

CITY OF OBERLIN, OHIO

RESOLUTION No. R22-12 CMS

**A RESOLUTION ADOPTING THE 2022 LORAIN COUNTY HAZARD
MITIGATION PLAN**

WHEREAS, this Council recognizes the threat that various hazards pose to people and property within the City of Oberlin and Lorain County; and

WHEREAS, Lorain County has prepared a multi-hazard mitigation plan, hereby known as 2022 LORAIN COUNTY HAZARD MITIGATION PLAN, (“Plan”) in accordance with the Disaster Mitigation Act of 2000, a copy of which Plan is attached hereto as **Exhibit A**; and

WHEREAS, the Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in Lorain County from the impacts of future hazards and disasters; and

WHEREAS, the adoption of the Plan by the Council of the City of Oberlin will demonstrate its commitment to hazard mitigation and the achievement of the goals outlined in the Plan; and

WHEREAS, the Plan has been approved by the Federal Emergency Management Agency.

NOW, THEREFORE, BE IT RESOLVED by the Council of the City of Oberlin, County of Lorain, State of Ohio:

SECTION 1. That this Council does hereby adopt the 2022 Lorain County Hazard Mitigation Plan and the City Manager is hereby authorized and directed to execute any and all documents and to take such other actions as may be necessary or convenient to facilitate the implementation of the Plan.

SECTION 2. That it is hereby found and determined that all formal actions of this Council concerning or relating to the adoption of this Resolution were adopted in an open meeting of this Council and that all deliberations of this Council and of any of its committees that resulted in such formal action were in meetings open to the public in compliance with all legal requirements, including Section 121.22 of the Ohio Revised Code.

SECTION 3. That this Resolution shall go into full force and effect on the earliest date allowed by law.

PASSED: 1st Reading: December 19, 2022

2nd Reading: _____

3rd Reading: _____

ATTEST:



BELINDA B. ANDERSON, MMC
CLERK OF COUNCIL



BRYAN BURGESS
PRESIDENT OF COUNCIL

POSTED: 12/20/2022

EFFECTIVE DATE: 01/18/2023

2022

Lorain County Hazard Mitigation Plan

Lorain County Office of Emergency Management and
Homeland Security

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INTRODUCTION

The 2022 Lorain County Hazard Mitigation Plan was developed using a whole community approach. The planning team, which included broad representation from jurisdictions and agencies across Lorain County, assessed hazards, risks, and vulnerabilities; developed mitigation goals and strategies; and planned for implementation of mitigation efforts. This work was completed through a series of countywide and jurisdiction work sessions. Throughout the process, the planning team reviewed and considered various regional, county, and local plans and documents that guide community and economic development in the county.

This planning process aligns with the mitigation planning guidance established by the Federal Emergency Management Agency in March 2013 and in effect at the time this plan was developed. Broad community participation was achieved by seeking input and participation from jurisdictions, county officials, community agencies, residents, and other partners and is evidenced by documentation of meetings and work sessions included in the plan.

The hazard mitigation plan provides a comprehensive review of mitigation needs in communities across Lorain County. It is one opportunity for government officials, businesses, and residents to increase their resilience to disasters and catastrophic events. The mitigation strategies are intended to help community leaders implement projects and develop policies that make the county more resistant to damage from disasters and facilitate rapid recovery when disasters do occur. The plan is also a tool for community development partners to ensure that growth across the county can be implemented in ways that does not increase the county's vulnerability to hazards.

1.0 THE PLANNING PROCESS

The Lorain County EMA utilized a comprehensive, whole community planning process to develop the 2022 Lorain County Hazard Mitigation Plan. This section describes the planning process and stakeholders involved in that process.

1.1 PLAN DEVELOPMENT

Lorain County's mitigation planning process began in February 2021 and concluding with the submission of a revised plan for state review and federal approval in May 2022. The plan development process included three phases: pre-update planning, planning team meetings, and final plan review.

1.1.1 Pre-Update Planning

Lorain County's most recent mitigation plan was approved on May 21, 2015, and expired May 21, 2020. Due to personnel changes, grant cycles, and the COVID-19 pandemic, the EMA was not able to begin work to update the plan until early 2021. Upon receipt of a Hazard Mitigation Grant Program award through the Ohio EMA, the Lorain County EMA requested quotes from consultants and selected a Resource Solutions Associates LLC to develop the updated plan in 2021.

Upon completion of all necessary grant agreements, contracts, and administrative requirements, the EMA Director and Consultant met to develop a project timeline, review planning requirements, and identify local references and resources to be included in the plan. The Consultant and EMA Director developed an initial contact list for the mitigation planning team that included jurisdiction officials and community leaders from across the county as well as EMA Directors from adjacent counties.

1.1.2 Planning Team Meetings

The planning team worked collaboratively throughout the process to provide feedback and input into the updated plan. Partners from across the county and all jurisdictions participated in the process. The complete planning team list is included in Appendix A: Mitigation Planning Team.

Hazard and Risk Identification Survey

The planning team's initial work focused on completion of a hazard identification and risk assessment survey. The survey was provided to all planning team members by email and was posted on the consultant's website. The survey gathered feedback from the community about the thirteen hazards addressed in the plan, including frequency, response duration, speed of onset, magnitude, business impact, human impact, and property impact. Participants also identified hazards that, from their perspective, had improved or worsened over the last five years and had the greatest impact on their jurisdiction. A copy of the survey instrument used to collect this data is included in Appendix C: Hazard Assessment Survey Tool.

The planning team provided information and feedback that indicated hazard vulnerability and risk assessment were not significantly changed from the last time they completed a mitigation plan. Therefore, this plan update would likely involve less significant changes than the last time the mitigation plan was developed. Standards from FEMA remain relatively unchanged, so that would also contribute to a less significant set of changes in the plan.

Because the COVID-19 pandemic was continuing, and a fall surge in cases brought fears of rapidly spreading illness, it was decided to collect as much information as possible in a remote manner through the use of surveys. A minimalistic approach was taken regarding in-person gathering, and collection of input would recognize conference calls, phone calls, emails, surveys and other non-contact methodologies.

Planning Team Work Sessions

After completing the hazard identification and risk assessment survey, jurisdictions and planning team members were invited to participate in planning team work sessions. These meetings included representatives from jurisdictions and organizations across the county. These individuals gathered with the purpose of discussing recent hazard events and the impact on the community, changes to the community since the 2015 mitigation plan was developed, and future development goals and trends that will impact the community in the next five years. Table 1-1 includes a complete list of the work sessions conducted throughout the planning process.

Table 1-1: Planning Team Meetings

Date	Location	Participating Stakeholders
9/15/21	Lorain County EMA (Morning Meeting)	Countywide Meeting
9/15/21	Lorain County EMA (Afternoon Meeting)	Countywide Meeting
9/15/21	Lorain County EMA (Evening Meeting)	Countywide Meeting
11/15/21	Sheffield Lake Meeting	Sheffield Lake
11/15/21	Vermilion Meeting	Vermilion Brownhelm Township
1/6/22	Northeast Ohio Regional Sewer District Meeting	Digital format - ZOOM
5/5/22	Lorain County EMA	All – countywide meeting

Mitigation Strategy Survey

After participating in the planning team work sessions, planning team members provided additional feedback on the status of the 2015 mitigation strategies. This work was completed through an electronic survey that was customized for each jurisdiction. The Contractor was available to discuss any questions, concerns, or other issues with respondents. Respondents assessed each strategy from the previous plan and assigned a status of complete, ongoing, unchanged, or defer. This feedback was combined with the feedback provided in the work sessions to identify new mitigation strategies for the updated plan. The EMA director made the decision that it was in Lorain County’s best interest to include all townships as Lorain County

instead of handling some of them individually, as had been done in the earlier plan. Therefore, there would be sixteen municipalities, one county, and eighteen townships to participate, bringing a more concise and collaborative methodology into play for the unincorporated portions of the county.

1.1.3 Final Plan Review

After extensive input from the surveys and work sessions, and other digital and telecommunicated input, the Consultant developed a draft plan. Jurisdictions and stakeholders were given electronic access to the draft plan sections through the Consultant's website. The planning team was asked to provide feedback on the accuracy and completeness of the information and identify any additional mitigation strategies that may be necessary. The planning team could provide feedback to the Consultant directly by email, through an electronic form on the website, or through the EMA Director. These changes were incorporated into the plan for the entire month of May.

Following the planning team's review, a three-week public review period was conducted from May 5, 2022 through May 20, 2022. During this time, the plan was available electronically on the Consultant's website. A print copy was also available at the Lorain County EMA for anyone with limited computer access. A public review forum was held on May 5, 2022, to provide stakeholders and the community with an opportunity to review and discuss the plan in person with the Consultant and EMA Director. Notification of this plan review forum was made through letters to jurisdictions, news releases, and posts on the EMA's official social media accounts.

Because some comments came in slowly and feedback was being received, the EMA Director and the Contractor worked on changes to the plan through the month of May. The EMA Director and Consultant reviewed all comments and questions submitted by stakeholders and the public. Appropriate revisions were incorporated into the plan documents.

After final revisions were completed, the plan was submitted to the Ohio EMA Mitigation Branch for state review. Upon state and federal approval, the formal plan adoption process began, as explained in section 4.0 of this plan.

1.2 STAKEHOLDER INVOLVEMENT

To encourage countywide participation in the mitigation plan, a broad group of stakeholders were invited to participate in the planning process. Invitations were extended to more than 130 individuals representing partners across Lorain County, including:

- Incorporated jurisdictions (county, city, village officials)
- Township representatives (trustees, fiscal officers)
- Specialized disciplines, including floodplain management, fire service, law enforcement, engineering, utilities, public health, healthcare, hospitals, education, nonprofits, and social service agencies

- Elected and appointed officials, including the county commissioners, auditor, treasurer, engineer, and regional planning
- Economic development organizations, chambers of commerce, and tourism bureaus
- Emergency management officials from adjacent counties (Erie, Huron, Ashland, Medina, and Cuyahoga)
- Non-government agencies and community action groups
- Special interest groups such as watershed coalitions, conservancy districts, federal partners, and state agencies with facilities in the county
- Residents, businesses, and the general public

During the planning process, more than 70 people contributed to the planning process by attending work sessions and completing surveys. A complete list of participating stakeholders is provided in Appendix A: Mitigation Planning Team. This participation occurred over the phases of plan development described previously in the plan.

