Services		
Recycling & Litter Prevention		
Soil & Water Conservation		
OSU Extension Office		
Ohio State Highway Patrol – Local Post		
ODOT- Local District		
ODNR – Division of Watercraft		
ODNR – Division of Parks & Recreation		
Corps of Engineers – Local Office		
National Weather Service - Pittsburgh		
MWCD – Muskingum Watershed		
EMS – Smith Ambulance		
Mental Health – ADAMS Board		
American Red Cross		
Salvation Army		
Carroll County EMA		
Coshocton County EMA		
Guernsey County EMA		
Harrison County EMA		
Holmes County EMA		
Stark County EMA		
Village of Baltic		
Village of Barnhill		
Village of Bolivar		
Village of Dennison		
City of Dover		
Village of Gnadenhutten		
Village of Midvale		
Village of Mineral City		
Village of Newcomerstown		
City of New Philadelphia		
Village of Parrall		

Attachment 5 Continued **Page 2 of 3**

DEPARTMENT/AGENCY	DATE	ACKNOWLEDGMENT SIGNATURE
Village of Port Washington		
Village of Roswell		
Village of Stone Creek		
Village of Strasburg		
Village of Sugarcreek		
Village of Tuscarawas		
City of Uhrichsville		
Village of Zoar		
Baltic FD		
Bolivar FD		
Delaware Valley Joint Fire District		
Dennison FD		
Dover FD		
Fairfield Township FD		
Gnadenhutten FD		
Midvale FD		
Mineral City FD		
NERS, Inc.		
New Philadelphia FD		
Rush Township FD		
Zoar FD		
Stone Creek FD		
Strasburg FD		
Sugarcreek FD		
Tuscarawas-Warwick FD		
Uhrichsville FD		
Wayne Township FD		
York FD		
Bolivar PD		
Dennison PD		
Dover PD		
Gnadenhutten PD		
Midvale PD		
Newcomerstown PD		
New Philadelphia PD		
Port Washington PD		
Strasburg PD		
Sugarcreek PD		
Tuscarawas PD		
Uhrichsville PD		
Ohio State Highway Patrol #79		
Baltic PD		
Roswell PD		

Attachment 5 Continued Page 3 of 3

DEPARTMENT/AGENCY	DATE	ACKNOWLEDGMENT SIGNATURE
Barnhill PD		
Swiss Valley Joint Ambulance District		
Mineral-Sandy EMS		
Tri-County Ambulance		
Smith Ambulance		
Auburn Township		
Bucks Township		
Clay Township		
Dover Township		
Fairfield Township		
Franklin Township		
Goshen Township		
Jefferson Township		
Lawrence Township		
Mill Township		
Oxford Township		
Perry Township		
Rush Township		
Salem Township		
Sandy Township		
Sugarcreek Township		
Union Township		
Warren Township		
Warwick Township		
Washington Township		
Wayne Township		
York Township		
Buckeye Career Center		
Claymont School District		
Dover City Schools		
Garaway Local School District		
Indian Valley Local School District		
Newcomerstown Exempted Village School		
Strasburg-Franklin Local School District		
New Philadelphia City Schools		
Tuscarawas-Carroll-Harrison ESC		
Tuscarawas County MRDD		
Tusky Valley Local School District		

ATTACHMENT 6 **DRAFT NEWS RELEASE**

Tuscarawas County Homeland Security & Emergency Management Agency
For Immediate Release
Date: _____
Contact: Patty Levengood, Director
(330) 308-6670
www.co.tuscarawas.oh.us/EMA/

EVACUATION ORDER ISSUED FOR RESIDENCES NEAR DOVER DAM

The Tuscarawas County Homeland Security and Emergency Management Agency reports that due to the significant precipitation at Dover Dam, an EVACUATION ORDER has been issued for the immediate Dover Dam area and for residents in the following locations: (Example: List locations who should evacuate)_____
_____
_____

Residents in the EVACUATION ORDER areas should evacuate their homes and business no later than: _____ (Date & Time).

County officials have recommended an EVACUATION WARNING for residents in the following areas: _____
_____
_____

Residents in the EVACUATION WARNING areas are not required to evacuate at this time, however should prepare and may be required to do so within the next 6-24 hours if conditions worsen.

Residents are urged to listen to local news stations and the Emergency Alert System for further evacuation information and instructions. Evacuees are asked to report to relocation centers in person located at _____ or by phone _____when safely evacuated.

County and State agencies continue communications with US Army Corps of Engineer officials. The County Emergency Operations Center has been activated and will remain operational until the situation is resolved.

Additional information is available at: _____**(Web Site Address)**

Local radio stations: WBTC 1540 AM, WJER 1450 AM and WTUZ 99.9 FM

Tuscarawas County Homeland Security & Emergency Management Agency
For Immediate Release
Date: _____
Contact: Patty Levengood, Director
(330) 308-6670
www.co.tuscarawas.oh.us/EMA/

POSSIBLE DAM FAILURE AT DOVER DAM

Officials at Dover Dam, approximately three miles northeast of Dover, Ohio, reported that a possible dam failure may occur if the pool continues to rise. The U.S. Army Corps of Engineers, county and state officials are on the scene, monitoring the situation.

The Tuscarawas County Homeland Security and Emergency Management Agency has activated the Emergency Operations Center. Ohio EMA has been notified that additional resources may be required if the situation worsens at the dam.

The Tuscarawas County Homeland Security and Emergency Management Agency reports that due to the significant precipitation at Dover Dam, an EVACUATION ORDER has been issued for the immediate Dover Dam area and for residents in the following locations: (Example: List locations who should evacuate)_____

_____

_____

_____

Residents in the EVACUATION ORDER areas should evacuate their homes and business no later than: _____ (Date & Time).

County officials have recommended an EVACUATION WARNING for residents in the following areas: _____

_____

_____

Residents in the EVACUATION WARNING areas are not required to evacuate at this time, however should prepare and may be required to do so within the next 6-24 hours if conditions worsen.

Residents are urged to listen to local news stations and the Emergency Alert System for further evacuation information and instructions. Evacuees are asked to report to relocation centers in person located at _____ or by phone _____when safely evacuated.

County and State agencies continue communications with US Army Corps of Engineer officials. The County Emergency Operations Center has been activated and will remain operational until the situation is resolved.

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Local radio stations: WBTC 1540 AM, WJER 1450 AM and WTUZ 99.9 FM

Tuscarawas County Homeland Security & Emergency Management Agency
For Immediate Release
Date: _____
Contact: Patty Levengood, Director
(330) 308-6670
www.co.tuscarawas.oh.us/EMA/

DAM FAILURE IN PROGRESS AT DOVER DAM

This is an Emergency Broadcast:

Dover Dam has failed. All residents in low lying areas downstream of Dover Dam through Coshocton within 1 mile of the Tuscarawas River and tributaries need to seek high ground immediately.

Repeat above paragraph.

Addition information will follow. Stay tuned to radio stations, the EMA website, and television news stations for the most up to date information.

Additional information is available at: _____ **(Web Site Address)**

Local radio stations: WBTC 1540 AM, WJER 1450 AM and WTUZ 99.9 FM

2007
Dover Dam Evacuation Planning Team Members

Name	Organization
Andrew Elder	Ohio EMA - Field Liaison
Bill Drzal	National Weather Service - Pittsburgh
Capt. George Bates	Salvation Army
Chad Conrad	Red Cross – Muskingum Lakes Chapter
Chris Abbuhl	Tuscarawas County Commissioner
Darci Knack	Tuscarawas County HS & EMA
Darrin Lautenschleger	MWCD
Dean Dietrich	Red Cross – Muskingum Lakes Chapter
Denis Chabot	US Army Corps of Engineers
Dick Bible	ODOT
Ed Bennett	ODOT
Gene Thornton	Tusc. Co. Metropolitan Sewer District
James Spain	ODOT
Jamie Snyder	New Philadelphia FD
Jeff Bonomo	ODOT
Jeff Urban	New Philadelphia PD
Jim Seldenright	Tuscarawas County Commissioner
Joe Bachman	Tuscarawas County Engineer
John Rypien	Twin City Water and Sewer
Matt Judy	Tuscarawas County Auditor

Attachment 7 Continued

Kerry Metzger	Tuscarawas County Commissioner
Larry Lowdermilk	Tuscarawas County GIS
Jill Lengler	Tusc. Co. Office of Regional Planning
Patty Levengood	Tuscarawas County HS & EMA
Lt. Eric Escola	Ohio State Patrol
Major Stephen Wickersham	US Army Corps of Engineers
Nick Krupa	US Army Corps of Engineers
Renee Young	Ohio EMA - Field Liaison
Ronald Johnson	Dover PD
Rudi Blaser	Ohio EMA - Planner
Russ Volkert	Dover FD
Scott Tritt	MWCD
Terry Burky	Tuscarawas County GIS
Walt Wilson	Tuscarawas County Sheriff

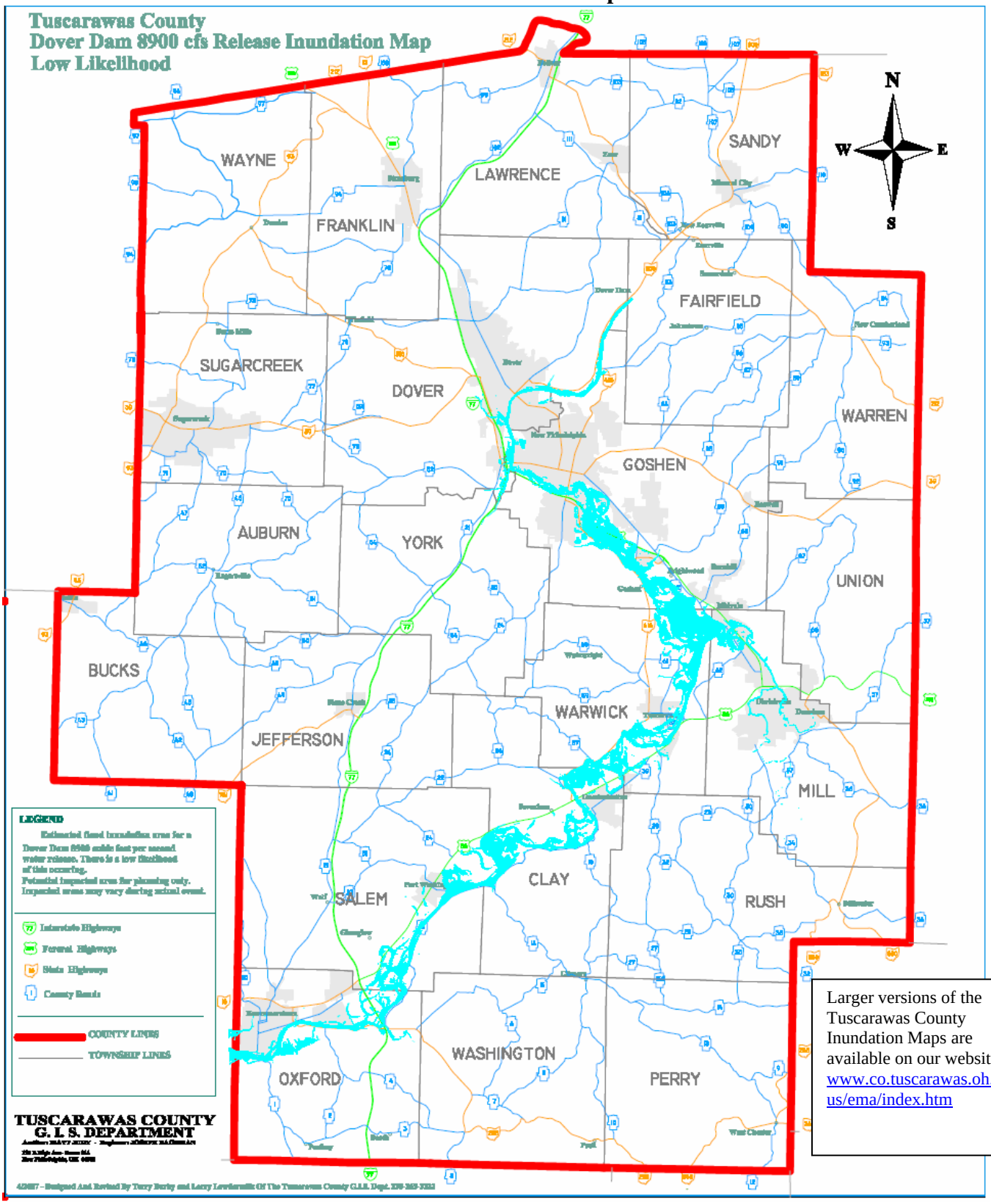
Attachment #8

List of Acronyms

AAR -	After Action Report
CFS -	Cubic Feet per Second
DMORT -	Disaster Mortuary Operational Response Team
EAS -	Emergency Alert System
EMA -	Emergency Management Agency
EOC -	Emergency Operations Center
EOP –	Emergency Operations Plan
FD -	Fire Department
GIS -	Geographic Information System
JPIC-	Joint Public Information Center
MRDD -	Board of Mental Retardation & Developmental Disabilities
MWCD -	Muskingum Watershed Conservancy District
NOAA -	National Oceanic and Atmospheric Administration
ODNR -	Ohio Department of Natural Resources
ODOT -	Ohio Department of Transportation
OSP -	Ohio State Highway Patrol
PIO -	Public Information Officer
PD -	Police Department
SOG -	Standard Operating Guidelines
SO -	Sheriff's Office
TCSO -	Tuscarawas County Sheriff's Office
TCHS -	Tuscarawas County Homeland Security

Attachment 9

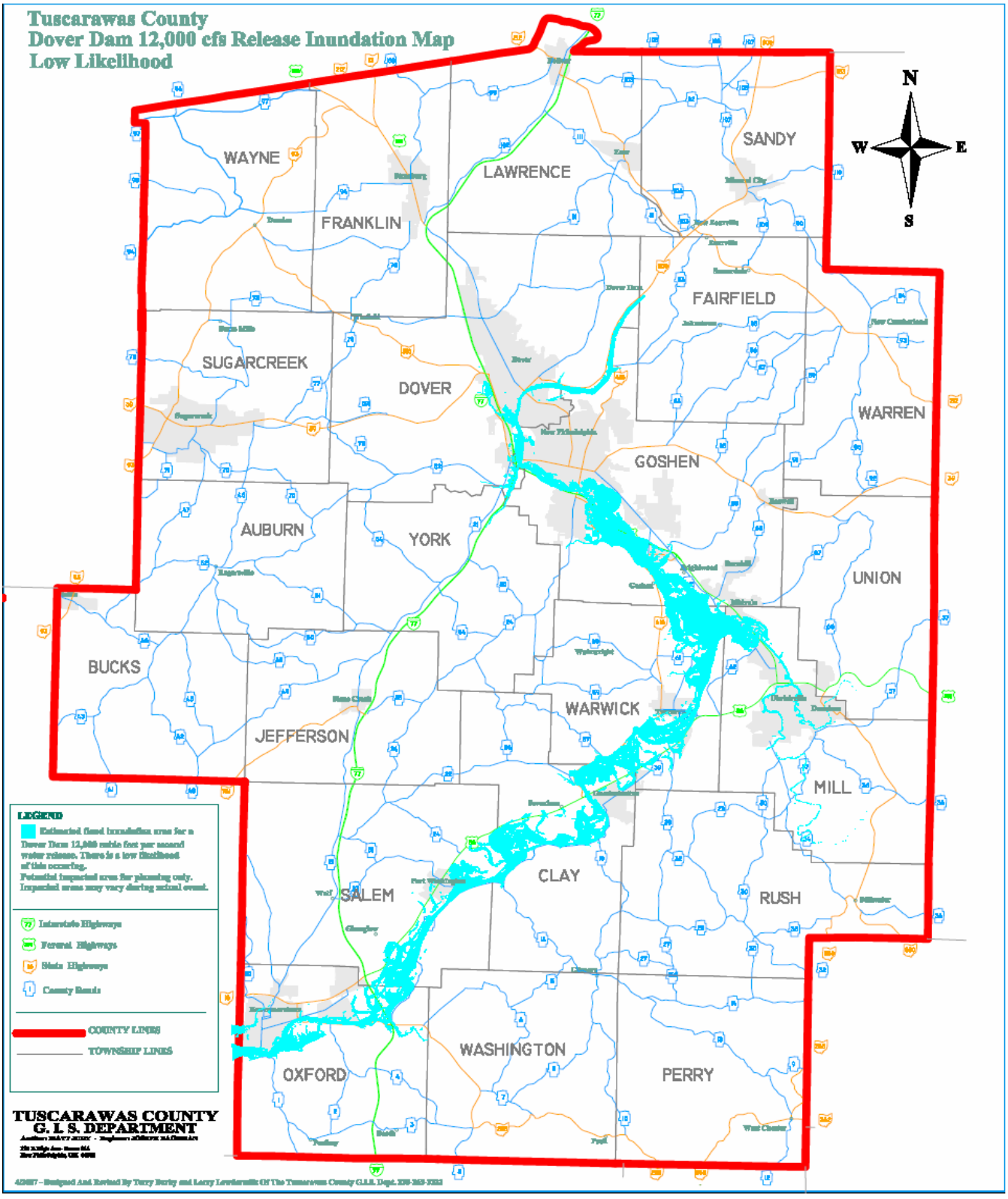
8900cfs release Inundation Map



Larger versions of the Tuscarawas County Inundation Maps are available on our website: www.co.tuscarawas.oh.us/ema/index.htm