When scheduling work sessions, the EMA considered the scheduling needs of stakeholders. Many sessions were held at the Lorain County EMA office because that location is centralized in the county and convenient to most participants. Some sessions were conducted in specific jurisdictions to facilitate participation by multiple individuals from that jurisdiction. Evening and virtual meetings were also offered to participants because the county has a number of officials that fill their role in a part-time or volunteer capacity.

1.2.1 Jurisdiction Participation

All incorporated jurisdictions in Lorain County elected to participate in the countywide hazard mitigation plan. Because of lingering pandemic concerns and some offices that were still limiting participation in open meetings, the opportunity to participate was offered in the form of face-to-face participation in several meetings, and/or participation by answering surveys by jurisdiction in place of attending face-to-face meetings. For all of these individuals, the EMA Director and the Contractor were available to answer questions, provide digital meetings or conference calls, or to answer questions presented through electronic mail. All meetings were held during business hours or just after, were open to the public as well as jurisdictions. Some jurisdictions with part-time staff were not able to attend meetings at the times they were scheduled; therefore, they participated through surveys as well.

The officials identified in Table 1-2 served as the primary representative and point of contact for their jurisdiction. Invitations were sent to them, and they agreed to invite, encourage and support all employees from their departments or jurisdictions to participate. They were able to rearrange schedules to facilitate participation, and were able to ensure that the appropriate persons from their individual jurisdiction were participating, either in person or through surveys.

All jurisdictions and participants had the opportunity to review updated documents throughout the process, and were able to contact the Contractor with modifications and corrections.

Table 1-2: Participating Jurisdictions and Primary Representatives

Jurisdiction	Position/Title	Representative	Participation by Survey	Participation in Meetings
COUNTY				
Lorain County	EMA Director	Jessica Fetter	Yes	Yes
Lorain County	County Administrator	Rob Weber	Yes	Yes
MUNICIPALITIES				
City of Amherst	Mayor	Mark Costilow	Yes	No
City of Avon	Mayor	Bryan Jensen	Yes	Yes
City of Avon Lake	Mayor	Gregory Zilka	Yes	Yes
City of Elyria	Mayor	Kevin Brubaker	Yes	Yes
Village of Grafton	Mayor	David Divencenzo	Yes	No
Village of Kipton	Mayor	Robert Meilander	Yes	Yes
Village of LaGrange	Mayor	Kim Strauss	Yes	No
City of Lorain	Mayor	Jack Bradley	Yes	Yes
City of North Ridgeville	Mayor	Kevin Corcoran	Yes	Yes
City of Oberlin	City Manager	Rob Hillard	Yes	Yes
Village of Rochester	Mayor	Cindy Kirpley	Yes	No
Village of Sheffield	Mayor	John Hunter	Yes	Yes
City of Sheffield Lake	Mayor	Dennis Bring	Yes	Yes
Village of South Amherst	Mayor	David Leshinski	Yes	Yes
City of Vermilion	Mayor	Jim Forthofer	Yes	Yes
Village of Wellington	Mayor	Hans Schneider	Yes	No
All Townships	Fiscal Officer	All trustees	12	8

1.2.2 Public Participation

In addition to jurisdiction representatives and community partners, the public was also included in the mitigation planning process. All work sessions were open to the public and surveys were posted publicly, allowing anyone in the community to provide feedback. Planning team members and jurisdiction officials were also encouraged to share mitigation information with their community and promote activities on their websites and social media accounts.

Upon completion of the plan, a public review period was held from May 5 – 20, 2022. The plan was posted on the Consultant’s website during this period and anyone from the community was able to submit comments or questions, either directly by email or through an electronic form on the website. A printed copy of the plan was available at the Lorain County EMA for

anyone without computer access. The public was notified of this review through news releases, letters to jurisdictions, and posts on official social media accounts. All notifications include a link to view the plan online, instructions for submitting feedback, and contact information for the EMA.

Within the public review period, a countywide plan review forum was held on May 5, 2022. This forum was open to the entire planning team and any member of the public that wished to attend. The forum’s purpose was to provide an in-person opportunity to review the plan, ask questions, and discuss multi-jurisdictional implementation of the mitigation strategies.

All comments from the public review period and forum were reviewed by the EMA Director and Consultant. Appropriate revisions were incorporated into the plan. After final revisions, the plan was submitted to the Ohio EMA for state review and FEMA for federal approval on June 1, 2022. Following federal approval, the formal adoption process began, as detailed in section 4.0 Plan Adoption.

1.3 RESEARCH METHODOLOGIES

Many information sources were utilized as this plan was developed. Research included formal plans, document, and databases as well as extensive discussions with stakeholders, subject matter experts, and community leaders to obtain information specific to Lorain County. The county profile is based on demographic data and local information provided by community partners. Hazard definitions and history information were taken from the National Weather Service; hazard histories are current through 2021, the most recent data available. The vulnerability assessment and risk analysis are based on multiple information sources, including HAZUS reports, Ohio EMA information, and FEMA data. The table below identifies the references, reports, and studies utilized in plan development.

Table 1-3: Studies, Reports, and References

Document	Author/Agency	Date
Federal Disaster Declaration Statistics	FEMA	2022
Ohio Hazard Mitigation Plan	Ohio EMA	2019
Lorain County Profile	Ohio Department of Development, Office of Research	2020
Storm Events Database	National Oceanic and Atmospheric Administration	2021
US Census 2020	US Census Bureau	2020
The National Risk Index	FEMA	2020
FEMA Repetitive and Severe Repetitive Loss Data	FEMA	2022
Lorain County Metroparks 10-year plan	Lorain County Metroparks	2014
Lorain County Metroparks Annual Report	Lorain County Metroparks	2019
Flood Insurance Study for Lorain County, Ohio	FEMA	2021
Community Status Notebook – NFIP	NFIP	2022

NOAA Storm Database for Lorain County OH	NOAA	2022
Black River Discovery Report	Ohio EPA	2008
Black River Watershed Action Plan	Lorain County Community Development	2011
Lorain County Comprehensive Economic Development Strategy (CEDS)	Lorain County Commissioners	2013
Great Lakes Coastal Flood Study	FEMA	2013
Lorain County HAZUS Run – Earthquake and Flood	Ohio EMA	2018
Ohio Agricultural Statistics Annual Bulletin	USDA	2020-2021
ODNR Ohio Geology Interactive Maps	ODNR online	2022

1.4 PLAN MAINTENANCE

Plan maintenance is a critical element of the hazard mitigation plan and encourages the inclusion of hazard mitigation considerations into ongoing community development activities, engages stakeholders in issues related to disaster risk reduction on a regular basis, and streamlines the mitigation plan update process. The Lorain County EMA will work to conduct plan maintenance activities following adoption of this plan, and will be responsible for that review taking place.

1.4.1 Annual Plan Maintenance Activities

Upon approval of this plan, Lorain County will transition into plan maintenance. The planning team will be called upon to review, evaluate, and discuss the plan annually, beginning approximately one year after the final approval of the plan. Because participation in meetings can be a challenge, the EMA will identify the method to conduct this review based on stakeholder needs. Methods can include, but are not limited to, traditional meetings, digital surveys, and virtual meetings. The intent of annual plan maintenance is to track progress on mitigation goals and strategies and document changes in hazards and risks. The specific method used to collect this information is less important than the actual collection of feedback. If the county is impacted by an actual disaster incident, the EMA will also consider a post-incident mitigation meeting to capture any specific mitigation needs and document changes for the next plan update. The EMA Director will also review the hazard identification and risk assessment and note necessary changes for the next plan update.

1.4.2 Community Participation

In Lorain County, the EMA is responsible for coordinating mitigation plan maintenance but stakeholder and community participation are critical. The EMA will continue reaching out to a broad group of community partners and encouraging their participation in ongoing mitigation activities.

To encourage participation from the community, all mitigation review meetings and activities will be open to the public. These events will be promoted through news releases, websites,

social media posts, and other appropriate communication methods. Any digital surveys or data collection tools will be made available to the community. Feedback received from all participants will be reviewed by the EMA Director and documentation maintained.

1.4.3 Integration with Community Planning Mechanisms

Across the county, multiple organizations work together to promote community and economic development. These agencies will also support and encourage implementation of the identified hazard mitigation strategies.

The Lorain County Community Development department provides planning services, zoning consultation, and floodplain management for the county. The commission collaborates with townships and municipalities across Lorain County to update and maintain zoning codes and other regulations. The planning commission is also charged with updating and maintaining the county's comprehensive plan.

The Lorain County Community Development department is the primary agency that works to develop businesses in the county through recruitment and placement of new companies and expansion of existing businesses. Along with the Chamber of Commerce and government officials, they work to foster business growth and development in the county.

Lorain County Community Development is involved with emergency housing programs, the Brownfield Coalition, CDBG/CHIP contractor options, and participates in the Black River Watershed coalition. They are the primary agency working with community development, economic development and business growth.

From a regulatory aspect, the Community Development department provides the floodplain manager, floodplain standards, and other floodplain activities for the county. They work with subdivisions for subdivision standards and regulations, zoning inspectors for zoning rules, and building inspectors for commercial and residential development.

The County Port Authority and the Stormwater Management District work with the Community Development department on new development, construction projects, renovations and refurbishments, and other business projects. They link to the Small Business Administration and other lenders and financial institutions as well as working with various loan programs, tax abatement programs and workforce development.

Several of the municipalities have development departments. The Lorain Port and Finance Authority, the City of Elyria, the City of Oberlin, the City of Avon Lake, the City of Lorain, the City of Avon, the City of North Ridgeville, the Village of Grafton, and other municipalities participate in development activities and projects.

The EMA Director works with these organizations and officials across the county to assess disaster risk, prepare for all types of hazards, and implement and monitor hazard mitigation actions.

1.4.4 Documentation of Plan Maintenance

The EMA will maintain documentation of all plan maintenance activities. This documentation will include attendance records, contact information for stakeholders and planning team members, surveys, progress reports, and disaster damage information submitted by jurisdictions and community partners. This information will be shared with the planning team during the next plan update process.

1.5.6 Plan Update Cycle

The 2022 Lorain County Hazard Mitigation Plan will expire in 2027. With ongoing plan maintenance activities, the county will be positioned to submit an updated plan before the identified expiration date. To ensure the appropriate timeline is met, formal efforts to update the plan will begin no later than 2026. The EMA Director will ensure that the appropriate and necessary steps are taken to complete this process.

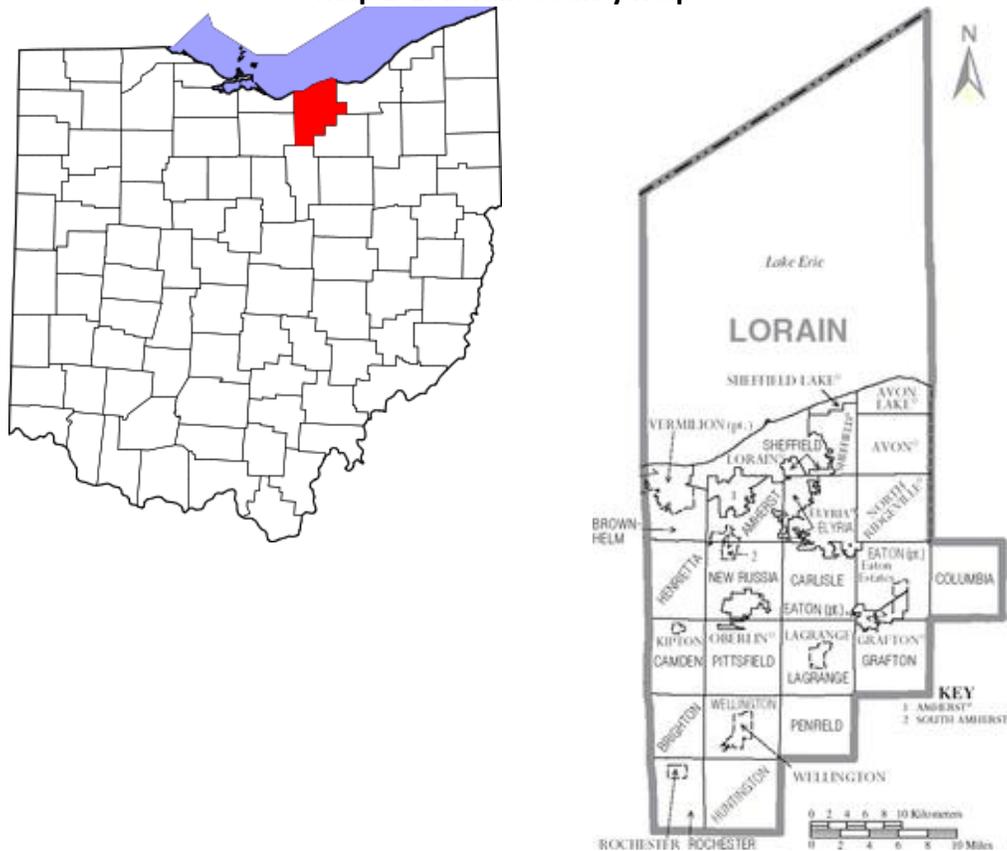
2.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

The purpose of the Hazard Identification and Risk Assessment (HIRA) is to identify the type and frequency of disasters in Lorain County and analyze the risk to people, property, and the environment when those hazards occur. This process allows officials and residents to better prepare for incidents and reduce loss. The HIRA includes four sections. The County Profile provides information on Lorain County and its jurisdictions. Hazard Identification describes hazards that pose a threat to Lorain County and provides a brief history of significant occurrences. The Vulnerability Assessment examines the vulnerability of each jurisdiction and the Risk Analysis evaluates and ranks the risks Lorain County must address through its mitigation efforts.

2.1 COUNTY PROFILE

Lorain County is located in northeast Ohio along the south shore of Lake Erie and is part of the Cleveland-Elyria OH Metropolitan Statistical Area. It shares borders with Cuyahoga, Medina, Ashland, Huron, and Erie counties. The county has 492 square miles of land area and 432 square miles of water, the majority of which is Lake Erie.

Map 2-1: Lorain County Map



2.1.1 Demographics

According to 2020 U.S. Census, the population of Lorain County is 312,964. The county is experiencing a moderate upward trend in population, which is expected to continue for the next several decades.

Table 2-1: County Population Statistics (US Census 2020)

Statistic	2020
Population	312,964
Female Population	50.8%
Male Population	49.2%
Persons under 5 years	5.5%
Persons under 18 years	21.8%
Persons 65 years and over	18.8%
White alone	86.2%
Black or African American alone	9.0%
American Indian and Alaska Native alone	0.4%
Asian alone	1.4%
Native Hawaiian and Other Pacific Islander alone	0.1%
Two or More Races	3.1%
Hispanic or Latino	10.4%
White alone, not Hispanic or Latino	77.7%
Average Household Size	2.48
Median Household Income	\$58,427
Persons in Poverty	11.9%

Lorain County has 132,798 housing units. The owner-occupied housing rate is 72.3% and the median value of owner-occupied units is \$150,500. The median gross rent for all types of rental properties is \$774 per month while the median cost for homes with mortgages is \$1,331 per month.

2.1.2 Incorporated Jurisdictions

Lorain County has nine cities and seven villages. All municipalities participated in the county's 2021 mitigation planning efforts.

Cities

Of the nine cities in Lorain County, Lorain is the most populated. Elyria, the second largest city, serves as the county seat.

Table 2-2: City Population and Demographics

City	2015 Population	2020 Population	Households	Median Income	Persons Below Poverty
Amherst	12,112	12,108	4,780	\$71,775	7.65%
Avon	22,017	22,999	8,110	\$109,916	2.79%
Avon Lake	22,998	24,030	9,540	\$83,018	5.09%
Elyria	53,956	53,821	22,800	\$44,324	23.1%

Lorain	63,710	63,801	25,600	\$38,291	25.1%
North Ridgeville	31,269	33,427	12,900	\$77,221	4.98%
Oberlin	8,390	8,296	2,570	\$50,509	28.1%
Sheffield Lake	9,067	8,968	3,490	\$62,292	5.8%
Vermilion	10,490	10,659	4,509	\$64,823	5.1%

Villages

Lorain County has seven incorporated villages. Several of these villages have a larger population that approaches the threshold of qualifying for city status while others are extremely small and rural. By definition, a village in Ohio has fewer than 5,000 residents although not all villages that exceed this population elect to pursue city status.

Table 2-3: Village Population and Demographics

Village	2015 Population	Population	Housing Units	Median Income	Persons Below Poverty
Grafton	6,636	5,996	824	\$61,042	7.78%
Kipton	243	233	108	\$51,792	7.50%
LaGrange	2,103	2,479	918	\$70,180	7.90%
Rochester	182	168	68	\$66,875	8.93%
Sheffield Village	3,982	4,190	1,680	\$80,000	5.59%
South Amherst	1,688	1,820	715	\$58,641	3.35%
Wellington	4,802	5,135	2,210	\$48,333	10.5%

2.1.3 Townships and Unincorporated Communities

The unincorporated areas of Lorain County are organized into eighteen townships. Townships in Ohio are governed by an elected board of trustees. They meet at least once per month and are responsible for the health, safety, and welfare of township residents. Residents also elect a Fiscal Officer to manage the township's finances. Because townships are unincorporated, they are considered part of the county for the purpose of hazard mitigation planning and activities. Lorain County has twelve townships.

Table 2-4: Township Population Statistics

Township	2015 Population	2021 Population
Amherst	6,844	6,861
Brighton	915	774
Brownhelm	7,618	7,877
Camden	1,677	1,697
Carlisle	7,500	7,382
Columbia	7,040	7,411
Eaton	5,750	5,828
Elyria	3,266	3,250
Grafton	2,833	2,789
Henrietta	1,861	1,779
Huntington	1,341	1,361
LaGrange	6,164	6,560

Township	2015 Population	2021 Population
New Russia	2,515	2,404
Penfield	1,789	1,835
Pittsfield	1,581	1,573
Rochester	799	792
Sheffield	3,720	3,963
Wellington	6,222	6,140

Unincorporated Communities and Neighborhoods

Within the unincorporated areas of Lorain County there are 13 unincorporated communities and 2 census-designated places. These small, informal neighborhoods have no official form of government. They function as part of the township in which they are located. The locations typically have historical significance or were formerly incorporated but have ceased to be considered a jurisdiction. Local residents generally still recognize the neighborhoods by their previous names.

2.1.4 Institutions and Special Facilities

Lorain County has abundant residential and healthcare resources available for the community. Access to these services improves the quality of life for residents and contributes to the local economy.

Education

Abundant educational opportunities exist for both children and adults in Lorain County. There are twenty public school districts that provide K-12 education. Most of these districts are located primarily in Lorain County while others are located in an adjacent county but serve students from Lorain County.

Table 2-5: Lorain County Schools

Public School Districts	Private/Parochial Schools
Amherst Exempted Village School District	Elyria Catholic High School
Avon Local School District	Lake Ridge Academy
Avon Lake City School District	Open Door Christian School
Black River Local School District	Christian Community School
Clearview Local School District	Constellation Schools
Columbia Local School District	First Baptist Christian School
Elyria City School District	Holy Trinity School
Firelands Local School District	Horizon Science Academy of Lorain
Keystone Local School District	St. Jude School
Lorain City School District	St. Peter School (Lorain)
Lorain Joint Vocational School	St. Joseph Elementary School
Mapleton Local School District	St. Anthony of Padua School
Midview Local School District	St. Joseph Elementary School (Amherst)
New London Local School District	St. Peter School (North Ridgeville)
North Ridgeville City School District	St. Mary of the Immaculate Conception
Oberlin City School District	St. Mary Elementary School

Olmstead Falls City Schools Sheffield-Sheffield Lake City School District Vermilion Local School District Wellington Exempted Village School District	
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For college and adult students, career-technical and post-secondary education providers in the county include:

- Lorain County Community College
- Lorain County Joint Vocational School
- Oberlin College
- Ohio Business College

Many other post-secondary programs are available in adjacent counties and northeast Ohio.

Healthcare

Within Lorain County, residents have access to comprehensive medical care through the robust local healthcare systems, including hospitals, physician offices, urgent care centers, and specialty centers. Given the county’s proximity to Cleveland, many residents also travel to neighboring counties for healthcare.