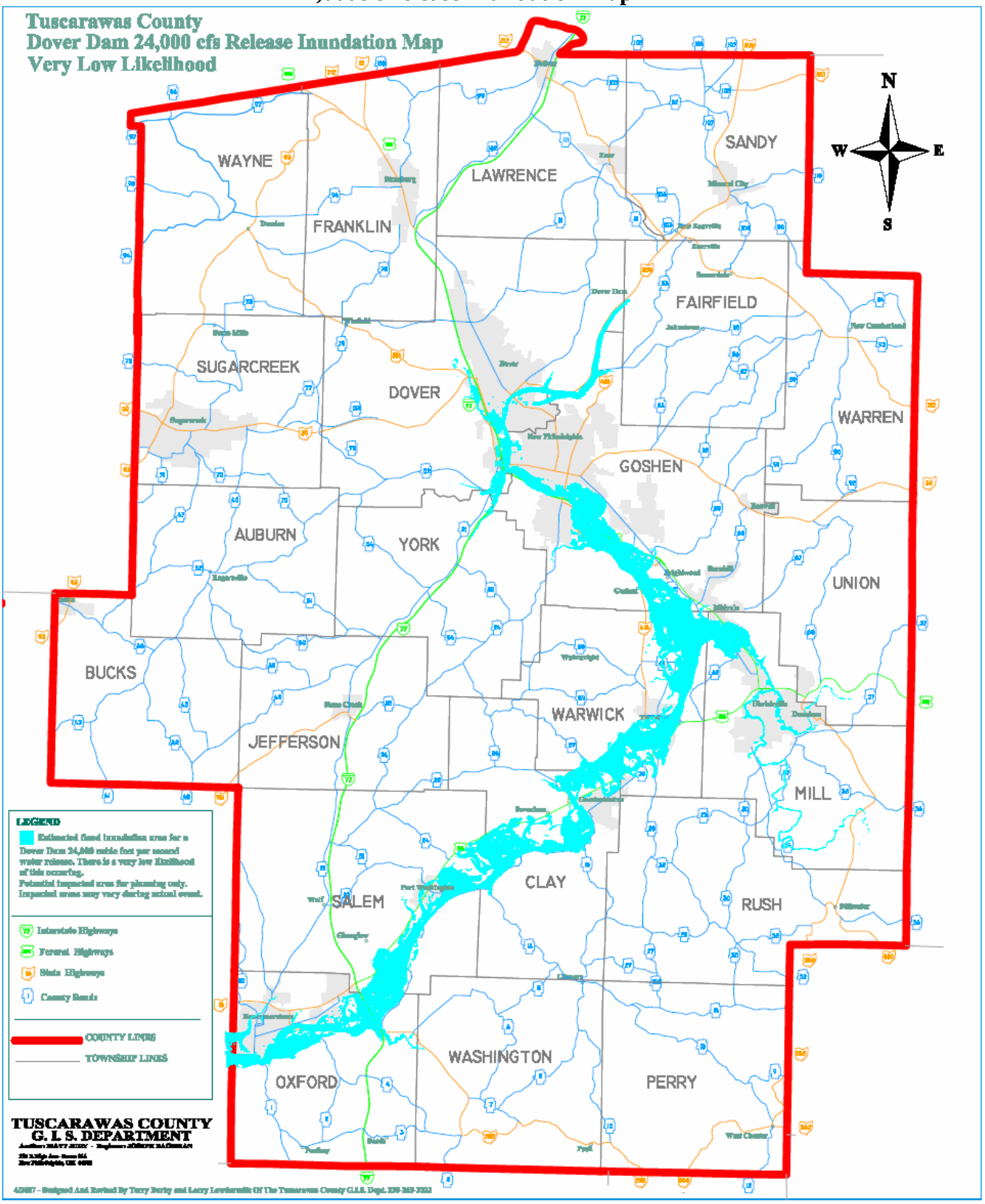
Attachment 9

12,000cfs release Inundation Map



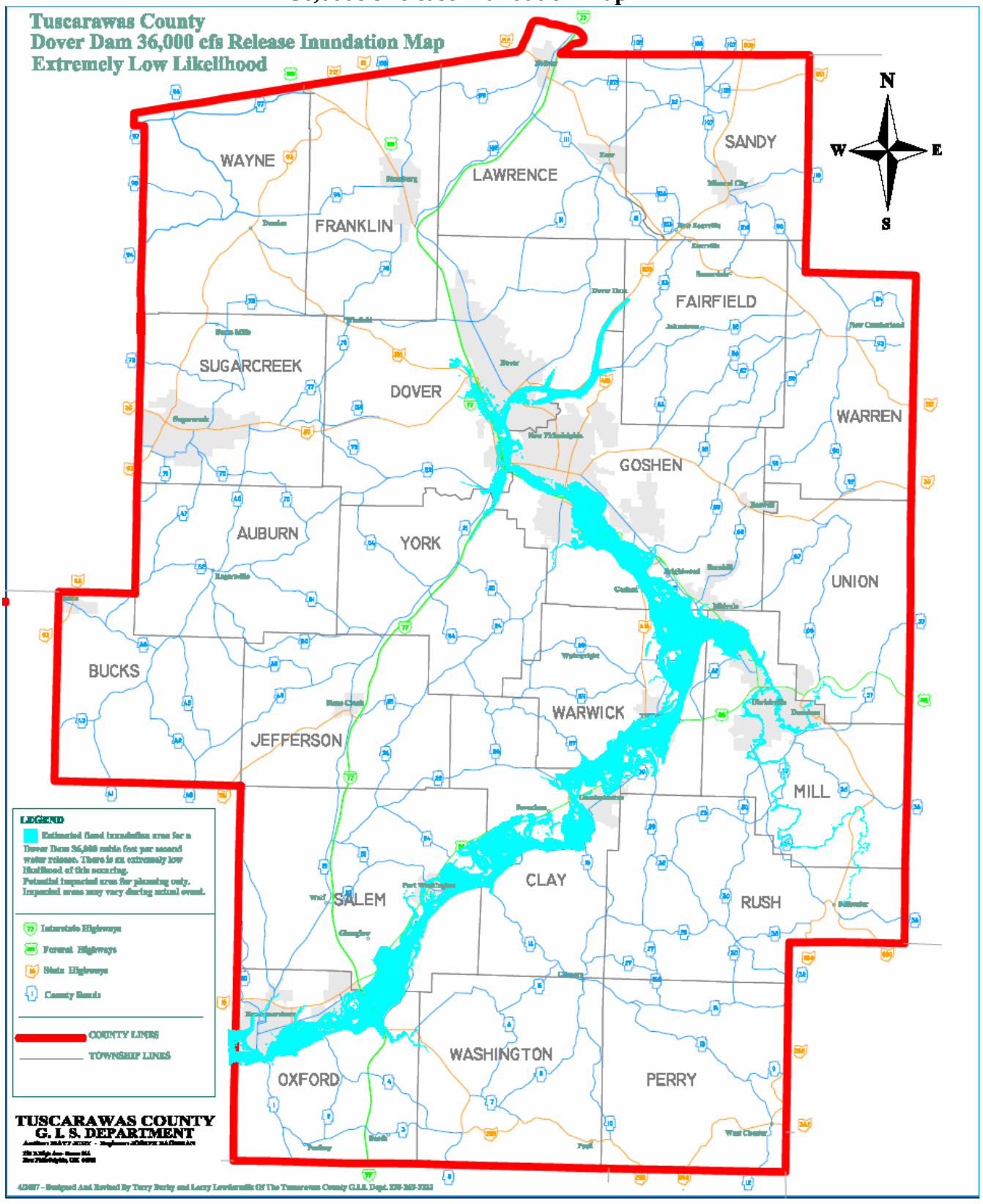
Attachment 9

24,000cfs release Inundation Map



Attachment 9

36,000cfs release Inundation Map



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APPENDIX G. TUSCARAWAS COUNTY MUNICIPAL MAPS

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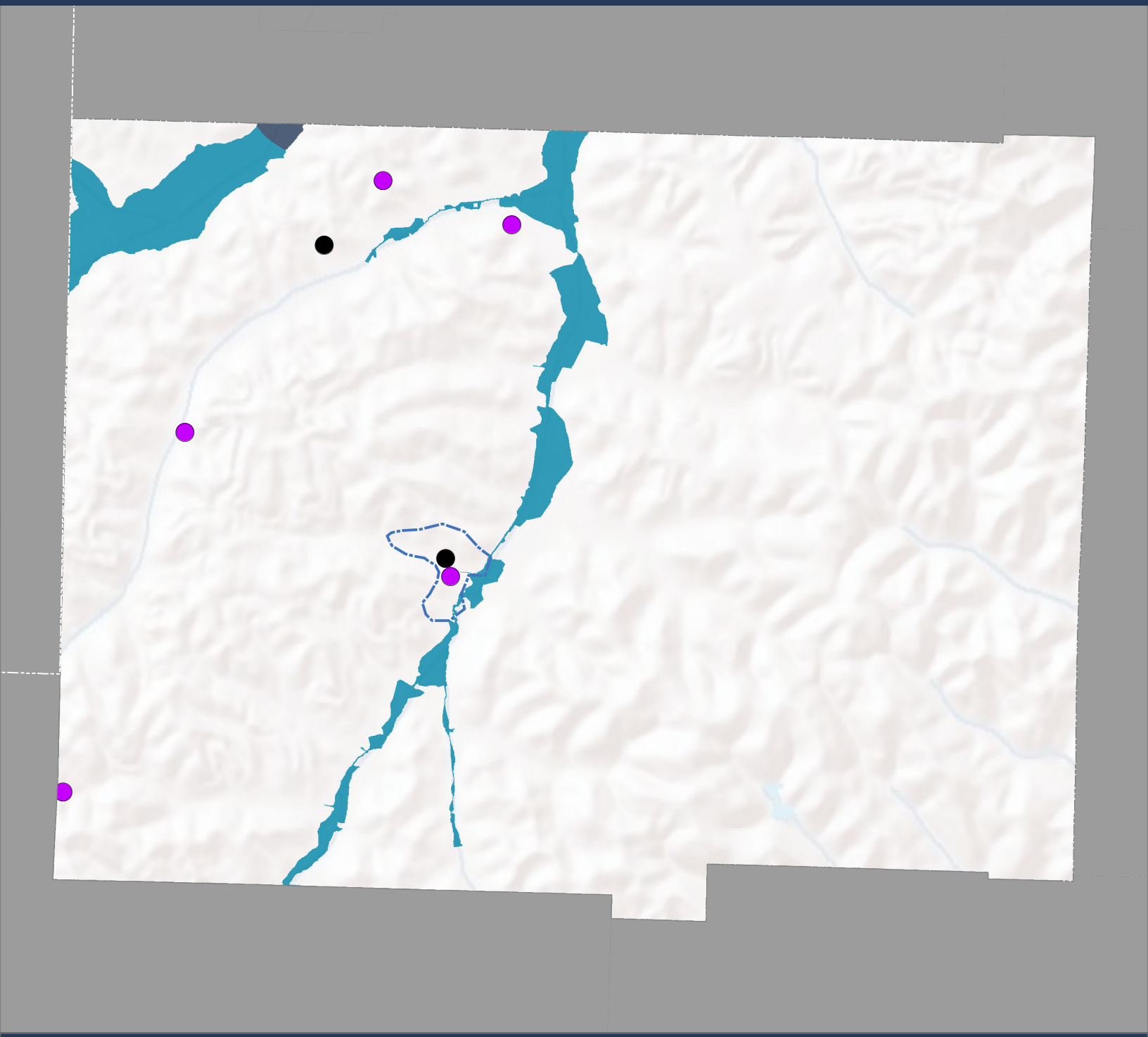
Auburn Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

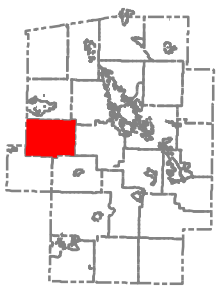
- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
- Water Bodies
- Parks

Special Flood Hazard Areas

- A
- AE

Critical Facilities

- Day Care
- EOC
- Fire Station
- Hospital
- Library
- Museum
- Place of Worship
- Police Department
- School



= Auburn Twp

N

0 0.5 1 Miles

Baltic Village

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

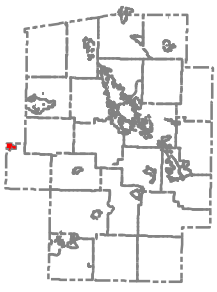
- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
- Water Bodies
- Parks

Special Flood Hazard Areas

- A
- AE

Critical Facilities

- Day Care
- EOC
- Fire Station
- Hospital
- Library
- Museum
- Place of Worship
- Police Department
- School



= Baltic Village

N

0 0.1 0.2 Miles

Barnhill Village

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

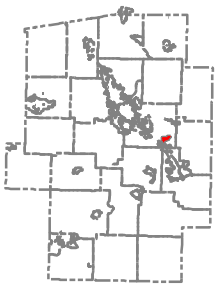
- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
- Water Bodies
- Parks

Special Flood Hazard Areas

- A
- AE

Critical Facilities

- Day Care
- EOC
- Fire Station
- Hospital
- Library
- Museum
- Place of Worship
- Police Department
- School



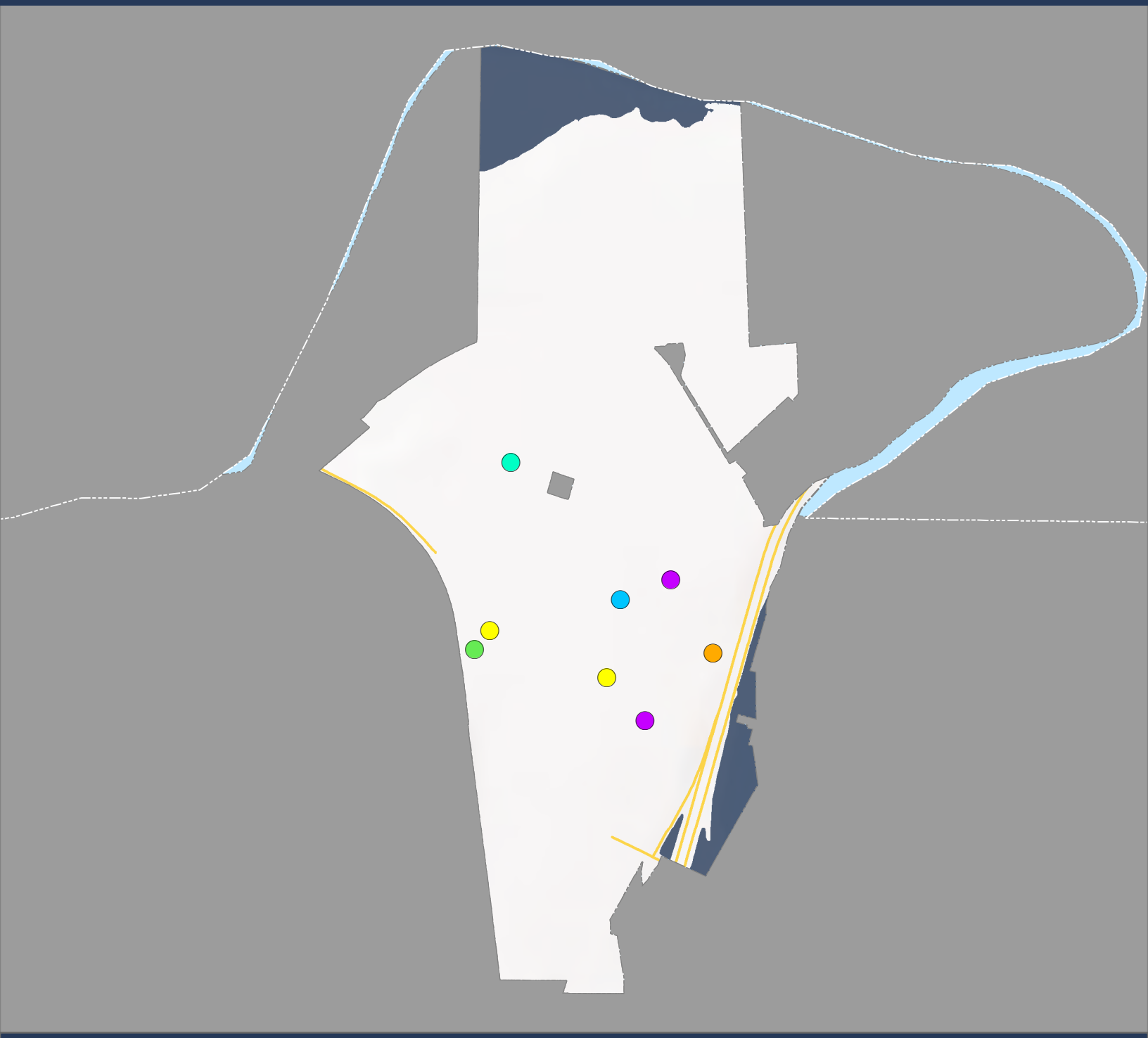
= Barnhill Village

N

0 0.075 0.15 Miles

Bolivar Village

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

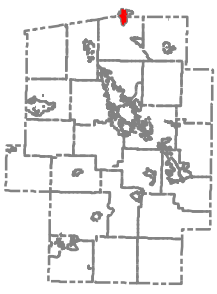
- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
- Water Bodies
- Parks

Special Flood Hazard Areas

- A
- AE

Critical Facilities

- Day Care
- EOC
- Fire Station
- Hospital
- Library
- Museum
- Place of Worship
- Police Department
- School



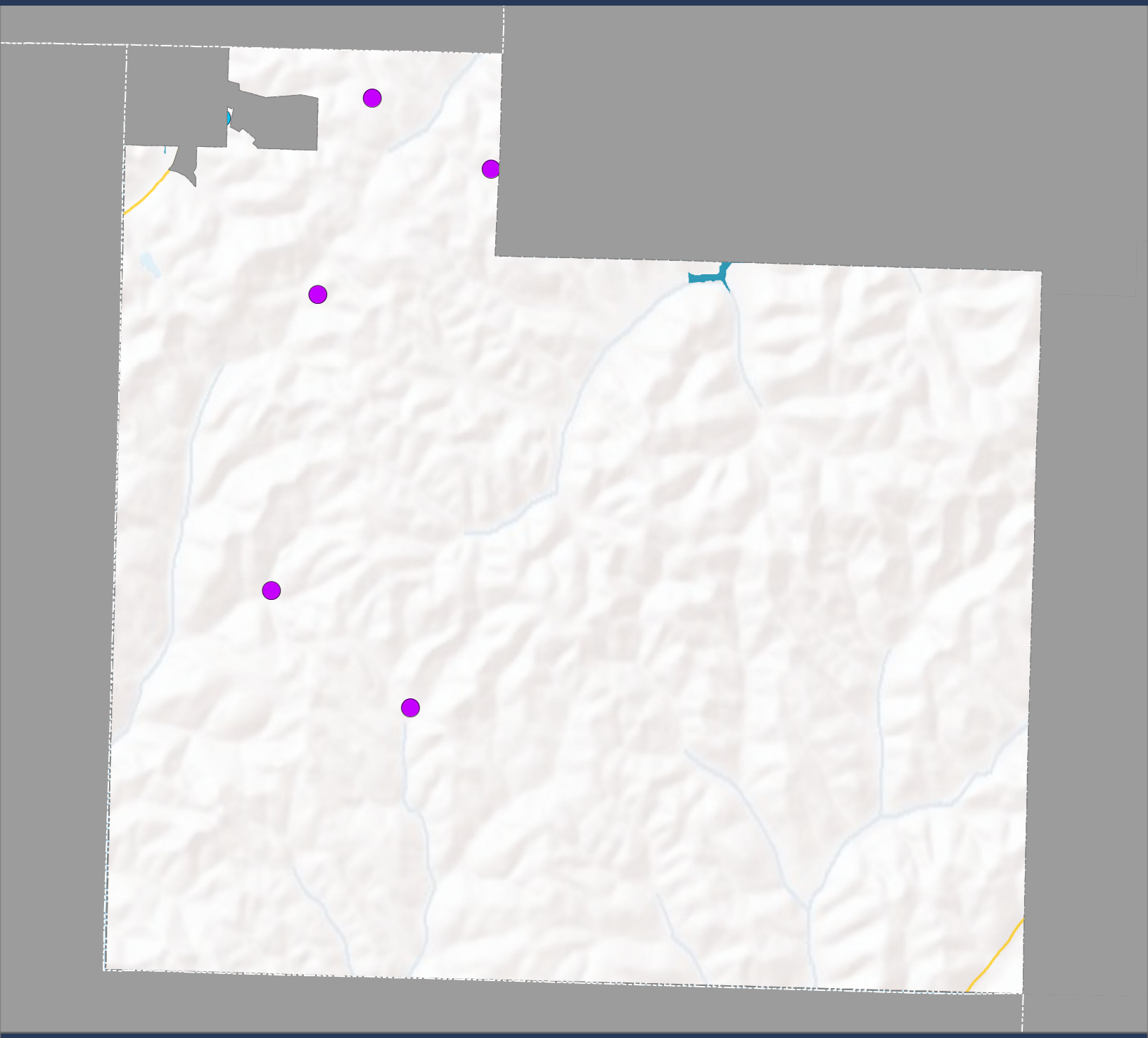
= Bolivar Village

N

0 0.175 0.35 Miles

Bucks Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

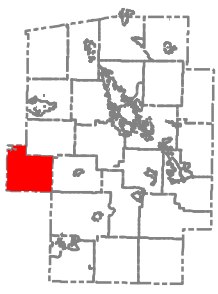
- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
- Water Bodies
- Parks

Special Flood Hazard Areas

- A
- AE

Critical Facilities

- Day Care
- EOC
- Fire Station
- Hospital
- Library
- Museum
- Place of Worship
- Police Department
- School