Residential Healthcare Facilities

Multiple residential healthcare facilities, such as nursing homes and assisted living facilities, are present in Lorain County. As of 2020, the types of facilities and statistics are as follows:

Table 2-6: Residential Healthcare Facilities

Facility	Facilities	Beds
Licensed Nursing Homes	20	1,921
Licensed Residential Care	16	1,576

2.1.5 Infrastructure

Lorain County’s infrastructure provides residents, workers, and visitors with critical access to services. This section describes Lorain County’s transportation and utility systems.

Transportation Systems

Lorain County is traversed by nearly 1,900 miles of roadways, including interstates, U.S. highways, state highways, and county, township, and municipal roads. Of these, 36.8 miles are interstate (including 20.79 Ohio Turnpike miles), 46.96 miles are U.S routes, 222.41 miles are state highways, and 1,576.57 miles are county, township, and municipal roadways.

Table 2-7: Lorain County Highways

Type	Roads
Interstates	80/90, 480
U.S. Highways	6, 20
State Highways	2, 10, 18, 57, 58,82,83,113,162,254, 301,303,511, 611

Rail is a major transportation system in Lorain County. Rail lines are present throughout the county. The county also has several ports and five commercial airports. These facilities support the local economy by providing transportation for the resources needed for manufacturing and industry. The lines are owned by CSX Corporation and Norfolk Southern Corp. Additional railroads operate trains on tracks owned by CSX and Norfolk Southern.

There are six airports and registered airstrips in Lorain County.

Utilities

Most homes in Lorain County, approximately 75.9%, are heated with natural gas. An additional 17.9% have an electric heat source. The Public Utilities Commission of Ohio regulates private companies that provide public utility services. The remaining properties in the county are heated by other sources, including:

- Bottled, tank, or LP gas 3.3%
- Solar energy or other fuel 0.9%
- Coal, coke or wood 0.9%
- Fuel oil, kerosene 0.7%
- No fuel used 0.5%

Lorain County has numerous pipelines that cross the area. Most of these pipelines are for gas transmission but there are also two hazardous liquid pipelines. These transmit materials east-west across the county. The first line runs across the southern part of the county near State Route 18; the other runs from Kipton in west central Lorain County to the northeast, exiting the county in Columbia Township.

Water, wastewater, and storm water services within incorporated jurisdictions are provided primarily by municipal and regional providers. Outside of incorporated areas, individual wells and septic systems are used for water and wastewater.

2.1.6 Topography and Climate

Lorain County's landscape features flat to slightly rolling farmland and moderately rich soils to lakeshores with various characteristics. The county's lowest areas are along the Lake Erie shoreline from Vermilion to Avon Lake, with elevations ranging from 594 to 610 feet above sea level. Vermilion is the lowest at 594 feet above sea level and Lorain is highest at 610 feet above sea level. In contrast, Rochester, LaGrange, Oberlin and Wellington are situated on higher elevations as they are more proximal to the Continental Divide and further up the watershed. Rochester sits at 928 feet above sea level and is near the headwaters of the West Branch of the Black River. Wellington sits at 846 feet above sea level; LaGrange is 820 and Grafton is 804. The maximum difference in the Black River Watershed is 328 feet, the difference between Rochester and Sheffield Lake and Avon Lake. Although Vermilion is lower than either Avon Lake or Sheffield Lake (both at 600), Vermilion is part of the Huron River Watershed.

The climate in Lorain County is consistent with most of Ohio's northern lakeshore. The humid continental climate zone features cold winters and hot summers. The average annual high temperature is 60° F and the average annual low temperature is 40° F. July is the warmest month with an average high temperature of 82° F; January is the coldest with an average low temperature of 21° F. Average rainfall is 26.0 inches and snowfall is 11.04 inches. June is typically the wettest month with average precipitation of 2.9 inches, but the months from May through November yield most of the annual rainfall. Due to temperatures, precipitation comes in the form of snow from December through March, averaging just under 3 inches of snow per month. Lorain County is considered "mostly cloudy", but less cloud cover occurs from June through November. January is the cloudiest month on the average. The earliest sunrise occurs on June 15, and yields 15 hours and 11 minutes of daylight. The shortest day is December 21st when the sun sets before 5 p.m. resulting in nearly 16 hours of darkness in a 24-hour period. Prevailing winds in Lorain County are out of the south and west, and averaging almost 11 mph with the highest winds in January and the calmest in July and August. The growing season is 205 days long, starting around mid-April to early November. These days are characterized by having continuous non-freezing temperatures. The earliest blooms are seen in very early April in a typical year.

2.1.7 Waterways and Watershed

Lorain County has 29 waterways. This includes two major rivers, the Black River and its tributaries that include Elk Creek, Beaver Creek, Salt Creek, Buck Creek, East Creek, Center Creek, Charlemont Creek, Plum Creek, Crow Creek, Frankenburg Creek, French Creek, Willow Creek, Overbrook Stream, East Branch Black River, West Branch Black River, Quarry Creek, Martin Run, Big Creek, Aldrich Creek, Caley Creek, Chance Creek, Folger Creek, Havet Creek, Little Beaver Creek, Robinson Creek, and Shepherds Run; and the Vermilion River and Brownhelm Creek.

The Vermilion River begins in northern Ashland County just north of the continental divide with its headwaters in Bailey Lakes. It travels to the northwest into Huron County, and then turns east and heads into Vermilion. Only a short length of the river runs into Lorain County, from the Erie-Lorain County line in Birmingham to the east, and then it turns westward and runs into Vermilion.

The Black River West Branch begins as a stream north of Sullivan in Ashland County, just north of the continental divide. It travels north into Lorain County toward Elyria in a north-northeasterly direction as several other creeks join in, including Buck, Charlemont, and Wellington creeks. The East Branch headwaters are west of Lodi. The East Branch meanders to the east and then heads to the northwest. The river flows north, passes LaGrange on the eastern side, and heads into Grafton and then goes north. In Elyria, it joins the West Branch Black River. The Black River is large and wide once the two branches combine, and when loaded with water, it roars through Elyria. It goes on to Sheffield and then downtown Lorain as it dumps into Lake Erie.

Vermilion River Watershed

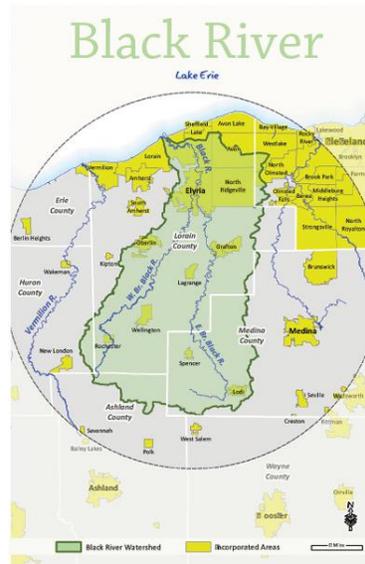
A Vermilion River Watershed Report indicates that the watershed includes 269 square miles and winds through parts of Richland, Ashland, Lorain, Huron and Erie counties before emptying into the central basin of Lake Erie in Vermilion. Seventy-three percent of the watershed is farmland, and 25% is wooded area; 2% is wetlands, open space, and urban development. Agricultural activities include grain farming and livestock production, and closer to the lake where soil types permit, fruits and vegetables.

Black River Watershed

The Black River watershed, covering almost 1240 stream miles, drains approximately 470 square miles of land. The east and west branches, described previously, meet in Elyria and flow north as French Creek joins the river near Sheffield Village. Plum Creek joins in from the Oberlin area; Charlemont Creek travels through Rochester and joins the river in Wellington Township. Wellington Creek meets the river near Pittsfield and LaGrange townships. In some places, the Black River slope is 0.8 feet/mile at the French Creek, and then 29.8 feet/mile at the Charlemont Creek, creating an average of 7.6 feet per mile. Communities affected by the Black River include the cities of Lorain, Elyria, Sheffield Lake, Avon, Avon Lake, North Ridgeville, Oberlin, and villages of Sheffield, Grafton, LaGrange, Wellington, and Rochester. Seventeen townships are affected by the Black River.

The map below shows the Black River Watershed in outlined green area; the Vermilion River Watershed in Lorain County is shown in gray and county lines are in white. The area in Lorain County that is part of the Vermilion River Watershed is a fairly small corner of the most northwestern area.

Map 2-2: Black River and Vermilion River Watersheds



2.1.8 Land Use

Agricultural land use is delineated by “farmland districts” in Lorain County, separating the agricultural use into three tiers of use: urban agriculture, transitional agriculture, and rural agriculture. This approach in Lorain County’s Comprehensive Land Use Plan allows for the protection of farmland in an environment of industrial, commercial and residential growth.

Agriculture is the predominant land use in southern Lorain County, although there are many fruit and vegetable farms along the lakeshore. The average size of a farm in Lorain County is 50 acres, according to the Comprehensive Land Use Plan. There are, according to the 2020-2021 Ohio Agricultural Statistics Annual Bulletin, there are 1,001 farms in the county, amounting to 125,721 acres of farmland. The report indicates that 105,149 acres are harvested cropland. There are 11,593 acres of woodland and 4,061 acres of pasture. Primary crops include corn, soybeans, hay, and wheat as well as fruits, tree nuts, berries, melons, vegetables, potatoes and sweet potatoes, and nursery products. Nursery items include floriculture products, sod production, Christmas tree production, and other tree production.

Livestock includes cattle, calves, and some dairy cows, poultry and egg production. There are hogs and pigs, sheep and goats raised in Lorain County. There are also recreational animals and show animals, including horses, ponies, mules, burros, donkeys, and llamas.

Table 2-8: Lorain County Land Use

Use Category	Percentage
Cultivated Crops	38.32%
Forest	22.64%
Developed Urban Area	26.67%
Pasture/Hay	6.99%
Wetlands	4.32%
Open Water	1.06%
Barren (strip mines, gravel pits, etc.)	0.00%

There are nine brownfields listed in Lorain County. These include St. Joseph Community Center (Lorain), the former RTI Coke Works (Lorain), the former Ford Assembly Plant (Lorain), additional properties in a Lorain industrial park owned by Ford (Lorain), the Garden Street Property (Elyria), a property at 915 West River Road (Elyria), the Cascade Forest (Elyria) and the Tappan #1 property (Elyria.) The Comprehensive Land Use Plan indicates that additional brownfields are likely to exist, but are unmeasured and not registered.

2.1.9 Regulation

Lorain County focuses on relevant regulation to guide development in an area adjacent to Cuyahoga County and the Cleveland metropolitan area. Situated along the shores of Lake Erie and having one of the largest geographic areas of all Ohio counties, Lorain County must be diverse yet consistent in regulations and development guidance.

The far northern border of Lorain County is Lake Erie Shoreline as well as the bottom of two watersheds. While this area is prime for development of commercial and residential property, it is also more highly vulnerable to coastal flooding and wind damages from storms that develop over the lake. The southern part of Lorain County is mostly agricultural, populated in smaller villages and townships, but is a major contributing party to runoff and watershed that inundates the shoreline.

Lorain County has both commercial and residential building codes in place. The cities of Elyria and Lorain have building enforcement departments led by officials who enforce various codes through plan examination, project inspection, and issuance of permits. Codes are enforced that cover not only basic construction like HVAC, plumbing and electrical work, but also signage, fencing, and elevators. They regulate foundation repairs, rental properties, and residential property outbuildings. They issue all sorts of occupancy permits. These departments provide nuisance abatement for properties and buildings in significant disrepair.

All municipalities, except the micro-village of Rochester, are members of National Flood Insurance Plan (NFIP) and have floodplain regulations in place. The county floodplain manager works through the Community Development department of Lorain County.

All areas of Lorain County are zoned and have active zoning inspectors. In addition to land use issues in compliance with zoning maps, they consider variances and appeals, and reclassification of property use. Community planners consider lots splits.

Table 2-9: Township Regulation and Zoning Status

JURISDICTIONAL CAPABILITIES							
Jurisdiction	Planning Commission	Comprehensive Plan	Building Codes	Zoning Ordinance	Floodplain Regulations	Capital Budget Funds Mitigation Projects	Public Works Budget Funds Mitigation Projects
Lorain County	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Amherst	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Amherst Township		Yes		Yes			
Avon	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Avon Lake	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Brighton Township		Yes		Yes			
Brownhelm Township		Yes		Yes			
Camden Township		Yes		Yes			
Carlisle Township		Yes	Yes	Yes			
Columbia Township		Yes		Yes			
Eaton Township		Yes		Yes			
Elyria	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Elyria Township	Yes	Yes	Yes	Yes			
Grafton	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Grafton Township		Yes		Yes			
Henrietta Township		Yes		Yes			
Huntington Township		Yes		Yes			
Kipton	No	Yes	No	Yes	Yes	No	No
LaGrange	Yes						
LaGrange Township		Yes		Yes			
Lorain	Yes						
New Russia Township		Yes		Yes			
North Ridgeville	Yes						
Oberlin	Yes						
Penfield Township		Yes		Yes			
Pittsfield Township		Yes		Yes			
Rochester*	No	Yes	No	Yes	No	No	No
Rochester Township		Yes		Yes			
Sheffield (Village)	Yes						
Sheffield Lake (City)	Yes						
Sheffield Township		Yes		Yes			
South Amherst	Yes						
Wellington	Yes						
Wellington Township		Yes		Yes			
Vermilion	Yes						
*Sanction effective 08-08-76							
A blackened box indicates that particular regulation type is generally inapplicable to the corresponding jurisdiction.							

2.1.10 Economy and Development

Lorain County Community Development Department leads the commercial and residential development in the county, and manages the Community Economic Development Strategy (CEDs). They also manage, among other duties, land use regulation, the Brownfield Coalition, residential contractor applications, watershed groups for the Black River, and community ++development grants. They utilize revolving loan funds, grants, tax incentives, and business assistance programs to foster economic growth and success. Floodplain management is provided through this department. They work with the Lorain County Port Authority and the Stormwater Management District in providing development services.

As an urban county, there are many destinations for residents to conduct business. Depending on their location, residents may travel to one of the county’s cities for retail needs or may utilize similar services in an adjacent county.

Major Industries and Employment

Lorain County has a steady manufacturing base that includes Camaco, Ford, Invacare, PolyOne, Ridge Tool, and others. Healthcare, education, and government are also significant employers. Table 2-11 lists the county’s major employers. Table 2-12 includes employment statistics by industry.

Table 2-10: Major Employers

Employer	Sector
Camaco LLC	Manufacturing

Elyria City Schools	Government
EMH Regional Healthcare System	Service
Ford Motor Company	Manufacturing
Invacare Corp	Manufacturing
Lorain City Schools	Government
Lorain County Government	Government
Mercy Health	Service
PolyOne Corp	Manufacturing
Ridge Tool Manufacturing	Manufacturing
State of Ohio	Government
City of Lorain	Government
University Hospital Health System	Healthcare

Table 2-11: Employment by Industry

Industrial Sector	Establishments	Average Employment
Trade, Transportation and Utilities	1,380	18,140
Manufacturing	386	16,566
Education and Health Services	731	16,222
Local Government	Not Available	13,252
Leisure and Hospitality	621	10,692
Professional and Business Services	917	9,815
Construction	619	4,228
Other Services	523	2,845
Financial Services	566	2,500
State Government	Not available	1,162
Federal Government	Not available	1,079
Natural Resources and Mining	33	1,031
Information	81	640

Lorain County's unemployment figures have remained relatively high in the last several years, especially when compared to other areas of Ohio. Employment statistics from 2016 through 2020 are listed in the chart below. The county, like the rest of the nation, experienced a significant increase in unemployment in 2020 due to the COVID-19 pandemic. Since that time, unemployment has largely returned to pre-pandemic levels.

Table 2-12: Employment Statistics

	2020	2019	2018	2017	2016
Total Labor Force	149,100	156,100	154,300	153,800	152,300
Employed	134,300	149,300	146,600	144,500	143,100
Unemployed	14,700	6,800	7,700	9,300	9,100
Unemployment Rate	9.9%	4.4%	5.0%	6.1%	6.0%

2.1.11 Development Trends

The Lorain County Community Development department leads the creation of the Community Economic Development Strategy (CEDS) to guide growth in thirty-four jurisdictions. This

strategy includes growth in public, private and non-profit sectors for the benefit of the entire county. Diversity of stakeholders enables them to develop regulation that works for a variety of localities, and helps them create a roadmap that takes them from where they are on any given day, to where they want to be.

This county-wide strategy allows for new and significantly renovated commercial properties to be built, and for historical properties to be preserved in a useful and historically correct manner. The plan fosters smart growth that promotes economic vitality. They encourage development and redevelopment through practical and feasible goals, and provide tools for community leaders to manage growth and make reasonable and effective policy decisions.

Community development uses various tools to help stimulate growth. Industrial and manufacturing jobs create community success and help provide jobs with livable wages. They provide tax incentives like enterprise zones with tax abatements, community development block grants, foreign trade zones, and small business development assistance. They have recently created a Land Reutilization Corporation (Land Bank) to deal with abatement, demolition, and mitigation issues for abandoned and underutilized properties.

Lorain County is working to attract both large and small manufacturing and industry to the county. These businesses, using skilled and non-skilled labor forces, promote livable wages and personal success for their workers. They work with post-secondary colleges and trade schools to create a workforce that meets the needs of the community. Jobs and Family Services pairs with work force and labor organizations and staffing services to fill jobs, employ people, and achieve economic goals.

Creation of residential neighborhoods for workers and their families is always a goal of economic development staff in Lorain County. On the outskirts of Cuyahoga County and Cleveland, the residents of Lorain County work inside and outside the jurisdiction. They have bedroom communities, but the same communities provide service and industrial jobs for workers. Schools, local government, and service providers employ thousands of workers annually. The development of a sophisticated and comprehensive medical community to serve the population is part of the development plan.

Single family homes are part of the development goals, but so are multi-family homes. Organized neighborhoods with quick and easy access to retail and service providers, with recreational areas and venues is a primary goal of all the cities. Affordable living with amenities that are desirable to younger families and workers are one of the goals. Providing appropriate housing for an aging population in the form of condominiums, senior living neighborhoods, and assisted living facilities is one of the objectives.

Adequate infrastructure is important in a community as large as Lorain County. Streets, highways, bridges, water treatment and wastewater systems, and utility distribution must all support the industrial and residential growth in the county. Floodplain management and the

handling of surface water, drainage, and coastal floodwaters is a critical component to maintaining the safety of the environment.

Telecommunications, internet services, and storm warning systems are critical when there is a population as large as Lorain County. They work to provide adequate emergency warning and incident information to the county so severe storms and weather incidents have as few negative consequences as possible.

The southern half of Lorain County is agricultural, occupied by family farms that produce grain, livestock and fruits and vegetables. There are some fruit and vegetable farms along the coastline as well. Development goals, including zoning, promote retention of this area as farmland.

Lorain County communities work together to engage in systematic growth and development that fosters a safe and environmentally friendly community with opportunity for all.

2.2 HAZARD IDENTIFICATION

Lorain County has experienced many disasters in its history, ranging from floods and tornadoes to winter storms. The purpose of this section is to identify and define each hazard that can impact Lorain County and examine the historical hazard events that have occurred in the county.

In developing this assessment, the Hazard Mitigation Planning Team analyzed the hazards and risks present throughout the county. The hazards identified as relevant to Lorain County are:

- Drought/extreme heat
- Earthquake
- Flood
- Hazardous materials spill/incident
- Infrastructure – Dam/levee failure
- Infrastructure – Transportation systems
- Infrastructure – Utility systems
- Infrastructure – Water quality
- Invasive species
- Land subsidence
- Severe thunderstorm
- Tornado/windstorm
- Winter Storm

Some hazards were excluded from this plan because they pose no risk to Lorain County. The excluded hazards and the justification for the exclusion are identified in the table below.