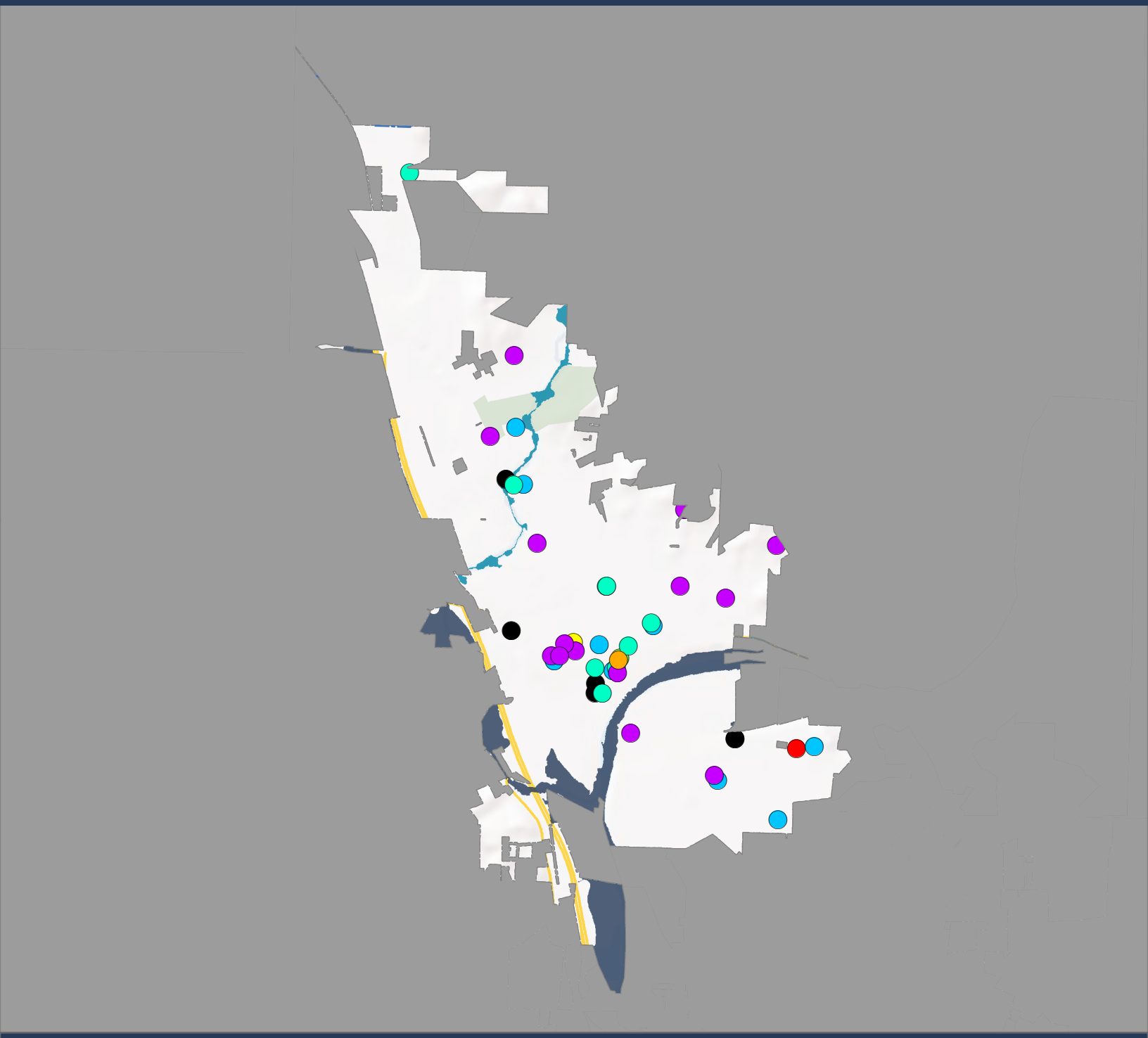
= Bucks Twp

N

0 0.5 1 Miles

City of Dover

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

- County Boundaries
- Unincorporated Areas
- Municipalities
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- Water Bodies
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Special Flood Hazard Areas

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- Library
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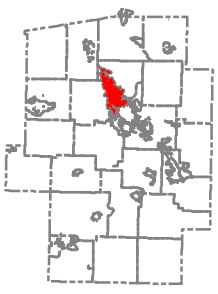


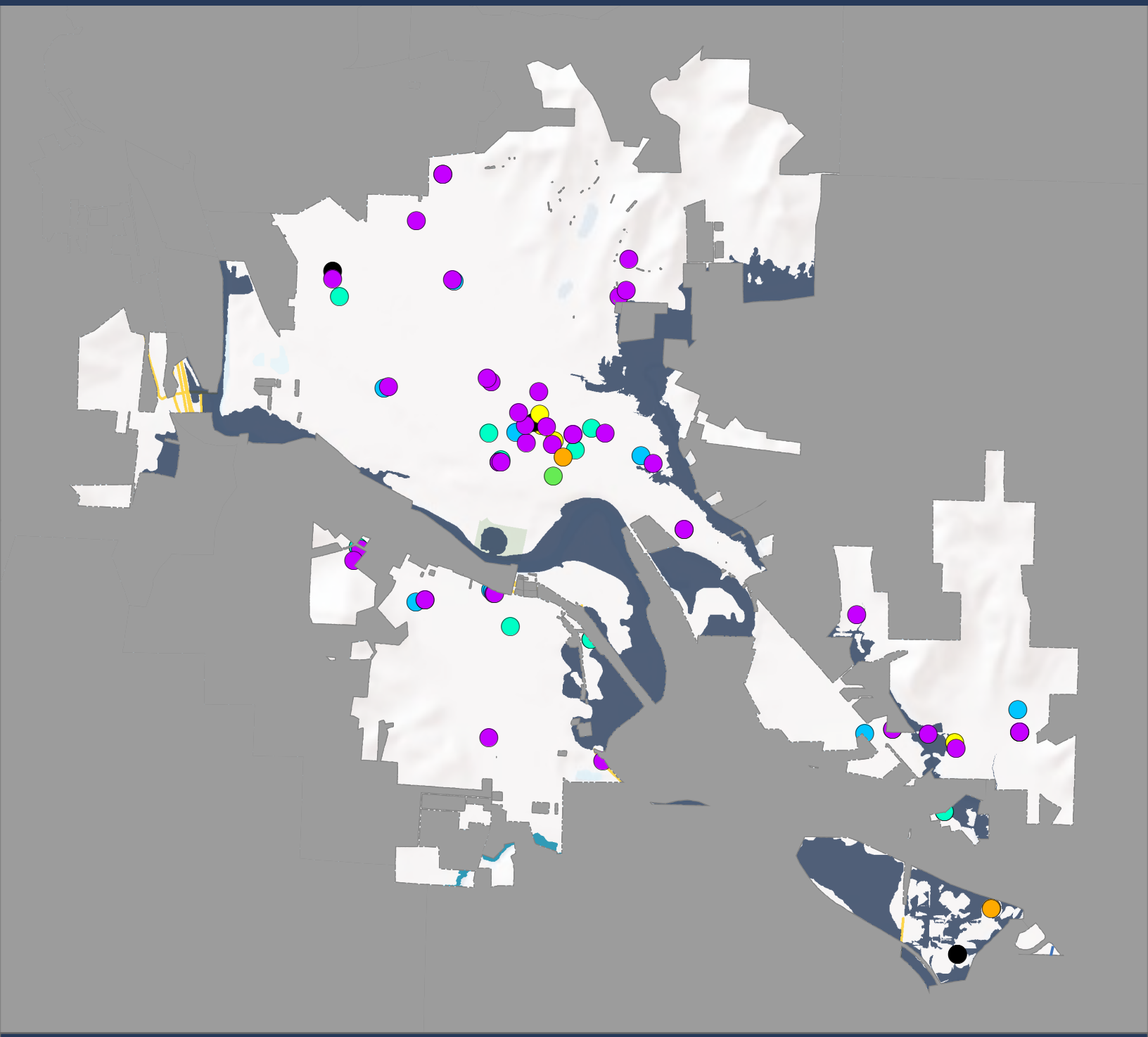
= City of Dover

N

0 0.5 1 Miles

City of New Philadelphia

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

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- Unincorporated Areas
- Municipalities
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- Water Bodies
- Parks

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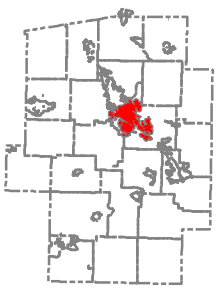


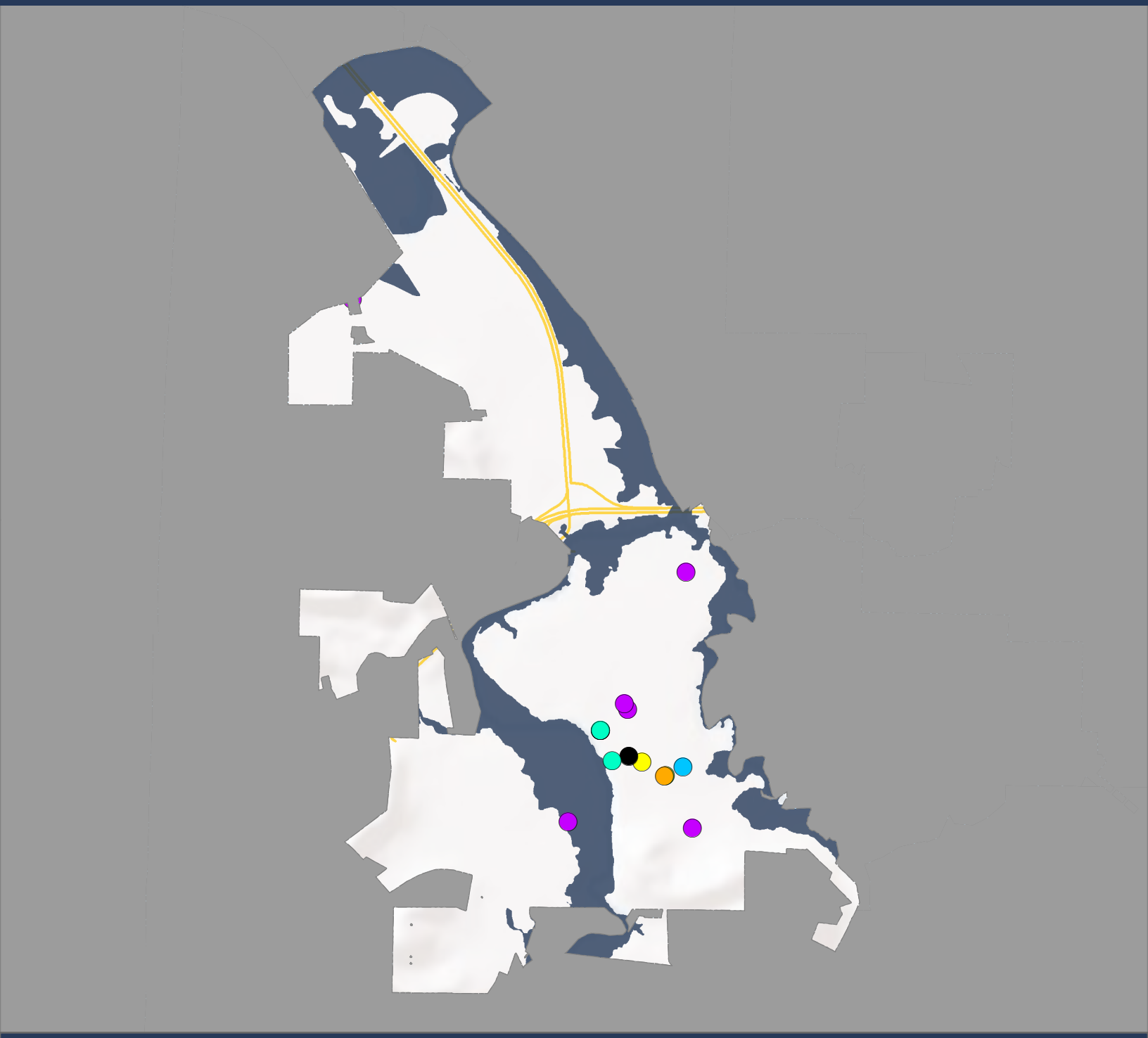
= City of New Philade

N

0 0.5 1 Miles

City of Uhrichville

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

- County Boundaries
- Unincorporated Areas
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- Water Bodies
- Parks

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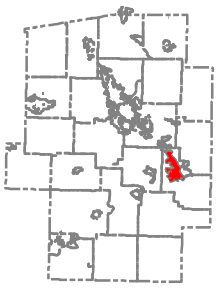


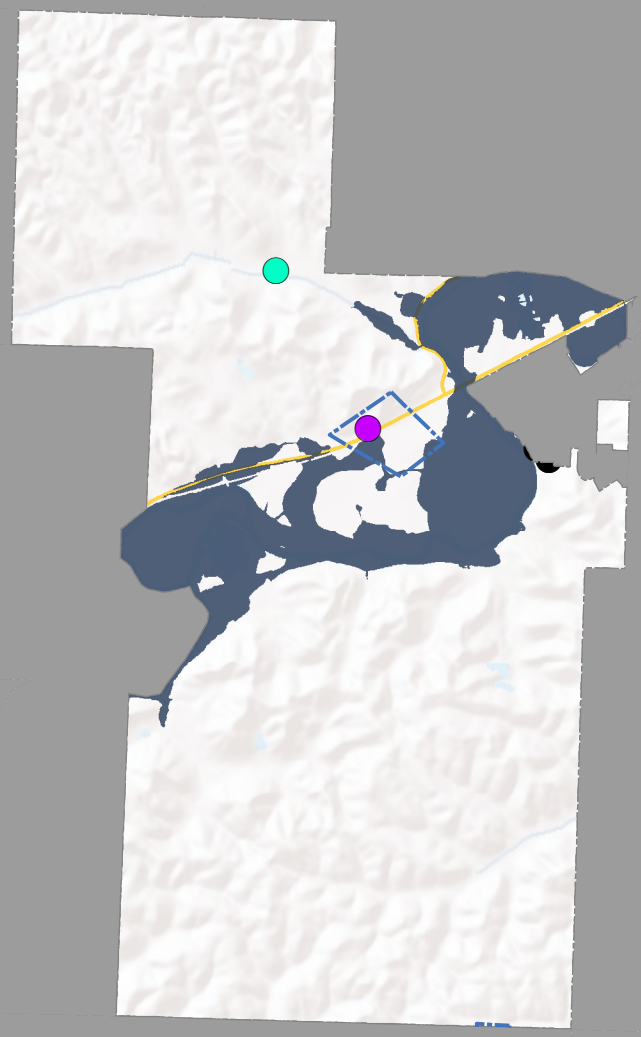
= City of Uhrichville

N

0 0.35 0.7 Miles

Clay Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

- County Boundaries
- Unincorporated Areas
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- Parks

Special Flood Hazard Areas

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- AE

Critical Facilities

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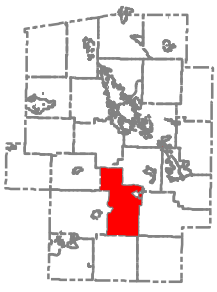
- School



= Clay Twp

N

0 1 2 Miles

Dennison Village

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
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- AE

Critical Facilities

- Day Care
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- Library
- Museum
- Place of Worship
- Police Department
- School

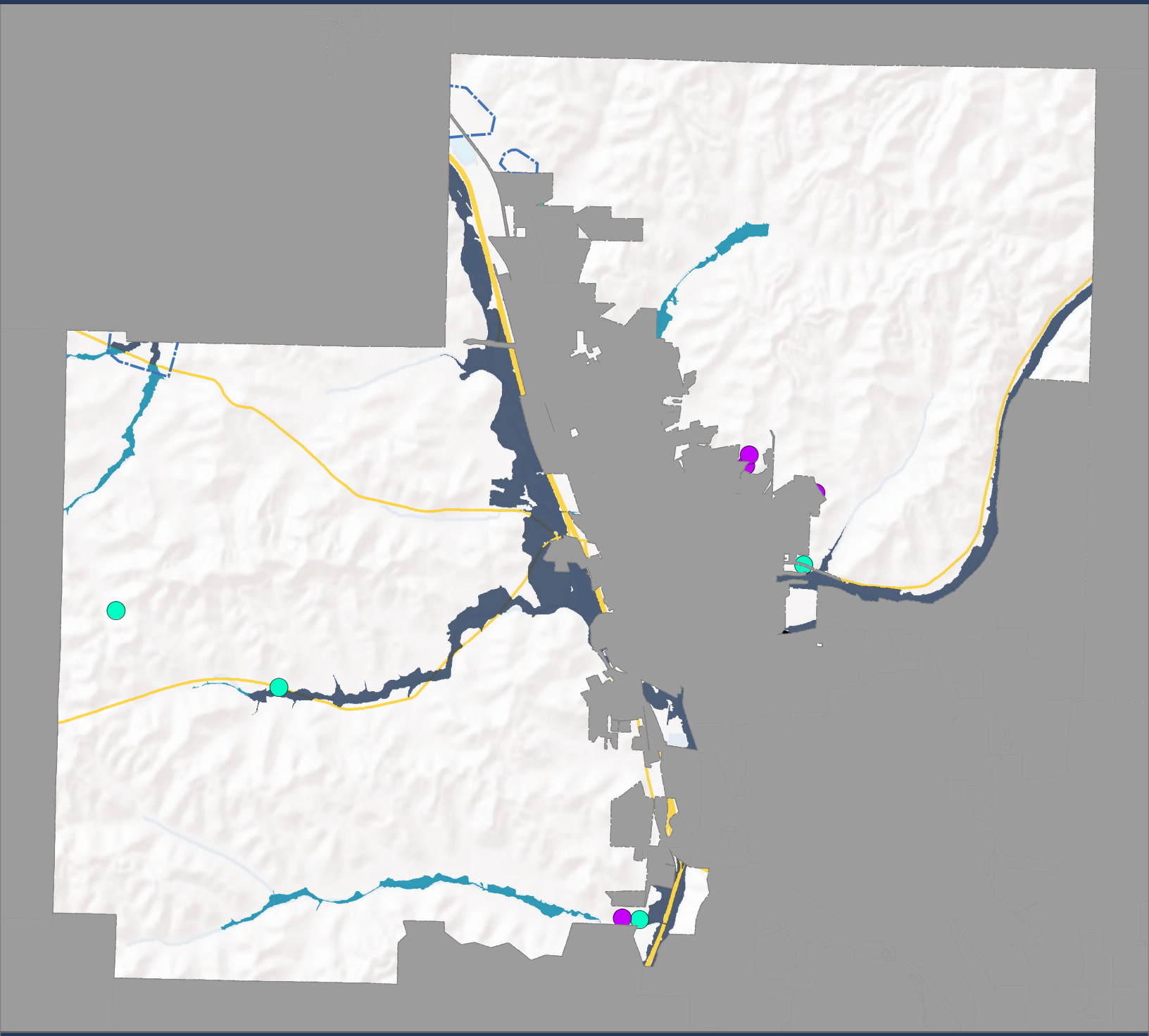
= Dennison Village

N

0 0.2 0.4 Miles

Dover Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

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- Unincorporated Areas
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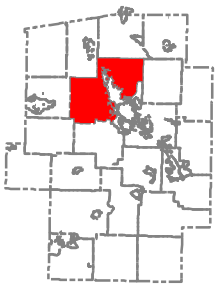


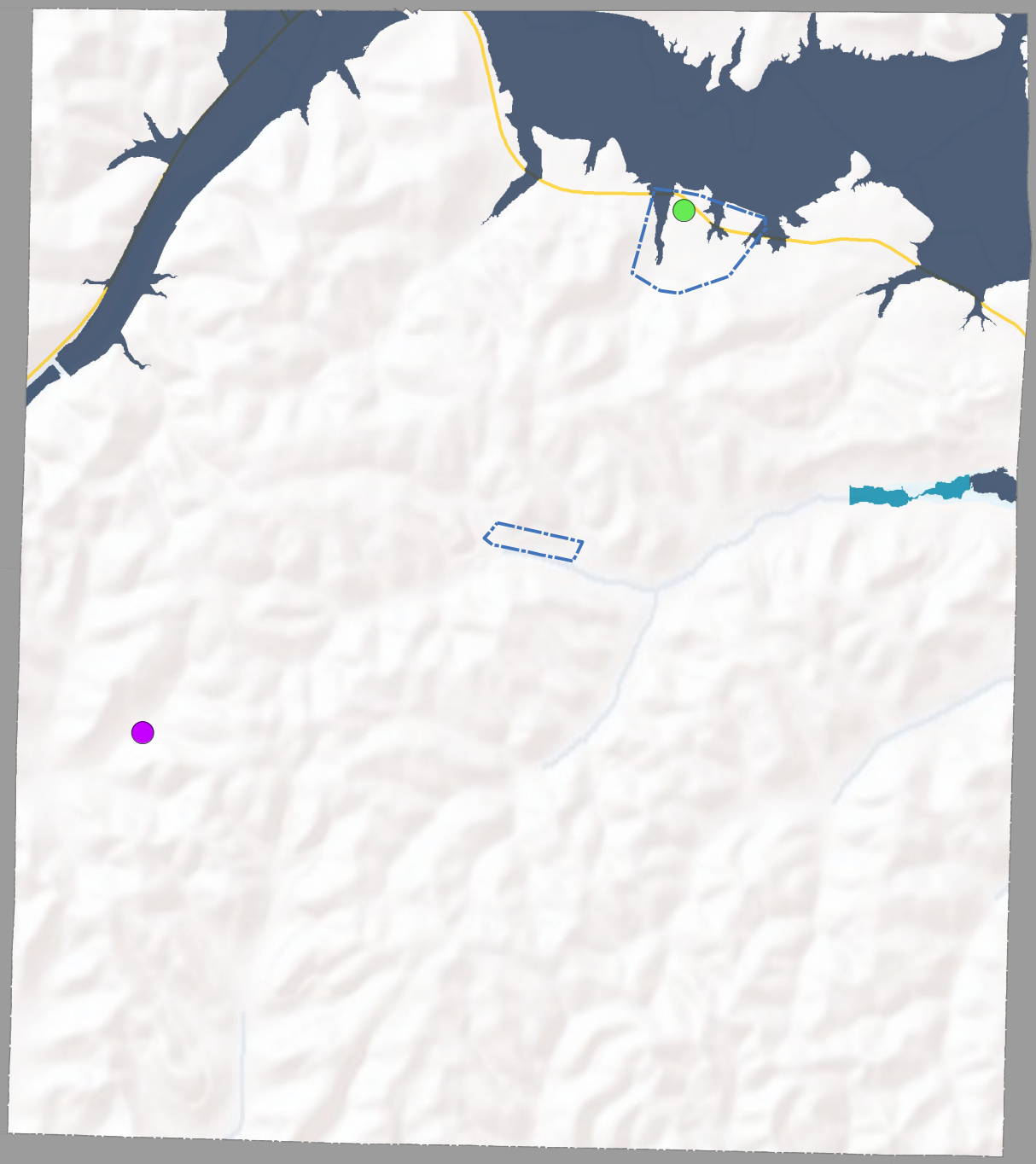
= Dover Twp

N

0 0.75 1.5 Miles

Fairfield Twp

Tuscarawas 2022 Hazard Mitigation Plan



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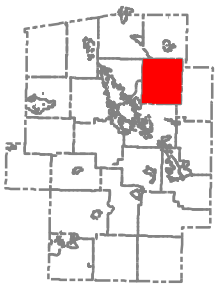


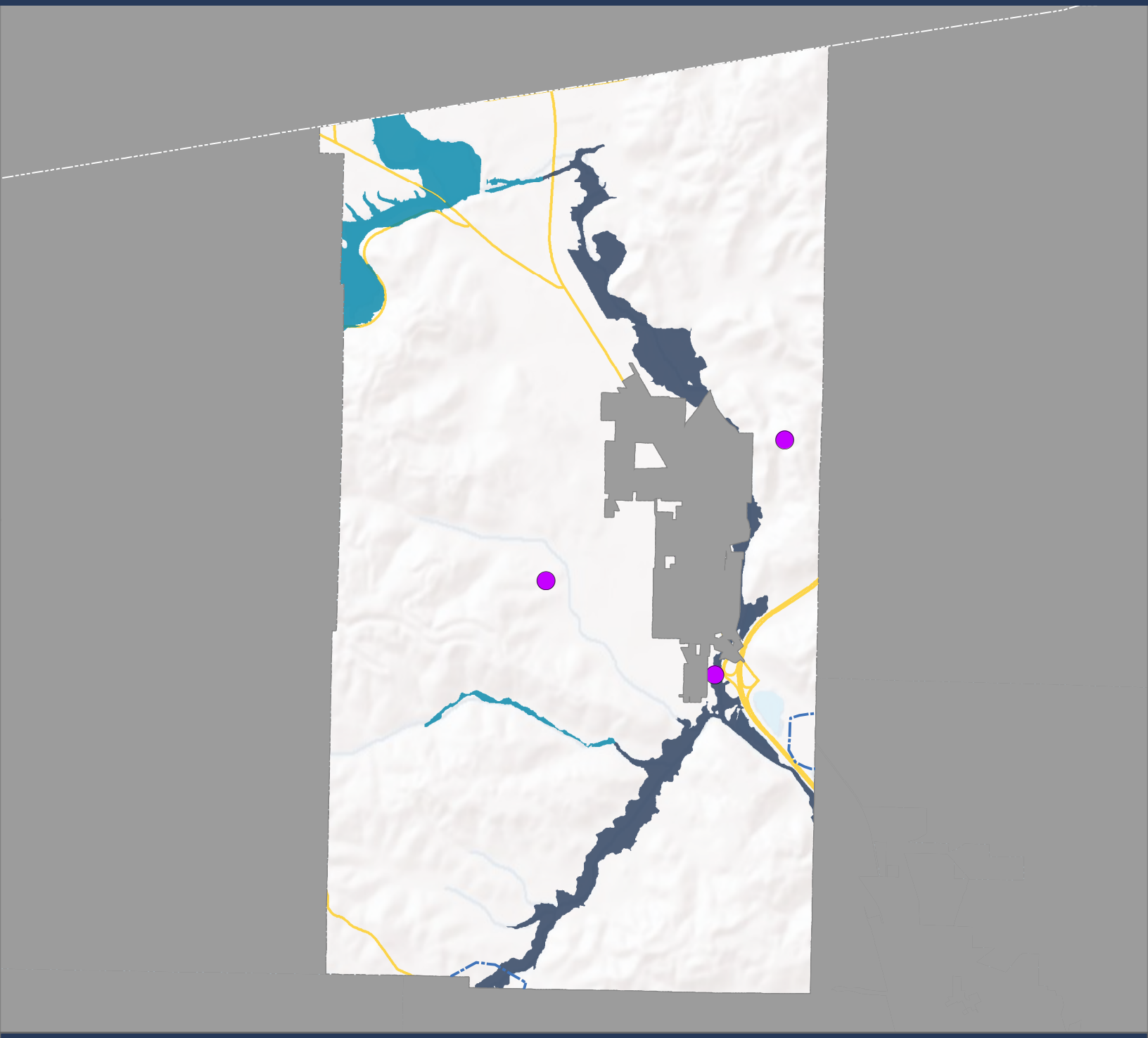
= Fairfield Twp

N

0 0.5 1 Miles

Franklin Twp

Tuscarawas 2022 Hazard Mitigation Plan



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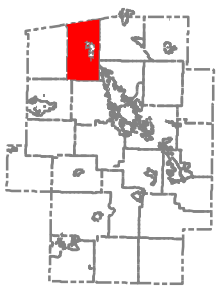


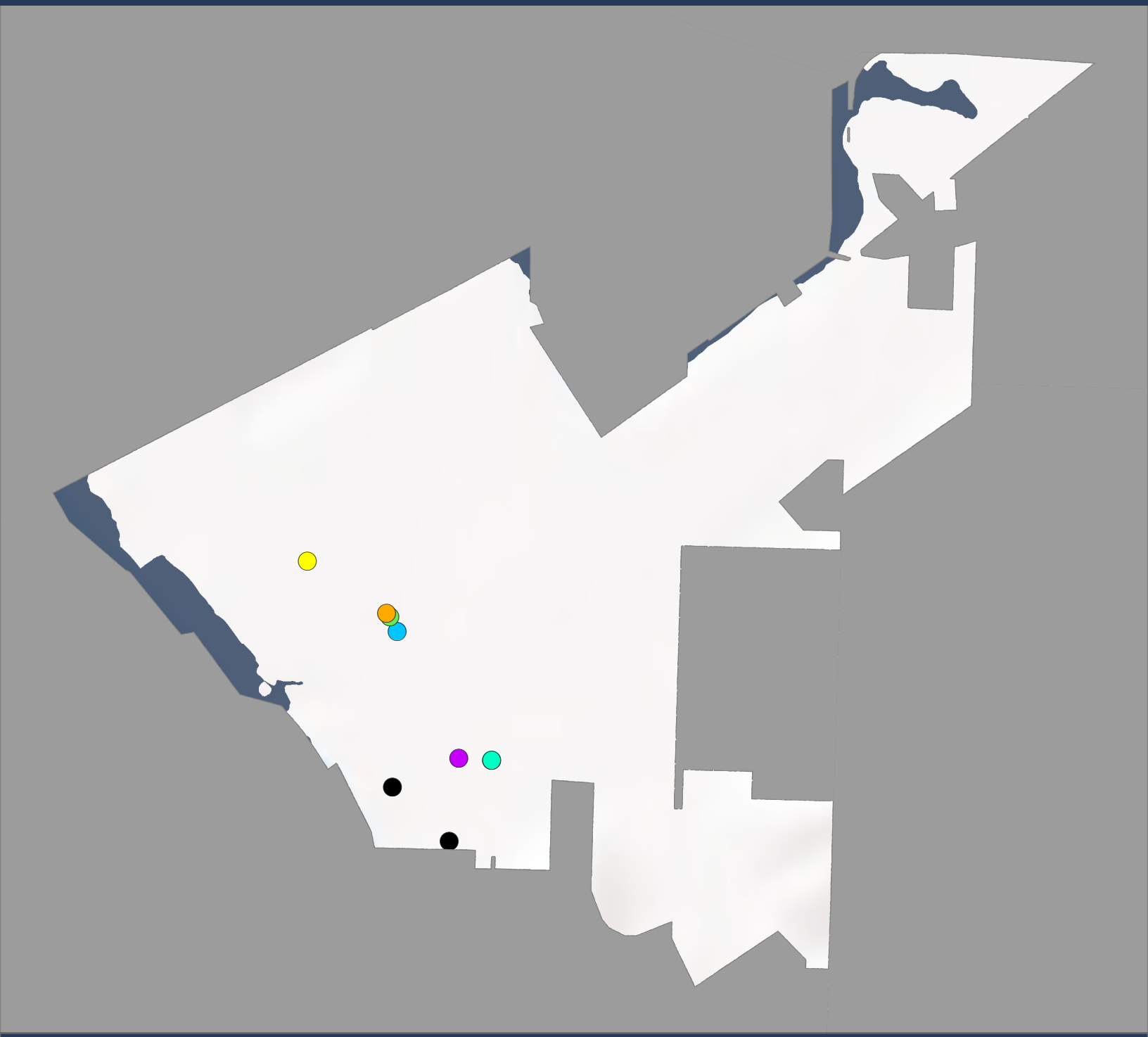
= Franklin Twp

N

0 0.5 1 Miles

Gnadenhutten Village

Tuscarawas 2022 Hazard Mitigation Plan



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- School

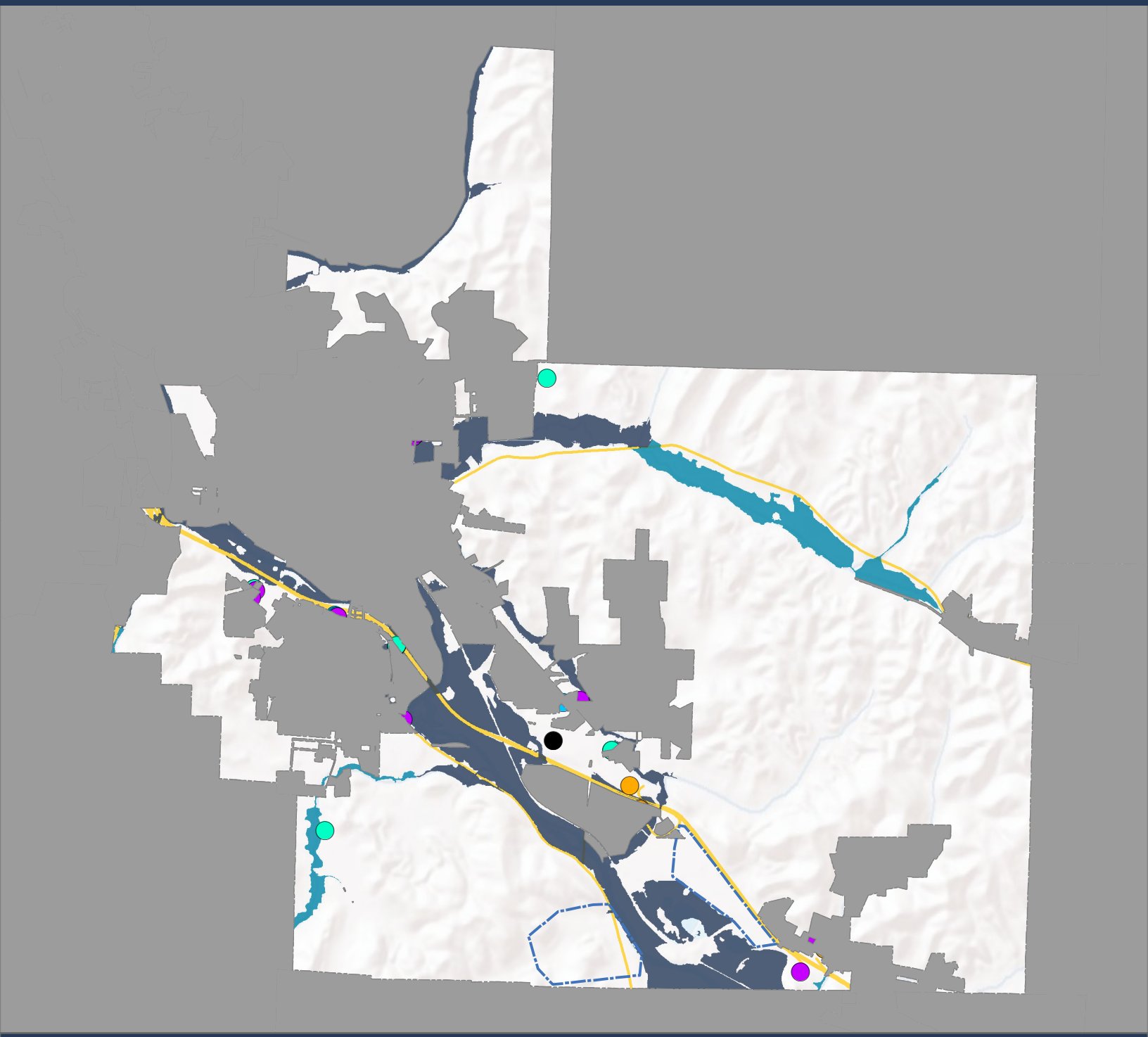
= Gnadenhutten Villa

N

0 0.15 0.3 Miles

Goshen Twp

Tuscarawas 2022 Hazard Mitigation Plan



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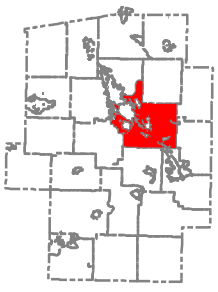


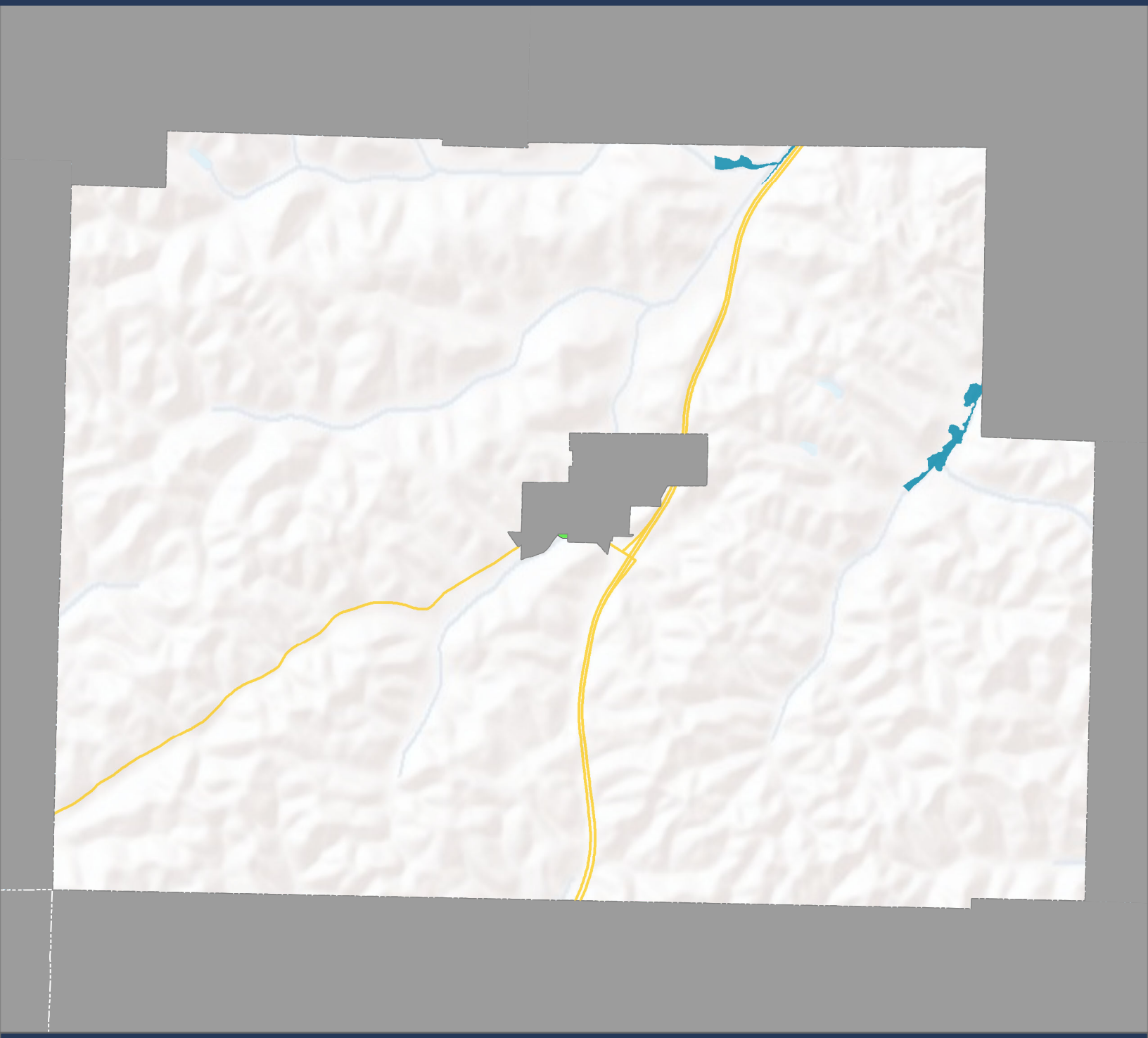
= Goshen Twp

N

0 0.75 1.5 Miles

Jefferson Twp

Tuscarawas 2022 Hazard Mitigation Plan



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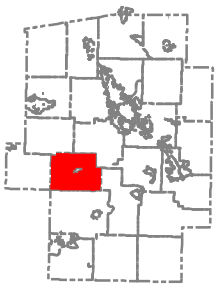