Table 2-13: Excluded Hazards

Excluded Hazard	Justification
Tsunami	Geographically impossible
Volcano	Geographically impossible
Wildfire	Insufficient forested area

Lorain County does not have an extensive history of federal disaster declarations. The county has received fifteen federal disaster declaration in its history. The most recent declarations have been for regional or national events such as the COVID-19 Pandemic (2020) and Hurricane Katrina (2005). The county has not been included in a federal declaration for local damage because of storms or flooding since 2002. A comprehensive list of incidents in Lorain County that results in federal declarations are provided in the following table:

Table 2-14: Federal Disaster Declaration History

DR/EM Number	Declaration Date	Incident Type(s)
DR-90-OH	01/23/1959	Floods
DR-191-OH	04/14/1965	Severe storms, tornadoes
DR-266-OH	07/15/1969	Severe storms, tornadoes, flooding

DR-345-OH	07/19/1972	Tropical Storm Agnes
DR-362-OH	11/24/1972	Severe storms, flooding
DR-377-OH	04/27/1973	Severe storms, flooding
DR-3055-OH	01/26/1978	Blizzards, snow storms
DR-831-OH	06/10/1989	Severe storms, flooding
DR-951-OH	08/04/1992	Severe storms, tornadoes, flooding
DR-1065-OH	08/25/1995	Severe storms, flooding
DR-1444-OH	11/18/2002	Severe storms, tornadoes
DR-3187-OH	09/23/2003	Power outage
EM-3250-OH	09/13/2005	Hurricane Katrina evacuation
DR-4507-OH	03/31/2020	COVID-19 Pandemic
EM-3187-OH	03/13/2020	COVID-19

To understand the local risk posed by these hazards, the following pages examine the characteristics and evaluate the local history of each hazard. Historical information was obtained from the National Oceanic and Atmospheric Administration’s National Climatic Data Center (NCDC) and supplemented with information from local officials. The National Risk Index Community Report for Lorain County, Ohio was also used to analyze risk.

According to the National Risk Index (NRI), Lorain County’s overall risk for natural hazards is Relatively Low. The risk index takes into consideration issues such as annual loss due to natural hazards, social vulnerability of the community, and community resilience. A copy of the survey instrument used to collect this information is included in Appendix C: Hazard Assessment Survey Tool.

Table 2-15: National Risk Index

Location	Risk Index Score
Lorain County	13.31
Ohio Average	8.46
National Average	10.60

Lorain County’s expected annual loss due to natural hazards is rated as Relatively Moderate compared to the rest of the United States.

Table 2-16: Expected Annual Loss (NRI)

Location	Expected Annual Loss Score
Lorain County	18.10
Ohio Average	12.08
National Average	13.33

The county’s composite expected annual loss, per the National Risk Index report, is \$10,726,695. This includes building value of \$7,208,027, agricultural value of \$199,943, and population loss of 0.44 fatalities, which is equivalent to \$3,318,725.

HAZUS Projections

According to the HAZUS system, Lorain County has the following vulnerability and anticipated losses as calculated by the software.

Table 2-17: Building Exposure by Occupancy Type (HAZUS)

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7
Commercial	7,301,068	18.4
Industrial	2,501,600	6.3
Agricultural	198,790	0.5
Religion	554,753	1.4
Government	145,381	0.4
Education	961,473	2.4
Total	39,738,857	100.00

Social Vulnerability and Community Resilience

Social vulnerability refers to the susceptibility of social groups within the county to adverse impacts from natural hazards. Lorain County is considered to have Relatively Moderate social vulnerability, which indicates that Lorain County residents are somewhat less likely to withstand the impacts of natural hazards than residents in other parts of the United States.

Relevant demographic information includes poverty levels in the cities of Lorain and Elyria that are high. People living in poverty are affected more adversely than other populations, and this increases the county’s susceptibility to disaster vulnerability.

Table 2-19: Social Vulnerability (NRI)

Location	Social Vulnerability Score
Lorain County	36.62
Ohio Average	34.28
National Average	38.35

Community resilience refers to the community’s ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recovery rapidly from disruptions. Lorain County’s resilience is conserved Relatively High.

Table 2-20: Community Resilience (NRI)

Location	Community Resilience Score
Lorain County	57.74
Ohio Average	56.84
National Average	54.59

2.2.1 Drought and Extreme Heat

A drought is a deficiency of moisture that adversely impacts people, animals, and vegetation over an area of significant size. Because drought is a creeping phenomenon characterized by the absence of water, there is no defined beginning or end, nor is there a specific amount of time required for an extended dry period to be considered a drought. An event is considered a drought when the dry period lasts long enough to impact the environment and economy of a region, typically several months or years.

Drought severity is measured using the Palmer Drought Severity Index (PDSI). The PDSI measures dryness based on recent precipitation and temperature statistics. Drought classifications are identified in the chart below:

Table 2-21: Palmer Drought Severity Index

Measurement	Description
-4 or less	Extreme Drought
-4 to -3	Severe Drought
-3 to -2	Moderate Drought
-2 to -1	Mild Drought
-1 to -0.5	Incipient Dry Spell
-0.5 to 0.5	Near Normal
0.5 to 1	Incipient Wet Spell
1 to 2	Slightly Wet
2 to 3	Moderately Wet
3 to 4	Very Wet
4 or more	Extremely Wet

A heat wave is a period of abnormally hot and unusually humid weather, typically lasting for two or more days. This can be an extended period with higher-than-normal temperatures or a shorter period with abnormally high temperatures. Regardless of the specific duration or temperature, heat waves are a safety hazard to anyone exposed to the extreme heat. People, especially the elderly and those with ongoing medical conditions, are at risk for heat exhaustion and heat stroke, which can be fatal in the most serious cases. When heat waves are accompanied by drought conditions, the potential for a serious natural disaster increases. Between injuries, fatalities, and crop/property damage, these disasters can significantly impact the economy of a region.

Heat waves can occur anywhere in Ohio but are typically brief, lasting only a few days. Extreme temperatures are considered anything above 90 degrees Fahrenheit. In the humid climate of the Midwest, these temperatures are often accompanied by high humidity. It is rare for temperatures to exceed the mid-90s, although the region does occasionally experience temperatures in the upper 90s or slightly higher. These brief heat waves are not uncommon, but rarely last more than a few days. A heat wave lasting longer than a week is extremely uncommon.

Table 2-22: Average Temperatures and Rainfall

Month	Average High	Average Low	Average Precipitation
January	36°	21°	2.58"
February	39°	23°	2.27"
March	49°	30°	2.75"
April	62°	40°	3.37"
May	72°	49°	3.77"
June	81°	59°	3.74"
July	85°	64°	3.74"
August	83°	62°	3.92"
September	76°	56°	3.72"
October	65°	45°	3.10"
November	52°	36°	3.38"
December	39°	26°	3.16"

Drought/Extreme Heat Risk Assessment

Drought and extreme heat are rare in Lorain County but are countywide hazards and can affect all areas and jurisdictions. Brief spells of abnormally dry conditions can last for several weeks but most months have sufficient rainfall to support crop growth. Drought conditions, when they do occur, have a significant impact on the county's significant agriculture industry.

During the agricultural growing season, Lorain County can experience short periods of unusually dry conditions. The county does not have a history of extended drought that would cause casualties or property damage. The most common drought-related loss is a reduction in crop yields for a single growing season and endangerment of any livestock that could not get water for survival.

Based on November 2020-21 Ohio Annual Bulletin published by the U.S. Department of Agriculture, Lorain County has 1,001 farms that produce crops on 105,149 acres of land. There are 4,061 acres of pastureland, and 11,593 acres of woodland. Lorain County ranks #42 of 50 states in production of cattle and calves with 11,200 head produced in 2020. There were 3,800 dairy cattle that same year. Also listed with no quantity indicated was production of corn, vegetables, fruit and berries, nursery and greenhouse plants, and poultry and eggs. The USDA listed acreage per crop as listed in Table 2-17.

Table 2-23: Drought Vulnerability Assessment

Top Commodities	Crop Acres	Livestock Inventory	Financial Value
Soybeans	36,800		\$23,245,000
Corn	Not listed		\$9,765,000
Wheat	1,500		\$1,507,000
Vegetables	Not listed		\$2,262,000
Fruit and berries	Not listed		\$1,468,000
Nursery and greenhouse	Not listed		\$76,571,000
Hogs/Pigs		Not listed	\$3,742,000

Cattle/calves		11,200	\$5,387,000
Dairy Cows		3,800	\$6,925,000
Sheep and goats		Not listed	\$145,000
Poultry and eggs		Not listed	\$95,000

According to the National Risk Index, Lorain County's risk for a heat wave is considered Relatively Moderate with a score of 13.26. The county's expected annual loss score of 17.22 is also Relatively Moderate. Expected annual loss values and exposure values are provided in the table below. Drought was not rated on the NRI for Lorain County.

Table 2-24: Heat Wave Loss Values (NRI)

	Expected Annual Loss Values	Exposure Values
Building Value	\$2,037	\$39,738,856.947
Population Equivalence	\$353,187	\$2,290,305,596,422
Agriculture Value	\$3,045	\$133,901.00
<i>Total</i>	<i>\$358,269</i>	<i>\$2,330,178,354.37</i>

Local Drought/Extreme Heat History

Drought is not common in Lorain County. Per official National Climatic Data Center (NCDC) records, the county has experienced six official droughts as indicated in the table below. The United States Department of Agriculture issues drought declarations and provides farmers and ranchers with disaster relief funding. According to USDA records, Lorain County has been included in several significant drought incidents.

Table 2-25: Lorain County Drought/Extreme Heat History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries
Drought	6	0	7M	0	0
Excessive Heat	0	0	0	0	0

One of Ohio's more significant droughts was the 1988-1989 North American Drought. This event was preceded by droughts in the southeastern United States and California the year before. The 1988 was widespread and intense. It included heat waves that killed thousands of people and livestock across the country. One of the underlying causes was the nationwide use of marginally arable land for agriculture production and continued pumping of groundwater near the depletion mark. This major drought was catastrophic for the agriculture industry, destroying crops across the country. Water use restrictions were put in place across many jurisdictions. The drought continued to impact the Midwest and Northern Plains states during 1989 and was not declared over until 1990.

In the summer of 2012, Ohio was impacted by another severe drought, the 2012 North American Drought. This incident was an expansion of the 2010-2012 United States drought; it began in the spring of 2012 when lack of snowmelt in the United States created very dry soils. The drought included most of the United States and all of Ohio. Lorain County, along with 84 other counties in the state, was designated with moderate drought conditions by mid-June of

2012. This drought has been compared to similar droughts in the 1930s and 1950s but did not last as long. The drought caused catastrophic economic ramifications. According to most measures, this drought exceeded the 1988-1989 North American Drought, which is the most recent comparable drought. On September 5, 2012, the USDA issued a disaster declaration for all counties in Ohio affected by the drought, including Lorain County.