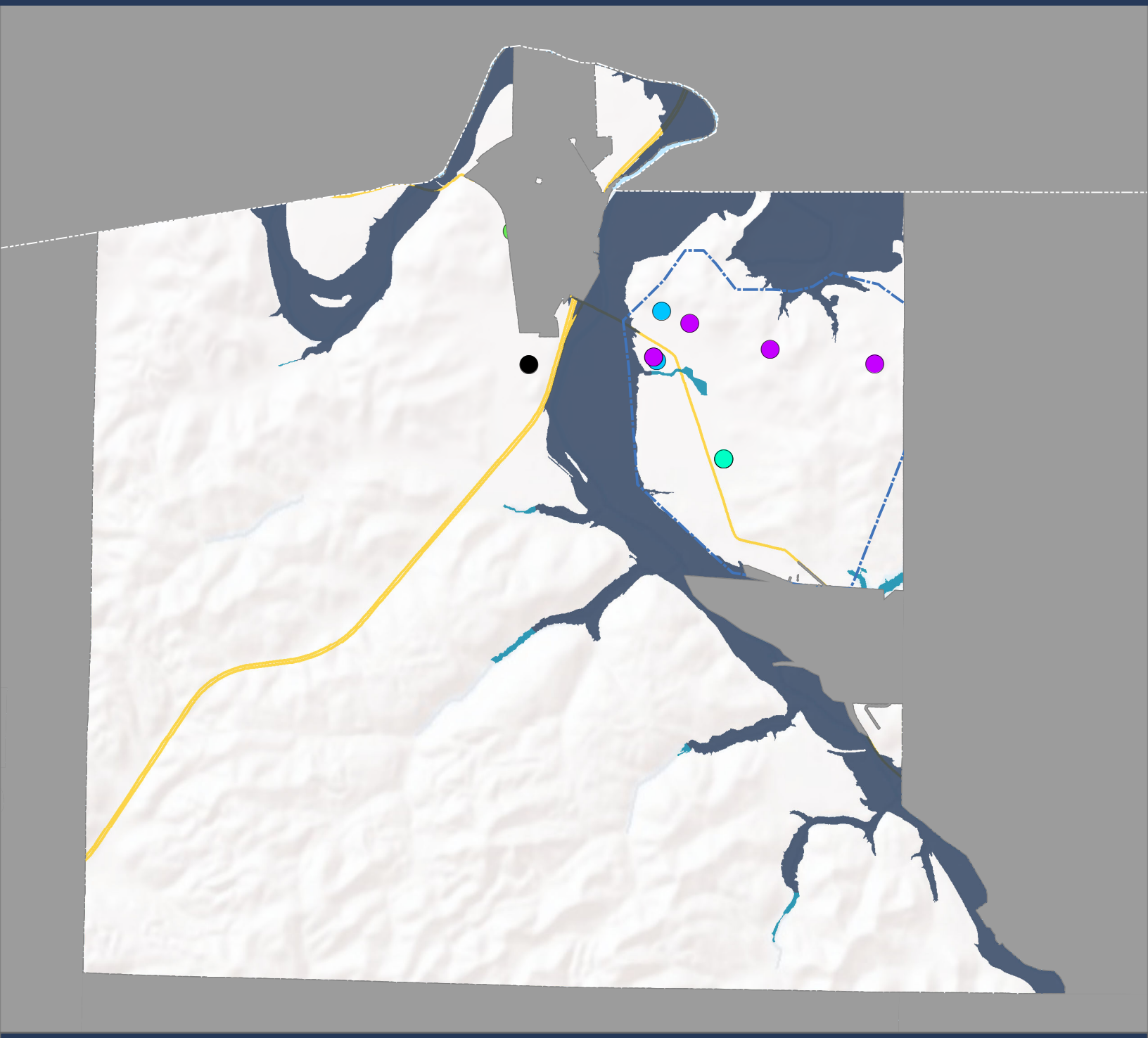
= Jefferson Twp

N

0 0.5 1 Miles

Lawrence Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

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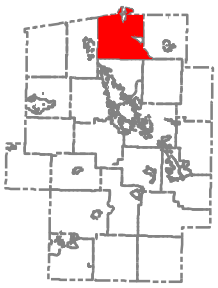


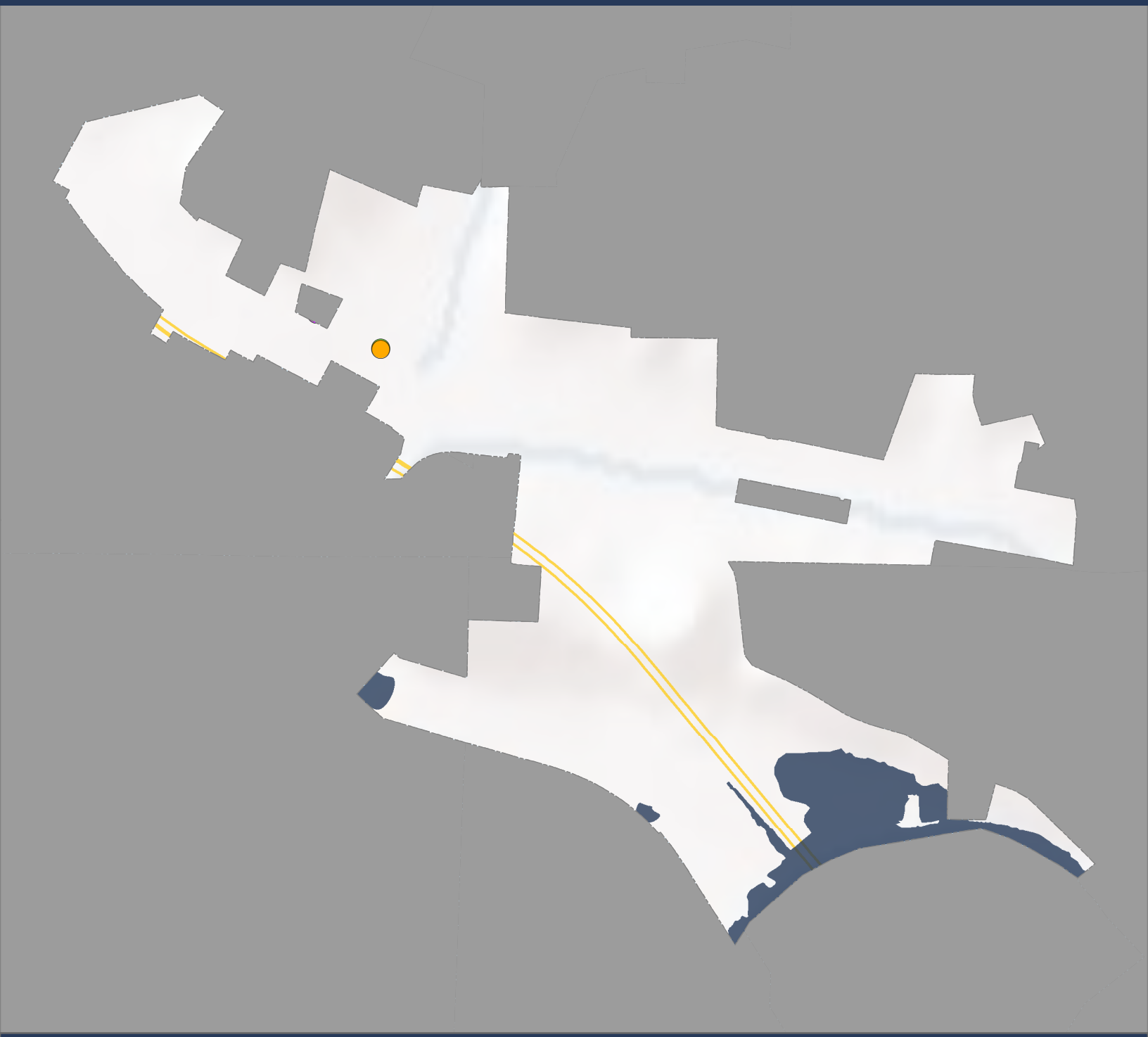
= Lawrence Twp

N

0 0.5 1 Miles

Midvale Village

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

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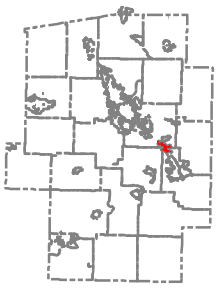


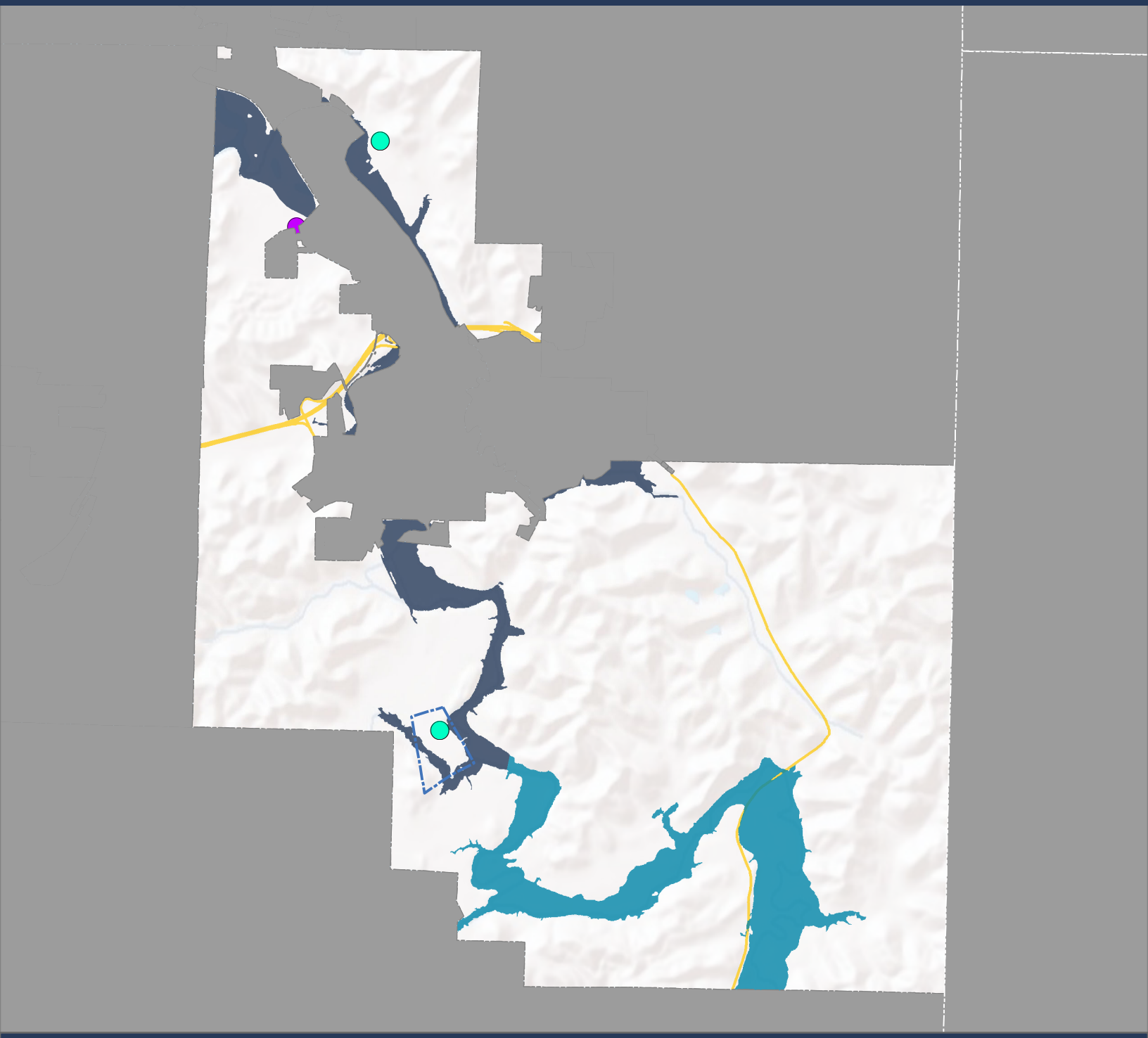
= Midvale Village

N

0 0.15 0.3 Miles

Mill Twp

Tuscarawas 2022 Hazard Mitigation Plan



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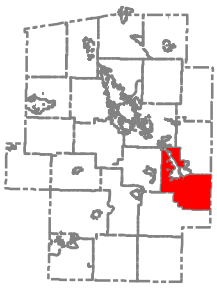

= Mill Twp

N

0 0.75 1.5 Miles

Mineral City Village

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

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- Unincorporated Areas
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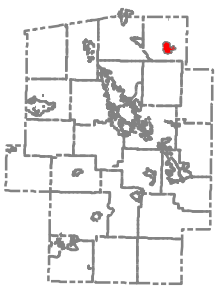


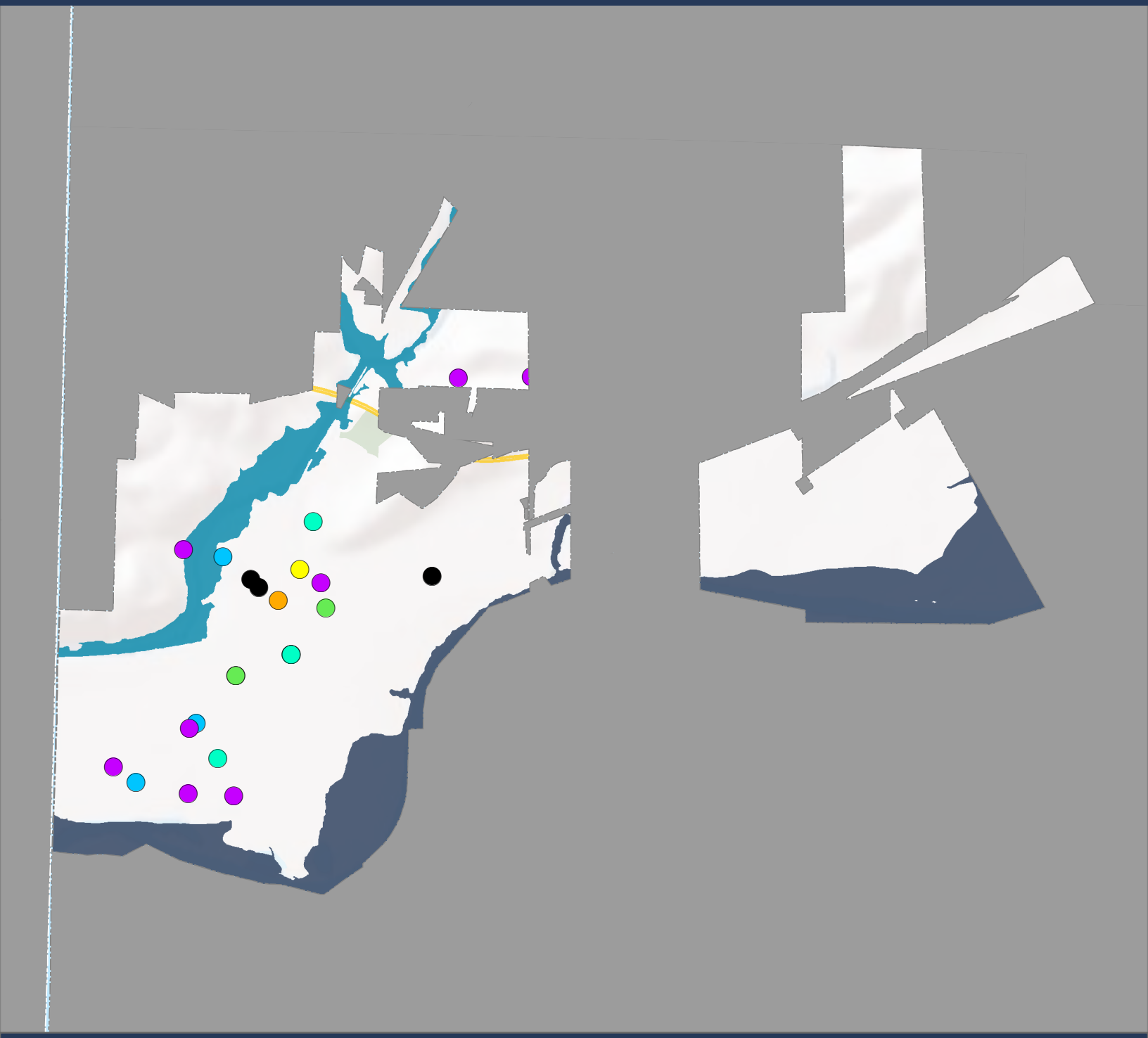
= Mineral City Village

N

0 0.125 0.25 Miles

NewComerstown Village

Tuscarawas 2022 Hazard Mitigation Plan



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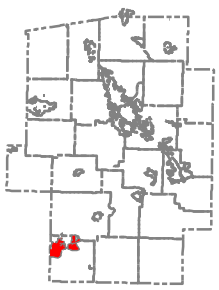