The most recent drought to affect Ohio occurred in 2016. On January 6, 2017, the USDA issued a disaster declaration for drought conditions experienced from May through October 2016. The primary declaration was issued for five Ohio counties; ten contiguous counties were also included in the declaration. Lorain County was not included in this declaration.

2.2.2 Earthquake

An earthquake occurs when two of earth's plates move past one another beneath earth's surface. The location where the plates meet is called a fault. The shifting of the plates causes movement along the fault line. This movement can often be felt in areas surrounding the earthquake's epicenter and can cause damage ranging from insignificant to devastating. Damage caused by an earthquake can include rattling foundations, falling debris, and, in the most severe cases, toppling buildings, bridges, and culverts. The severity of earthquake movement is measured using the Modified Mercalli Index scale as defined in this chart:

Table 2-26 Modified Mercalli Index

Intensity	Shaking	Description/Damage
I	Not Felt	Not felt except by a very few under especially favorable conditions.
II	Weak	Felt only by a few persons at rest, especially on building upper floors.
III	Weak	Felt quite noticeably by persons indoors, especially on upper floors. Vibrations similar to a passing truck.
IV	Light	Felt indoors by many, outdoors by few during the day. Sensation like heavy truck striking building.
V	Moderate	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned.
VI	Strong	Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight.
VII	Very Strong	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures.
VIII	Severe	Damage slight in specially designed structures; damage great in poorly built structures
IX	Violent	Damage considerable in specially designed structures. Damage great in substantial buildings. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Earthquake Risk Assessment

Earthquakes are extremely rare in Ohio but are a countywide hazard that could affect all jurisdictions. Ohio has experienced more than 200 known earthquakes. Most of these events

have not caused structural damage. In spite of little property damage, Ohio is still considered to have minor risk. West central and northeast Ohio has with the highest earthquake risk.

Lorain County has experienced three minor earthquakes in the past. None of these incidents caused property damage. Therefore, there is no data to support committing resources to earthquake-proofing buildings and other structures.

The planning team considered historical earthquake damage data and HAZUS loss projections for a 5.0 magnitude earthquake with an epicenter in Elyria. The tables below describe the anticipated building damage and economic impact from this scenario.

Table 2-27: Building Exposure by Occupancy Type

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7
Commercial	7,301,068	18.4
Industrial	2,501,600	6.3
Agricultural	198,790	0.5
Religion	554,753	1.4
Government	145,381	0.4
Education	961,473	2.4
Total	39,738,857	100.00

**Table 2-28: Building-Related Economic Loss Estimates (Table 11 HAZUS)
(Millions of dollars)**

Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses						
Wage	0.00	5.0068	107.6127	10.5552	8.2721	131.4468
Capital-Related	0.00	2.1353	101.8078	6.6647	2.7964	113.4042
Rental	37.8250	19.7513	62.3608	3.3082	3.7842	127.0295
Relocation	131.9694	14.9318	95.5221	13.6728	39.1244	295.2205
Subtotal	169.7944	41.8252	367.3034	34.2009	53.9771	667.1010
Capital Stock Losses						
Structural	229.8102	35.9209	151.9429	53.5068	42.5256	513.7064
Non-Structural	904.1128	203.5481	405.6341	158.2328	118.1301	1,789.6669
Content	368.1979	64.3322	225.0168	113.0671	70.1861	840.8001
Inventory	0.00	0.00	5.0013	23.0509	0.9248	28.9770
Subtotal	1502.1209	303.8012	787.6041	347.8576	231.7666	3173.1504
Total	1671.92	345.83	1154.91	382.06	285.74	3840.25

According to the National Risk Index, Lorain County's risk for earthquake is conserved Relatively Low with a score of 4.84. The county's expected annual loss score of 6.59 is also Relatively Low. Expected annual loss values and exposure values are provided in the following table.

Table 2-29: Earthquake Loss Values (National Risk Index)

	Expected Annual Loss Values	Exposure Values
--	-----------------------------	-----------------

Building Value	\$415,312	\$39,738,857,000
Population Equivalence	\$18,319	\$2,290,305,600.00
Agriculture Value	n/a	n/a
<i>Total</i>	<i>\$433,630</i>	<i>\$2,330,044,457,000</i>

The HAZUS program was utilized to project potential losses in an earthquake situation. The parameters included a 5.0 magnitude earthquake in the City of Elyria with a depth of 5 kilometers. In addition to structural damage, transportation and utility systems would be significantly affected. Damages would likely include highways and bridges; rail bridges and facilities as well as segments of rail; bus stations; and airport facilities and runways. Utility losses would include water treatment facilities, waste water treatment facilities, oil refineries, electrical power facilities, and communication facilities.

Should that situation occur, losses can be estimated as described in the table below, as taken from the HAZUS projection Table 3: Expected Building Damage by Occupancy:

Table 2-30: HAZUS Earthquake Loss Projections by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	#	%	#	%	#	%	#	%	#	%
Agriculture	201.37	0.30	82.26	0.29	98.48	0.62	51.85	1.00	13.05	0.92
Commercial	2319.72	3.40	1261.30	4.46	1428.10	8.97	685.54	13.27	192.34	13.54
Education	99.44	0.15	52.33	0.19	60.92	0.38	26.44	0.51	7.87	0.55
Government	72.57	0.11	28.81	0.10	33.49	0.21	13.23	0.26	3.90	0.27
Industrial	827.32	1.21	406.91	1.44	507.73	3.19	264.62	5.12	68.42	4.82
Other Residential	3268.88	4.79	1689.89	5.98	1581.26	9.93	778.80	15.08	188.17	13.25
Religion	274.09	0.40	125.67	0.44	117.57	0.74	59.32	1.15	17.35	1.22
Single Family	61135.47	89.64	24609.14	87.09	12093.81	75.96	3285.15	63.60	292.44	65.43
Total	68,199		28,258		15,921		5,165		1,421	

904.1128

Local Earthquake History

Records from the Ohio Department of Natural Resources indicate that Lorain County has experience three earthquakes with epicenters located locally. In 1883 a 3.0 earthquake occurred on January 5 at 10:30 in the morning along East Avenue west of the Black River in Elyria. On September 14, 1899 there was a 3.3 magnitude earthquake near the intersection of State Route 18 and SR 301 in Penfield Township. On October 18, 2007 a 2.7 magnitude quake struck in Lake Erie just south of the Canadian border to the north-northeast of the City of Lorain. These quakes were obtained from the Ohio Department of Natural Resources Earthquake Epicenter mapping tool. There was no documented damage from any of these earthquakes. The two quakes that occurred on land are mapped below in Maps 2-3 and 2-4.

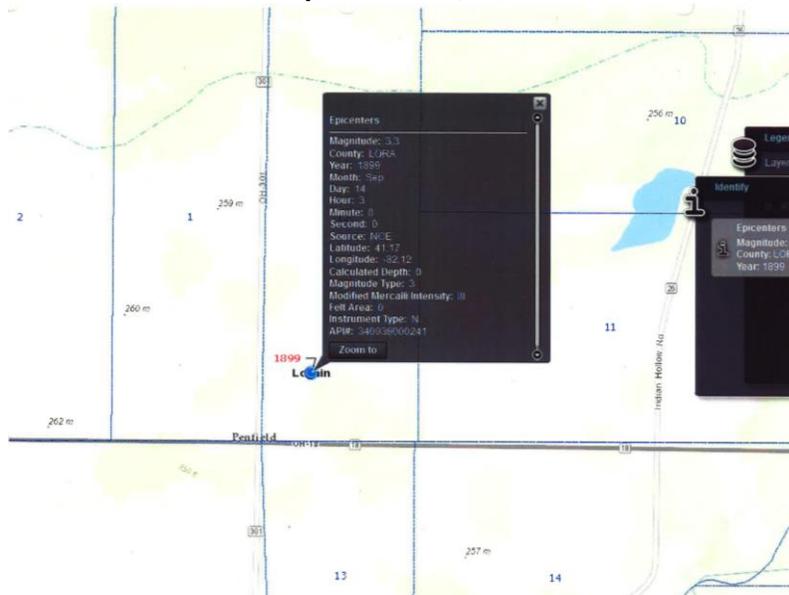
Table 2-31: Lorain County Earthquake History

Date	Location	Magnitude	Modified Mercalli
01/05/1883	Carlisle Township	3.0	F
09/14/1899	Penfield Township	3.3	III
08/18/2007	Lake Erie	2.7	I

**Map 2-3: Lorain County (Carlisle Township) Earthquake Epicenter
January 5, 1883**



**Map 2-4: Lorain County (Penfield Township Earthquake Epicenter
September 14, 1899**



2.2.3 Flood

According to the National Weather Service, a flood is defined as an overflow of water onto typically dry land. The inundation of a normally dry area is caused by rising water from a nearby waterway, such as a river, stream, or drainage ditch. Flooding generally occurs subsequent to a meteorological event such as substantial precipitation, rapid snowmelt, or extreme wind events along coastal waterways. This type of flooding, also known as riverine flooding can last days or weeks.

A flash flood is caused by heavy or excessive rainfall over a short period of time, typically less than six hours. These events are often characterized by raging torrents after heavy rains impact river beds, streets, or low-lying areas and can occur within minutes or hours of excessive rainfall. Flash flooding can also occur when the ground is too saturated, impervious, or flat to drain rainfall into waterways through storm sewers, ditches, creeks, and streams at the same rate as the precipitation falls.

Karst flooding occurs when the drainage capacity of an underground sinkhole is not adequate enough to transfer storm water runoff to the subsurface and the excess water pushes to the surface. Unlike riverine and flash flooding, this type of flooding occurs in the days and weeks after heavy precipitation events as the rainfall is absorbed into the ground and fills subsurface karst voids. As these voids fill to capacity, the water pushes through to the surface, flooding basements, yards, driveways, and anything else in the way. This type of flooding can only occur in areas with subsurface karst formations. There are no known karst areas in Lorain County.