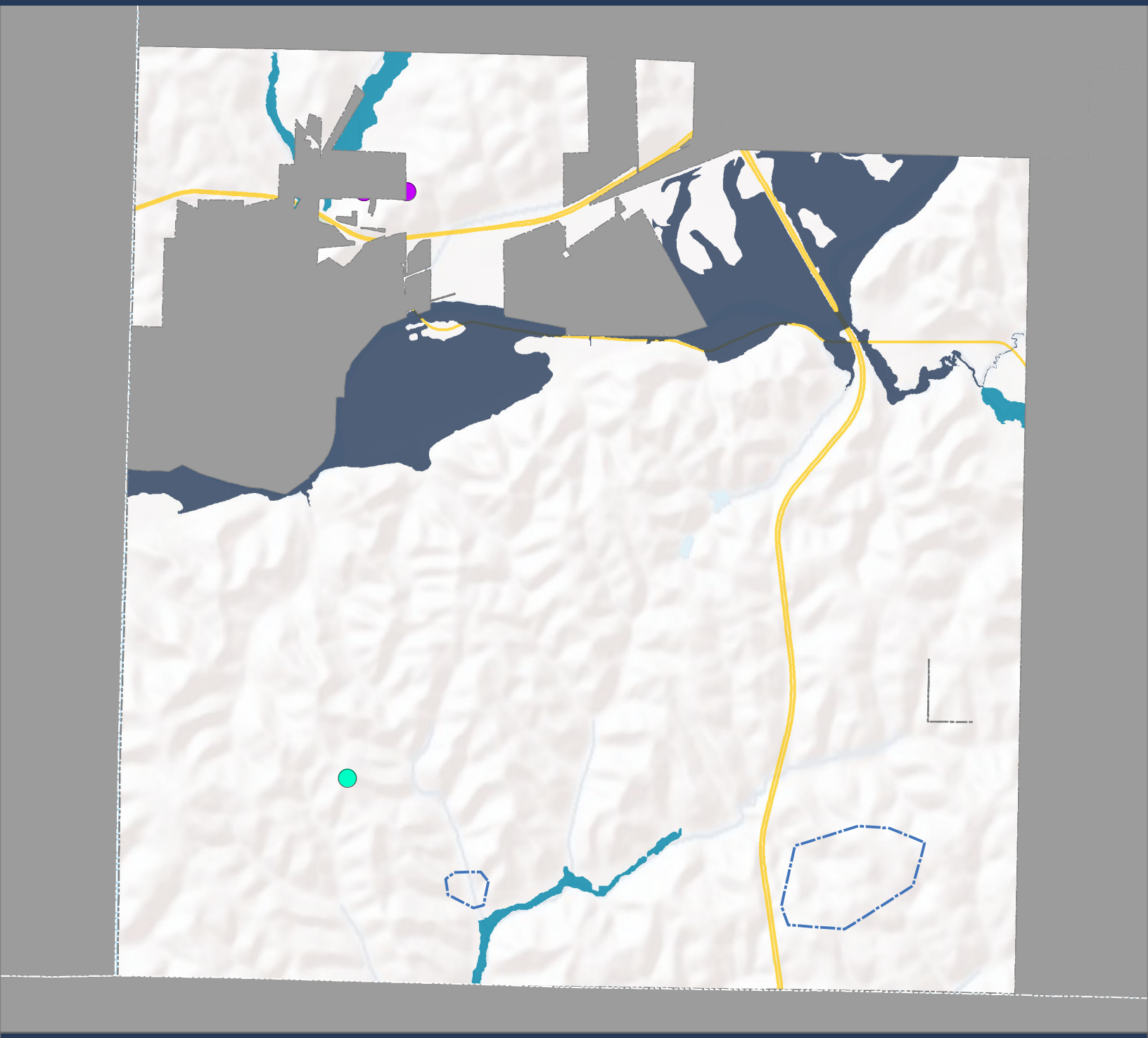
= NewComerstown V

N

0 0.325 0.65 Miles

Oxford Twp

Tuscarawas 2022 Hazard Mitigation Plan



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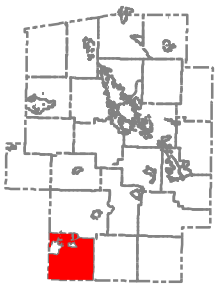

= Oxford Twp

N

0 0.5 1 Miles

Parral Village

Tuscarawas 2022 Hazard Mitigation Plan

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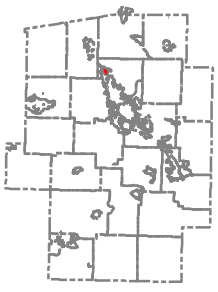


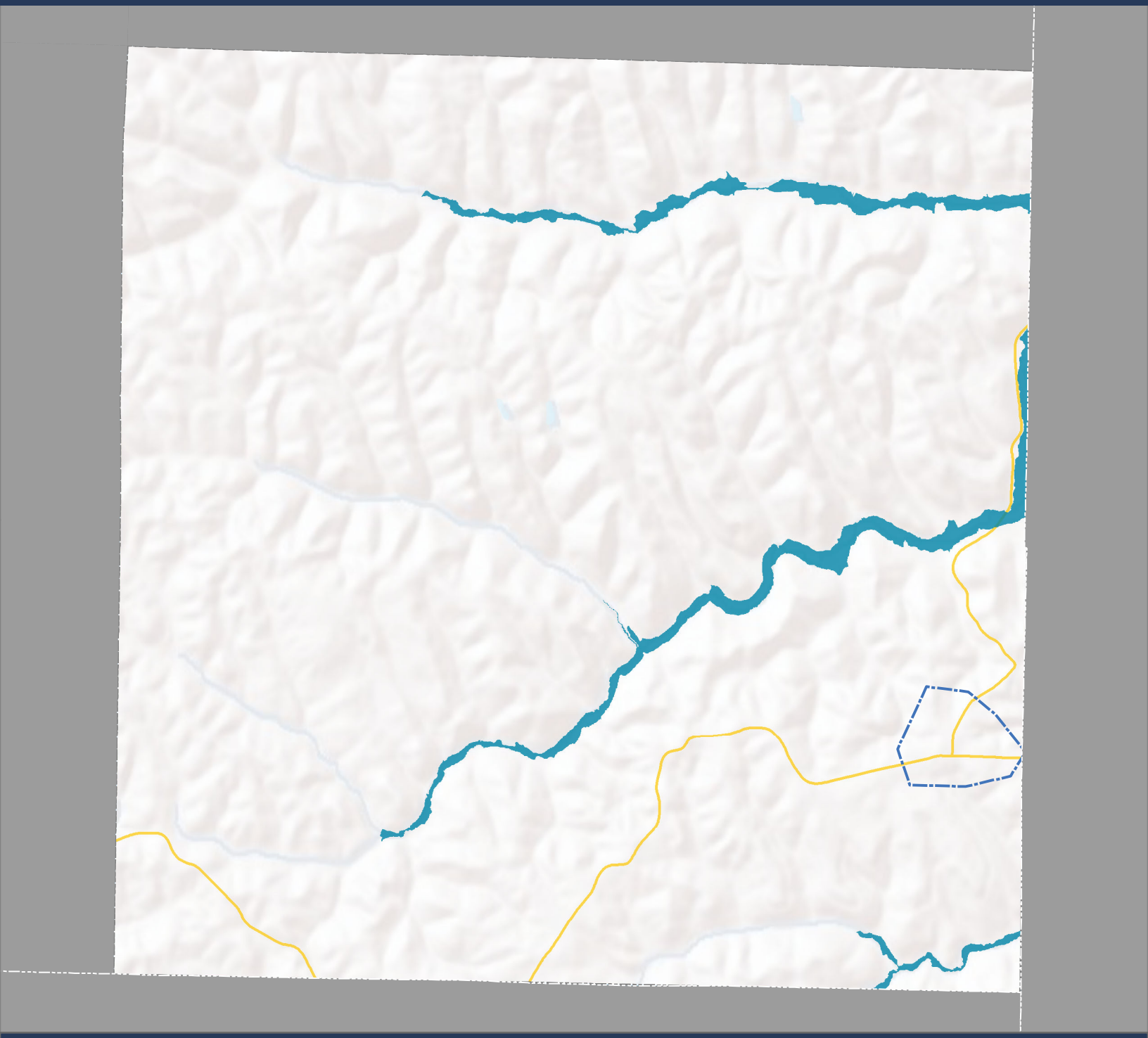
= Parral Village

N

0 0.05 0.1 Miles

Perry Twp

Tuscarawas 2022 Hazard Mitigation Plan



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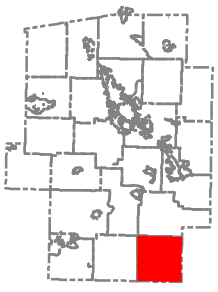

= Perry Twp

N

0 0.5 1 Miles

Port Washington Village

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

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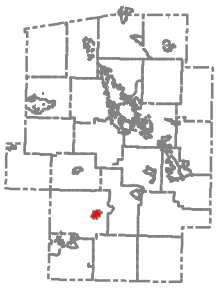


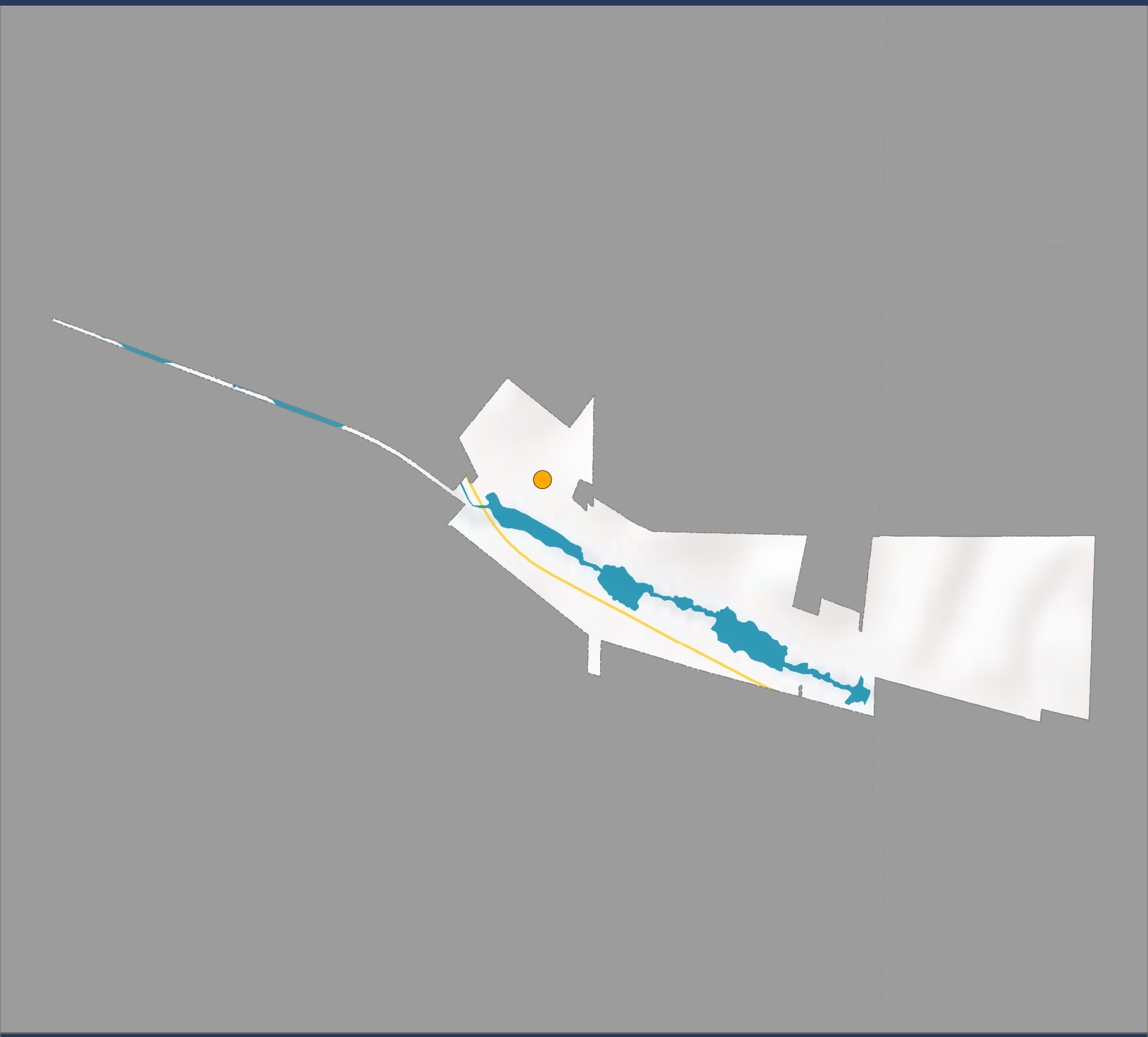
= Port Washington Vi

N

0 0.1 0.2 Miles

Roswell Village

Tuscarawas 2022 Hazard Mitigation Plan



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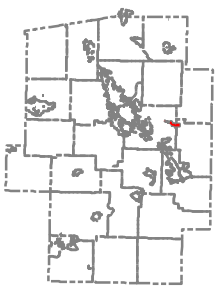


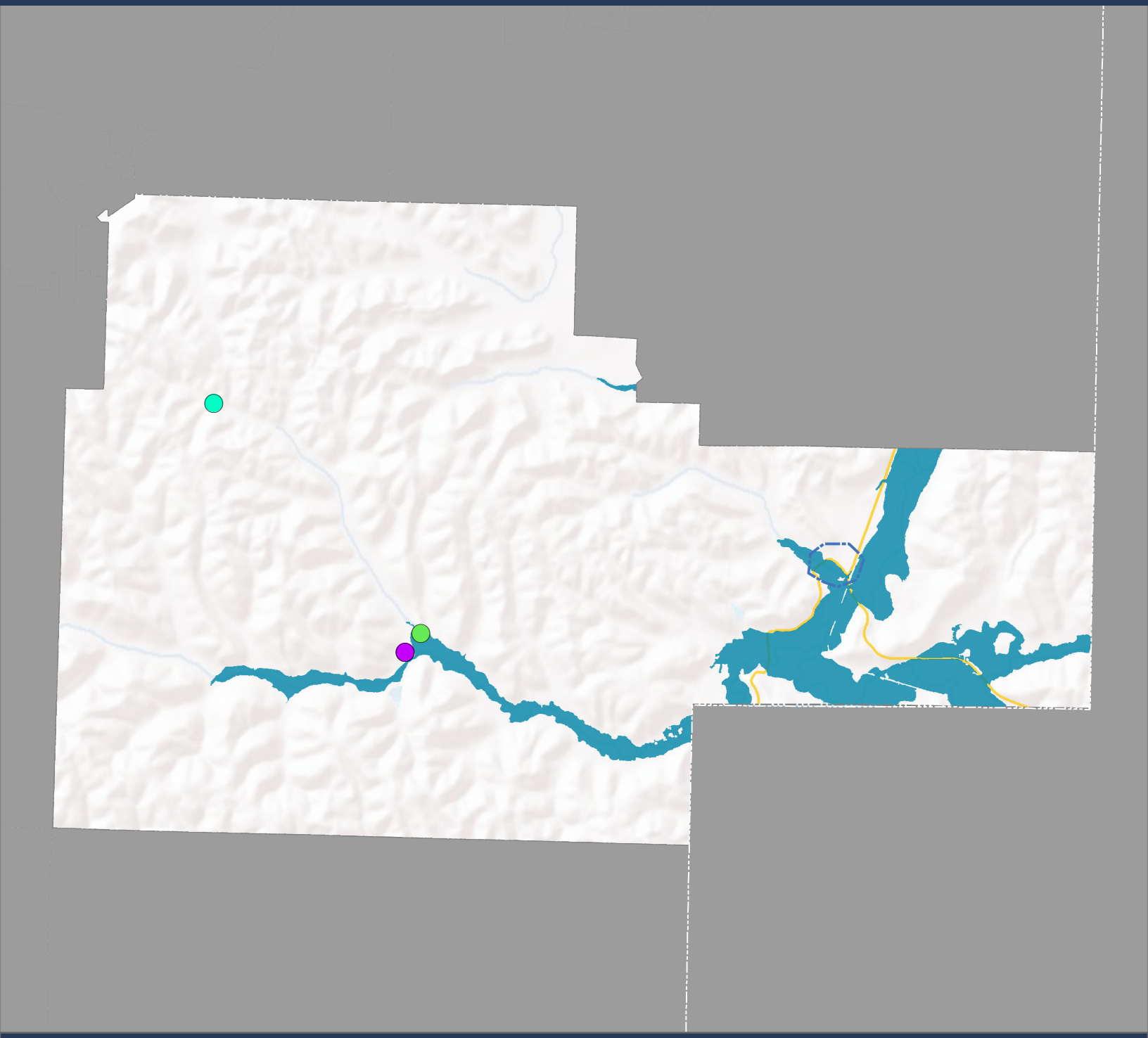
= Roswell Village

N

0 0.15 0.3 Miles

Rush Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

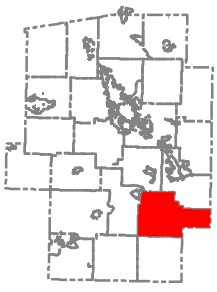
- County Boundaries
- Unincorporated Areas
- Municipalities
- Major Highways
- Water Bodies
- Parks

Special Flood Hazard Areas

- A
- AE

Critical Facilities

- Day Care
- EOC
- Fire Station
- Hospital
- Library
- Museum
- Place of Worship
- Police Department
- School



= Rush Twp

N

0 0.75 1.5 Miles

Salem Twp

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

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- Unincorporated Areas
- Municipalities
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Special Flood Hazard Areas

- A
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Critical Facilities

- Day Care
- EOC
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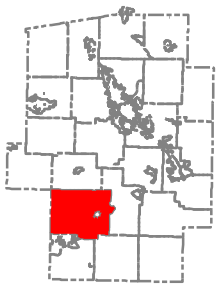


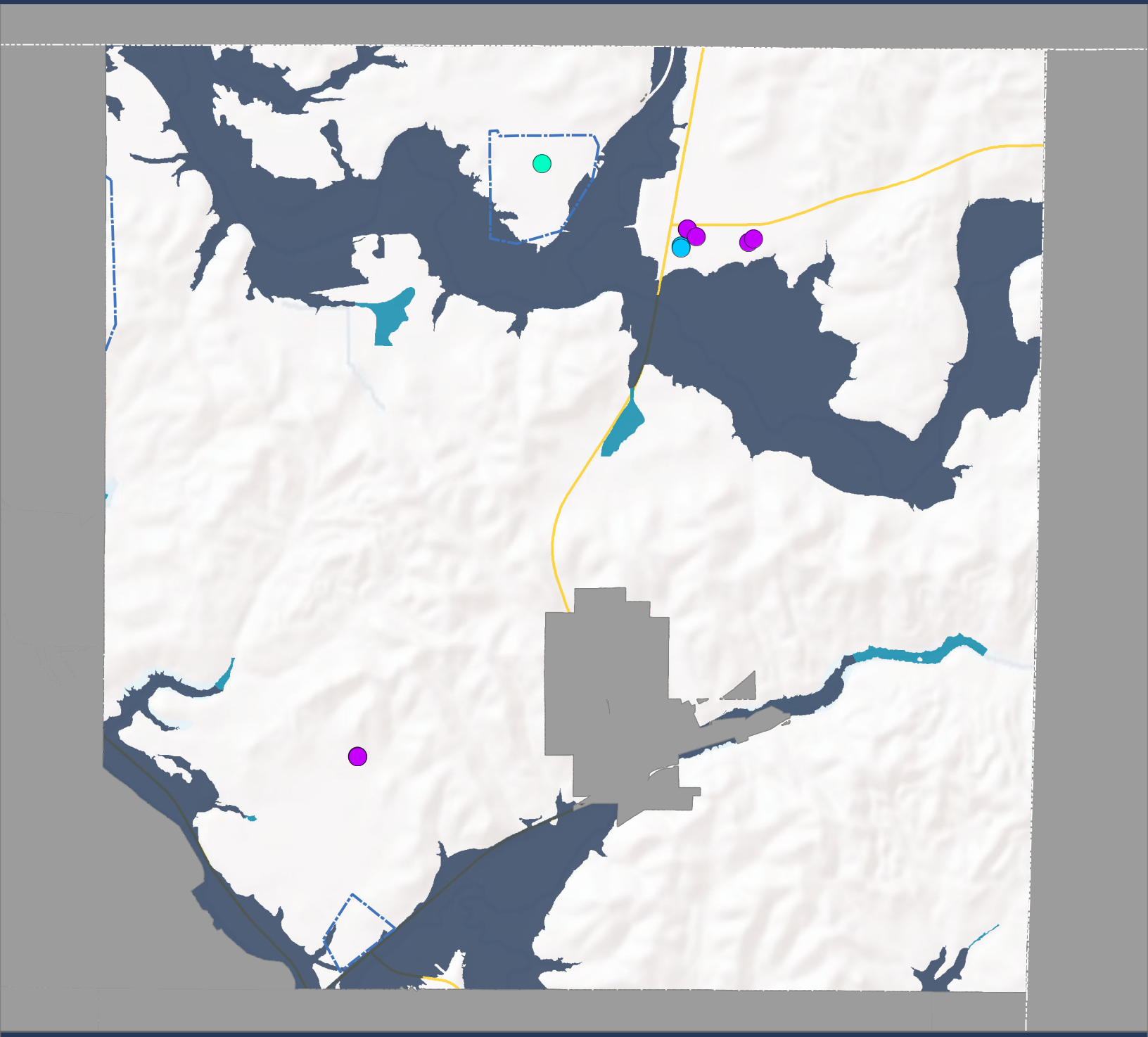
= Salem Twp

N

0 0.5 1 Miles

Sandy Twp

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

- County Boundaries
- Unincorporated Areas
- Municipalities
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- Water Bodies
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Special Flood Hazard Areas

- A
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Critical Facilities

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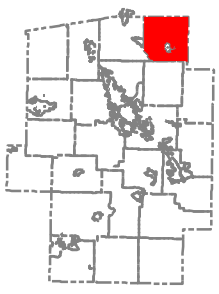

= Sandy Twp

N

0 0.5 1 Miles

Stone Creek Village

Tuscarawas 2022 Hazard Mitigation Plan

LEGEND

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- Unincorporated Areas
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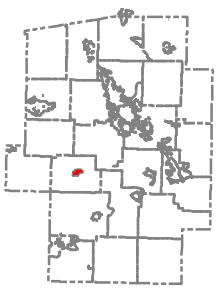


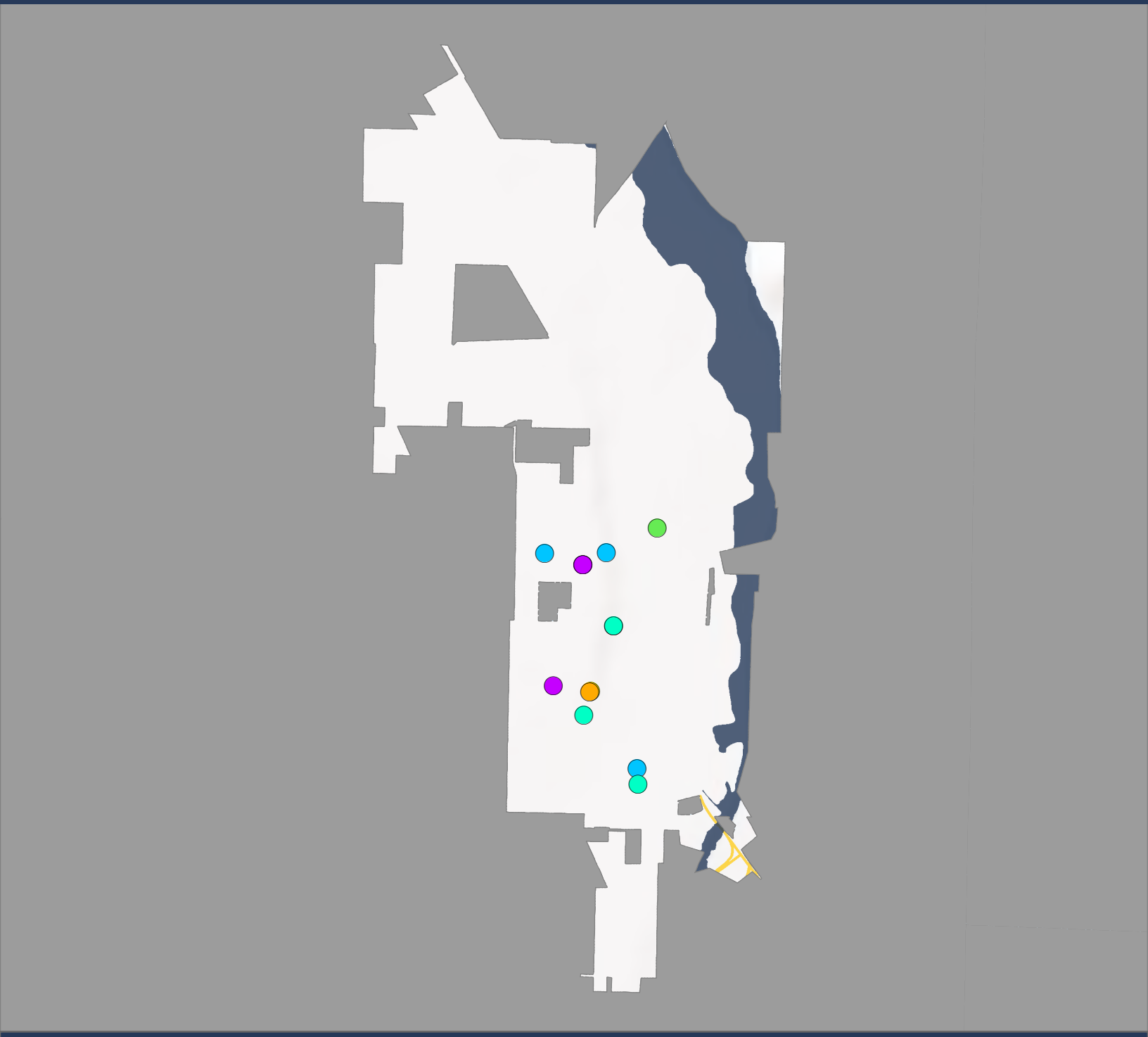
= Stone Creek Village

N

0 0.1 0.2 Miles

Strasburg Village

Tuscarawas 2022 Hazard Mitigation Plan



LEGEND

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- Unincorporated Areas
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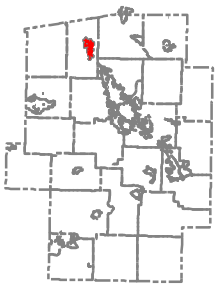


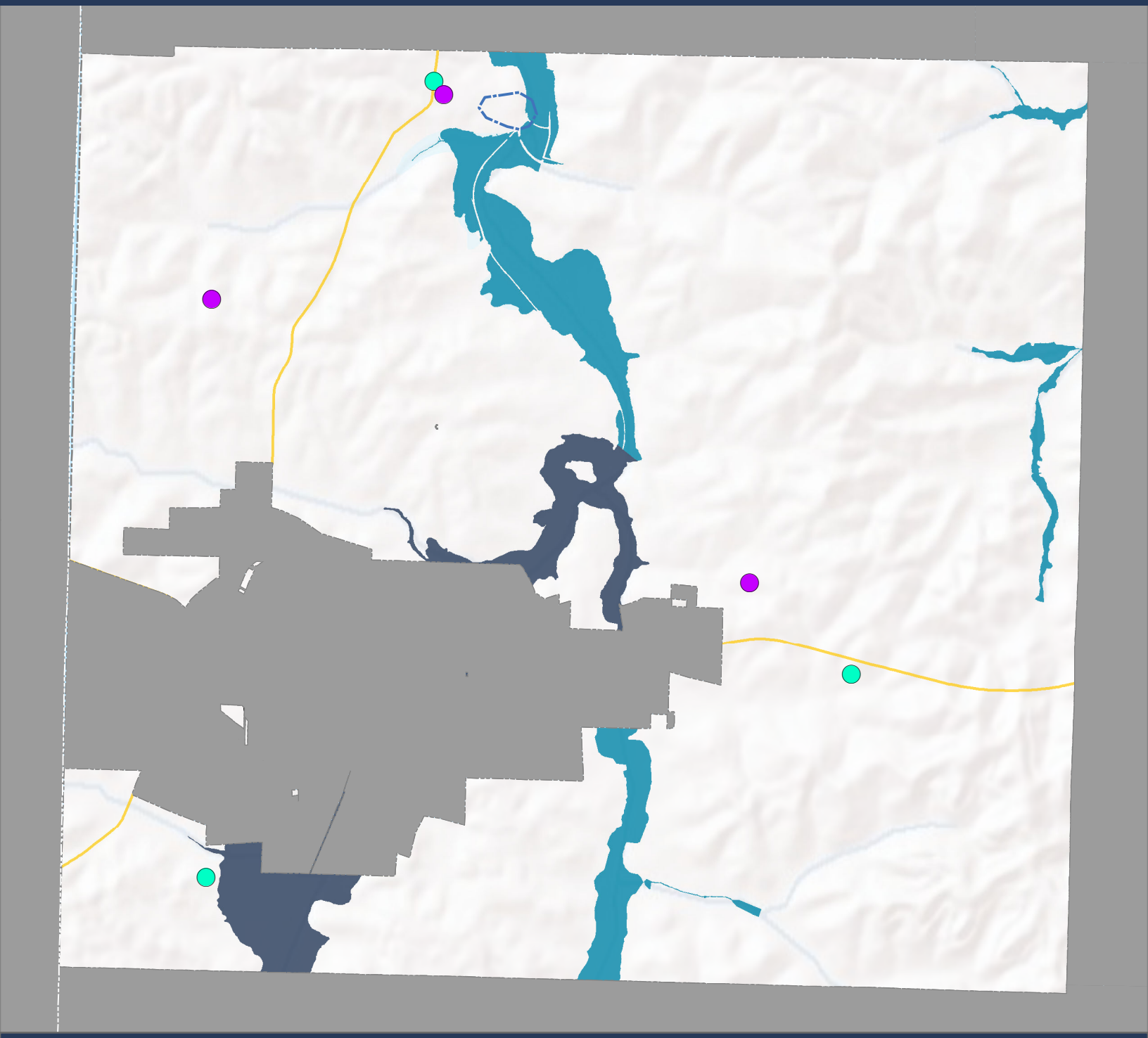
= Strasburg Village

N

0 0.25 0.5 Miles

Sugarcreek Township

Tuscarawas 2022 Hazard Mitigation Plan



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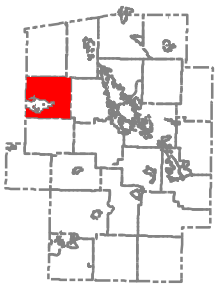


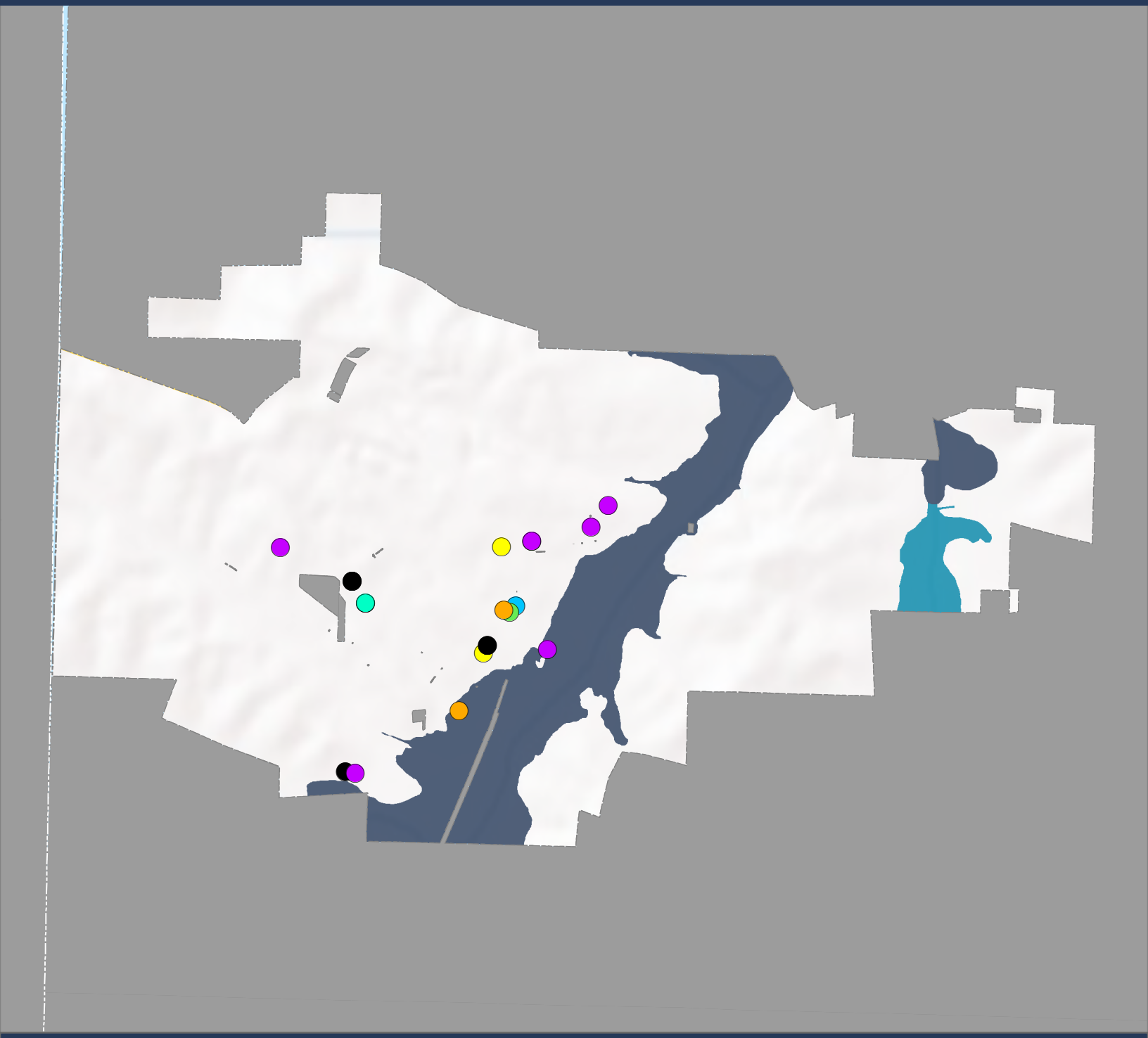
= Sugarcreek Townsh

N

0 0.5 1 Miles

Sugarcreek Village

Tuscarawas 2022 Hazard Mitigation Plan



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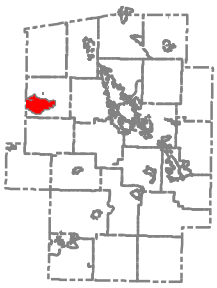

= Sugarcreek Village

N

0 0.3 0.6 Miles

Tuscarawas Village

Tuscarawas 2022 Hazard Mitigation Plan

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- School

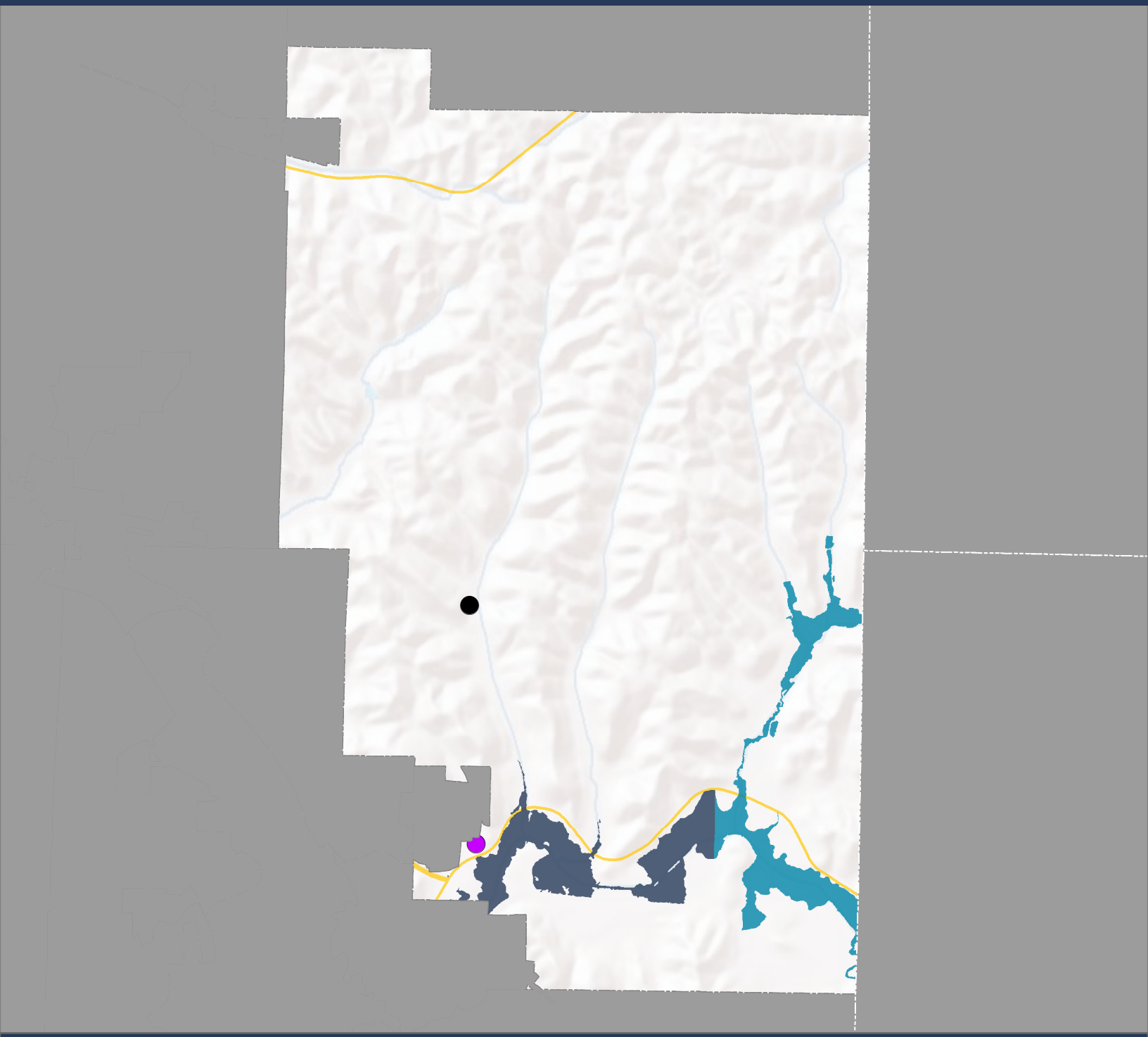
= Tuscarawas Village

N

0 0.175 0.35 Miles

Union Twp

Tuscarawas 2022 Hazard Mitigation Plan



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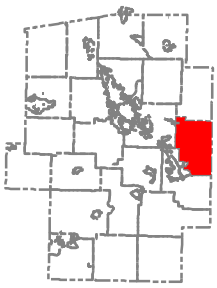


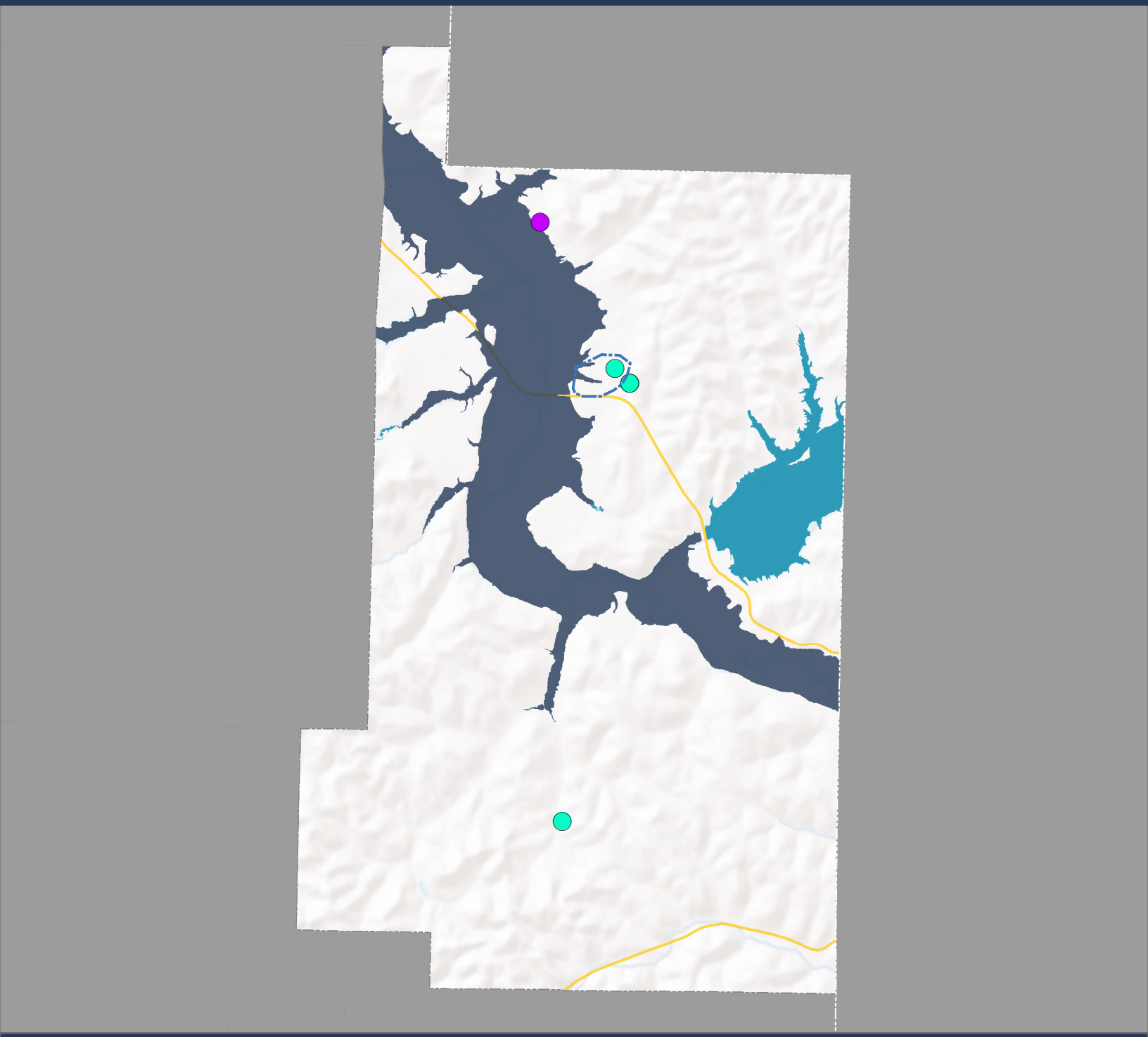
= Union Twp

N

0 0.5 1 Miles

Warren Twp

Tuscarawas 2022 Hazard Mitigation Plan



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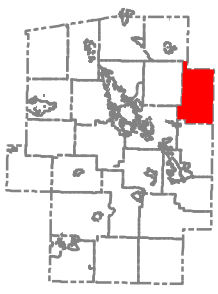


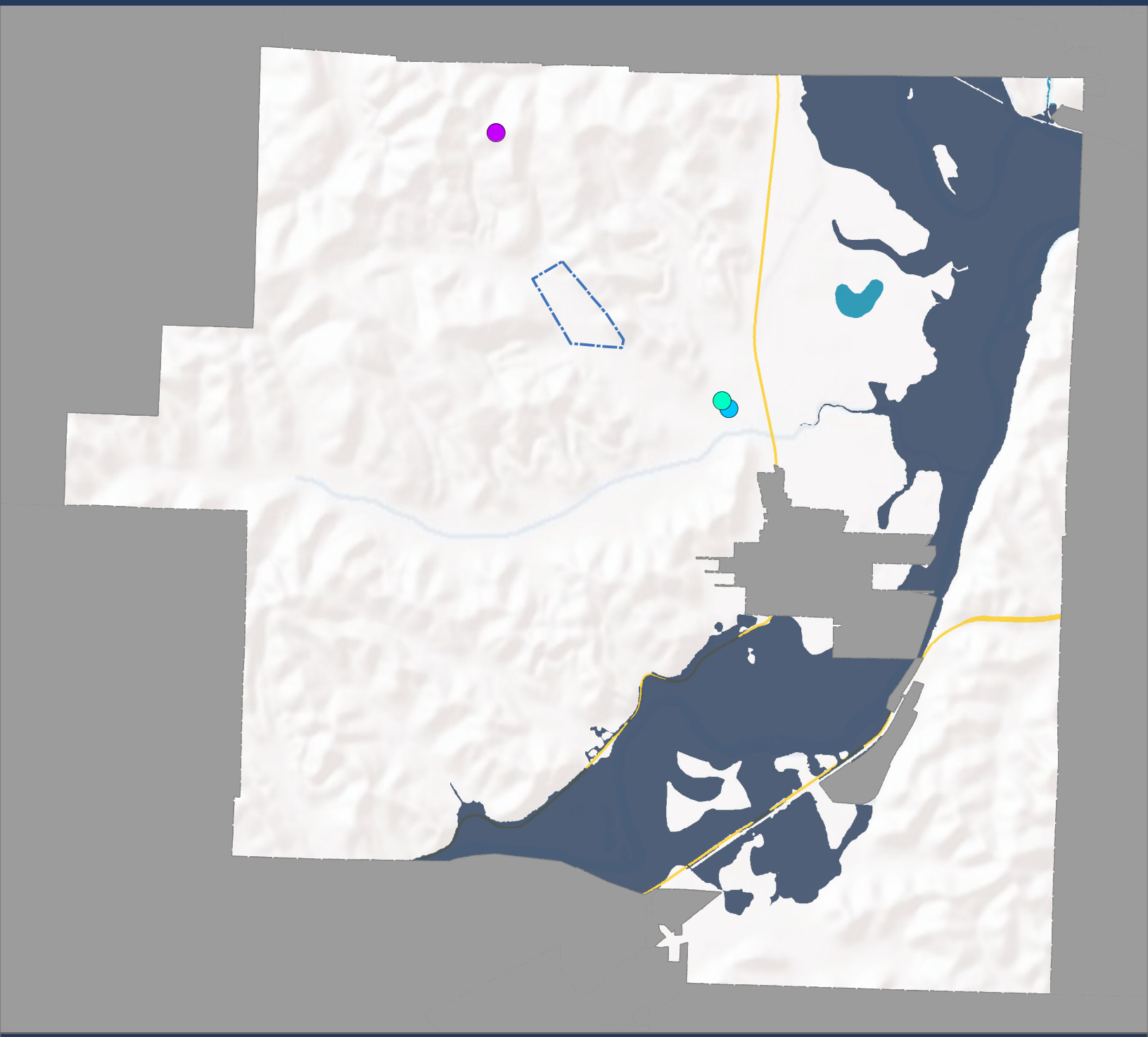
= Warren Twp

N

0 0.75 1.5 Miles

Warwick Twp

Tuscarawas 2022 Hazard Mitigation Plan



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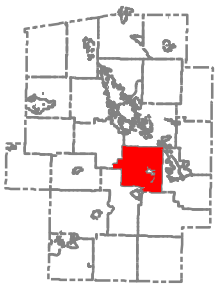

= Warwick Twp

N

0 0.5 1 Miles

Washington Twp

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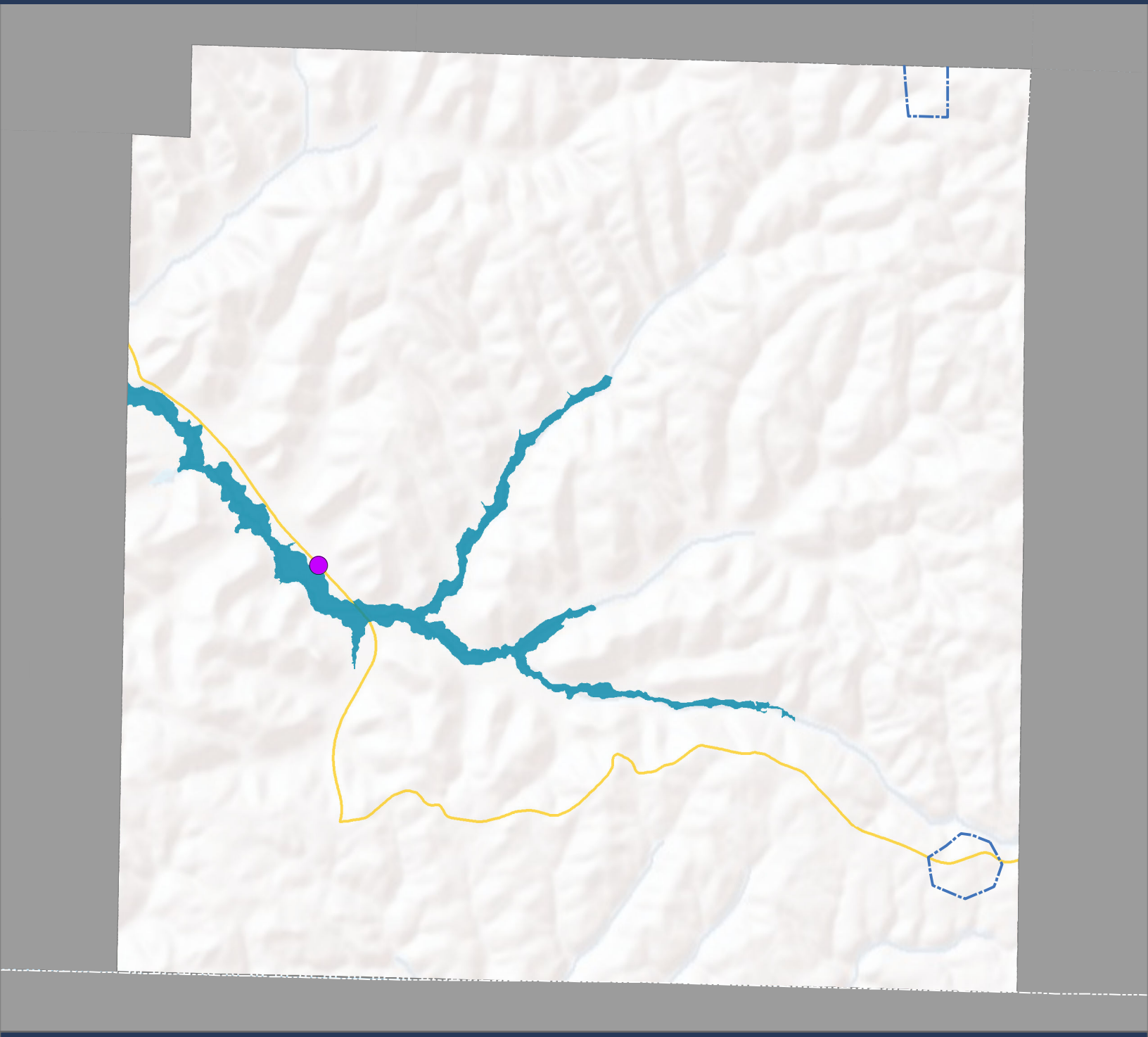

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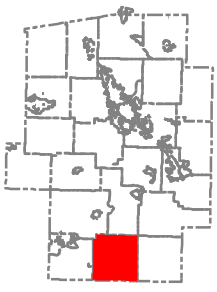

= Washington Twp

N

0 0.5 1 Miles

Wayne Twp

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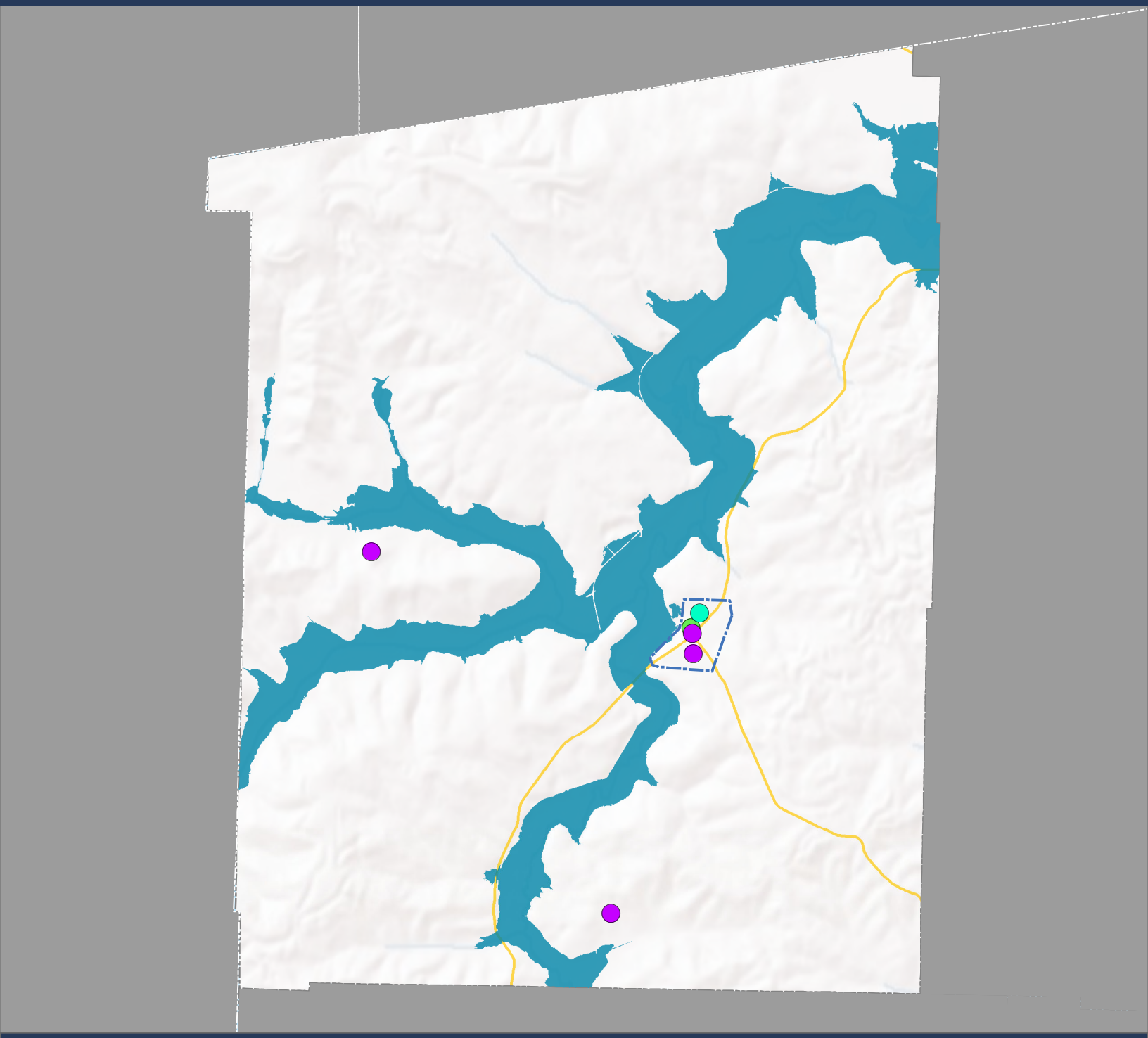

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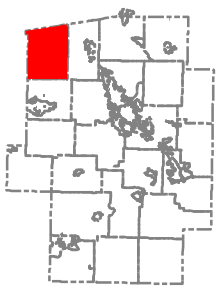


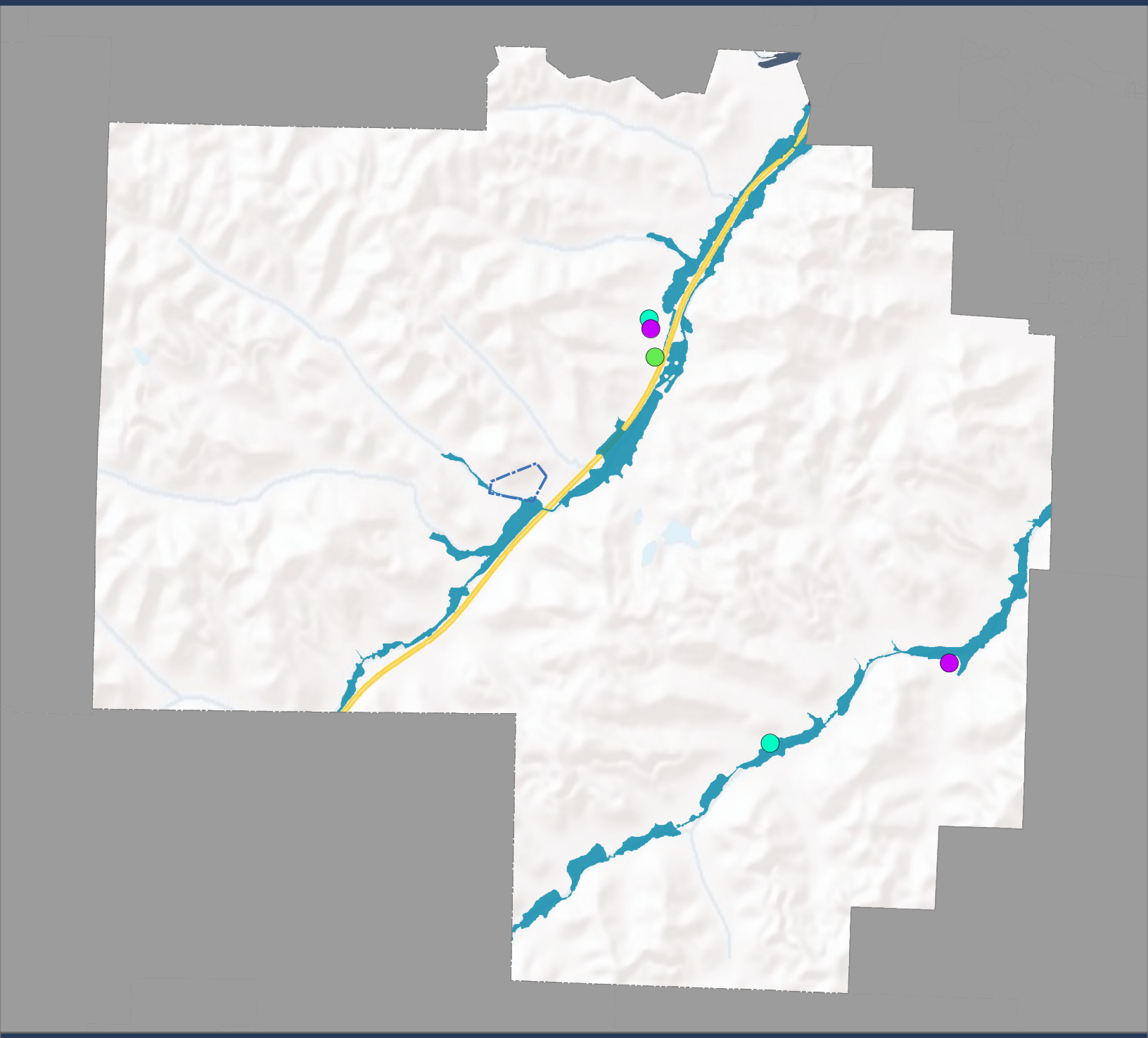
= Wayne Twp

N

0 0.5 1 Miles

York Twp

Tuscarawas 2022 Hazard Mitigation Plan



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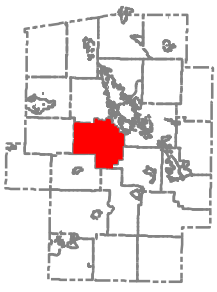

= York Twp

N

0 0.5 1 Miles

Zoar Village

Tuscarawas 2022 Hazard Mitigation Plan

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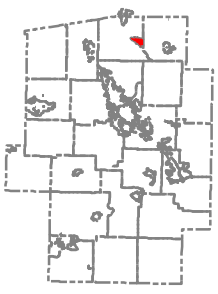

= Zoar Village

N

0 0.125 0.25 Miles