Coastal flooding is a type of flood that occurs when water levels in large bodies of water rise and the excess water pushes ashore. In Ohio, this occurs along Lake Erie and its associated bay areas.

Floods are the most common and costly disaster worldwide, resulting in significant loss of life and property. They have a substantial impact on infrastructure, including roadway breaches, bridge washouts, roadway wash away, and water-covered roadways. Fast-moving floodwater can wash away the surface and sub-surface of roads, creating holes, ruts, and other problems for vehicles. Floodwater that is one foot deep is strong enough to carry vehicles away, often with occupants inside.

Floodwaters seek the path of least resistance as they travel to lower ground and will seep into and occupy any structure in their path. Basements and lower levels of buildings can become inundated with floodwater. Installing sandbags along the exterior of a building can be a temporary stopgap measure but, if floodwaters do not recede quickly, the force of the water will move through the sandbags and enter the structure.

The aftereffects of flooding can be just as damaging as the flood itself. Cleanup is often a long, protracted activity with its own set of hazards. Standing flood water can become contaminated with household and industrial chemicals, fuel, and other materials that have leaked into the

water. All floodwater is considered contaminated, either from germs and disease or hazardous materials. This creates a hazard for responders and residents throughout the cleanup phase.

Flood Risk Assessment

Flooding is considered a significant risk in Lorain County. This includes riverine, flash, and coastal flooding. The county's flat to rolling terrain and the number of rivers and streams contribute to this risk in the southern two-thirds of the county where agriculture is the primary industry. In addition to that, the coastal area of the county in the north is at the lowest elevation of two robust agricultural watersheds where drainage from a very large area empties into Lake Erie. All areas of the county are covered with development that includes highways, roadways, parking lots, and other paved areas that contribute to the runoff headed for the lake. Flooding is a countywide hazard and can affect nearly all jurisdictions.

Lorain County is susceptible to riverine flooding in multiple areas of the county. One area is located along the Vermilion River, which flows north from Ashland County through Huron County fields and woodland before emptying into Lake Erie in the City of Vermilion. The many creeks, streams, and tributaries that feed into these waterways are also susceptible to flooding as they wind through Brownhelm Township and the area south and southeast of Vermilion. The volume of water combined with rolling elevations and twisting and turning of the river increases the risk for flooding across this particular area.

The Black River forms, in part, in southern Lorain County as Charlemont and Wellington Creeks start near the Ashland County line. Elk, Salt, and Willow Creeks join the East Branch east of Oberlin. The waterway goes on to combine the East Branch Black River whose headwaters were formed as East Creek and Buck Creek north of Rochester. The West Branch Black River then joins up with the East Branch Black River inside Elyria. The two branches form the Black River, and later, north of Sheffield Village, absorbs French Creek. The robust and hearty Black River rolls through the most concentrated metropolitan area of Lorain County and empties into Lake Erie in downtown Lorain.

Riverine and flash flooding are widespread risks in the county. Roads and highways combine to add surface drainage into an area that already has high flood potential in heavy or rapid precipitation conditions. Highly developed areas and municipalities with undersized storm sewer systems experience frequent flash flooding. Some areas are simply not able to drain as fast as the rain comes, and the streets and parking lots flood quickly. In many areas, flat terrain and increased commercial development have seriously impeded effective drainage systems. There are many roads that are closed after heavy rain due to a low-lying bridge, or a winding turn in the road that is flooded over in one section or another. The water collects quickly in these areas as it runs across clay soils that harden and drain poorly. If ground is frozen or already saturated, this occurs very quickly. This can last for several days, impeding transportation and movement of goods and services within the county for an inconvenient length of time.

The risk area for coastal flooding extends for the entire coastline of Lorain County, starting in Vermilion and stretching to Avon Lake. Depending on the water level in Lake Erie and the wind direction and speed, water from the lake can push ashore as far south as downtown Lorain. When strong north and northeast winds push lake water back into coastal communities, the rivers and waterways can then have secondary back-up into non-coastal communities, including Elyria. Much of the area along the shoreline is used primarily for recreational purposes but there are many year-round residential neighborhoods that are impacted. In summer months, there are multiple vacation facilities and resorts that are filled with tourists who have nowhere else to go. Multi-family housing in the form of apartments, condominiums, and townhouses dot the lakefront. Streets and roadways can be flooded. The downtown of Lorain is vulnerable, with city facilities including the police station directly that are located directly on the shoreline. The water treatment plant is just west of the city building, and can be flooded in a strong nor'easter storm. The City of Vermilion is also situated on the lakefront, and is vulnerable to inundation by coastal flooding, especially in the Lagoons neighborhood and along the mouth of the Vermilion River. This exposes residential and commercial property as well as streets, roads, and bridges to damages associated with flooding such as berm deterioration, pavement erosion, and substructure weakening.

Flood damage in Lorain County could include damage and destruction to residential and commercial buildings, public works facilities, factories and industries, roads and highways, other infrastructure, crops, and livestock. Residential structural damages could include single and multi-family homes, group living facilities, and multi-family housing complexes. Commercial and industrial structural damages could include buildings used for manufacturing, product handling, transportation, warehousing, retail, business, and industrial, and the capital equipment associated with those uses. There are hospitals and numerous medical facilities within coastal flooding vulnerable areas.

Riverine flooding would include all these, plus additional vulnerable property. Agricultural structures would include barns used for livestock, storage buildings, equipment, and machinery. Grain bins and elevator systems could be damaged very easily by the force of water. Government, nonprofit, and educational institutions include critical structures like fire stations, police stations, hospitals, offices, schools, and special facilities like garages and maintenance buildings, and the capital contents of those structures, and are all over Lorain County. These are subject to riverine, flash and coastal flooding, dependent upon their specific locations.

All of this damage would result in large amounts of debris to manage, including structural, and foundation materials. It is unlikely that loss of life would be attributed to flooding. If a death were to occur, it would likely be the result of two or more combined threats, such as lightning, tornado, or driving into standing water. The chance of swift water rescue exists near the Black River in areas where flash flooding can occur without much warning during severe storms.

A 100-year flood scenario was projected using the HAZUS software. Loss projections include the following two sets of data:

**Table 2-32: 100 Year Flood Scenario
Building Exposure by Occupancy Type for the Study Region (HAZUS)**

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7
Commercial	7,301,068	18.4
Industrial	2,501,600	6.3
Agricultural	198,790	0.5
Religion	554,753	1.4
Government	145,381	0.4
Education	961,473	2.4
Total	39,738,857	100.00

**Table 2-33: 100 Year Flood Scenario
Building Exposure by Occupancy Type for the Scenario (HAZUS)**

Occupancy	Exposure (\$1000)	Percent of Total
Residential	5,257,841	52.3
Commercial	3,637,624	36.2
Industrial	865,169	8.6
Agricultural	43,033	0.4
Religion	110,735	1.1
Government	23,872	0.2
Education	123,725	1.2
Total	10,061,999	100.00

According to the National Risk Index, Lorain County’s risk for riverine flooding is considered Relatively Moderate with a score of 15.87. The county’s expected annual loss score of 18.57 is Relatively Moderate. Expected annual loss values and exposure values in the NRI are provided in the table below. Coastal flooding was not rated for Lorain County.

Table 2-34: Riverine Flood Loss Values (NRI)

	Expected Annual Loss Values	Exposure Values
Building Value	\$2,333,397	\$1,458,497,180
Population Equivalence	\$744,890	\$59,378,069,394
Agriculture Value	\$131,038	\$4,406,991
<i>Total</i>	<i>\$3,209,325</i>	<i>\$60,840,973,565</i>

Floodplain Mapping and National Flood Insurance Program

Lorain County’s floodplain maps were updated in 2020 as part of FEMA’s Risk MAP (Mapping, Assessment, and Planning) program. This program uses a watershed-based study approach to floodplain mapping; this approach provides improved engineering credibility and allows risks to be understood in a more complex way. The current floodplain maps became effective March 9,

2021. Because this mapping process was completed so recently, some communities in Lorain County are still in the process of adopting the new maps.

The table below provides information on National Flood Insurance Program participation for communities in Lorain County. The information is from FEMA’s Community Status Book for Ohio. The communities listed in table 2-24 participate in NFIP and are considered to be in good standing with the program. Those identified in table 2-25 are under sanction by NFIP because they have identified flood hazard area but do not participate in NFIP.

Table 2-35: NFIP Participating Communities

Community	Initial FHBM Identified	Initial FIRM Identified	Current Map Effective Date	Reg-Emer Date
Lorain County	06/03/1977	02/04/1981	03/09/2021	10/14/1991
Amherst	03/15/1974	08/01/1980	03/09/2021	08/01/1980
Avon	04/14/1974	06/18/1980	03/09/2021	07/12/1983
Avon Lake	04/12/1974	11/02/1977	03/09/2021	11/02/1977
Elyria	05/03/1974	07/02/1980	08/19/2008	07/02/1980
Grafton	12/20/1974	07/02/1980	08/19/2008	07/02/1980
Kipton	04/18/1975	09/22/1978	08/19/2008 (M)	09/22/1978
LaGrange	12/23/1977	08/19/2008	08/19/2008	08/19/2008
Lorain	05/17/1974	08/15/1978	03/09/2021	08/15/1978
North Ridgeville	06/07/1974	06/04/1980	08/19/2008	09/04/1980
Oberlin	01/09/1974	06/18/1980	08/19/2008	06/18/1980
Sheffield Lake	05/31/1974	03/01/1978	03/09/2021	03/01/1978
Sheffield Village	06/21/1974	06/18/1980	03/09/2021	06/18/1980
South Amherst	07/11/1975	05/01/1980	08/19/2008	05/01/1980
Vermilion	05/05/1970	12/31/1970	03/09/2021	12/31/1970
Wellington	01/09/1974	06/04/1980	08/19/2008	06/04/1980

Table 2-36: NFIP Sanctioned Communities

Community	Initial FHBM Identified	Initial FIRM Identified	Current Map EFF Date	Sanction Date
Rochester	08/08/1975	08/19/2008	08/19/2008	08/08/1976

Map 2-5: Lorain County Coastal Floodplain

The following map represents the shoreline areas of Lorain County that are vulnerable to coastal flooding, taken from the Lake Erie Coastal Study completed by FEMA in 2013.

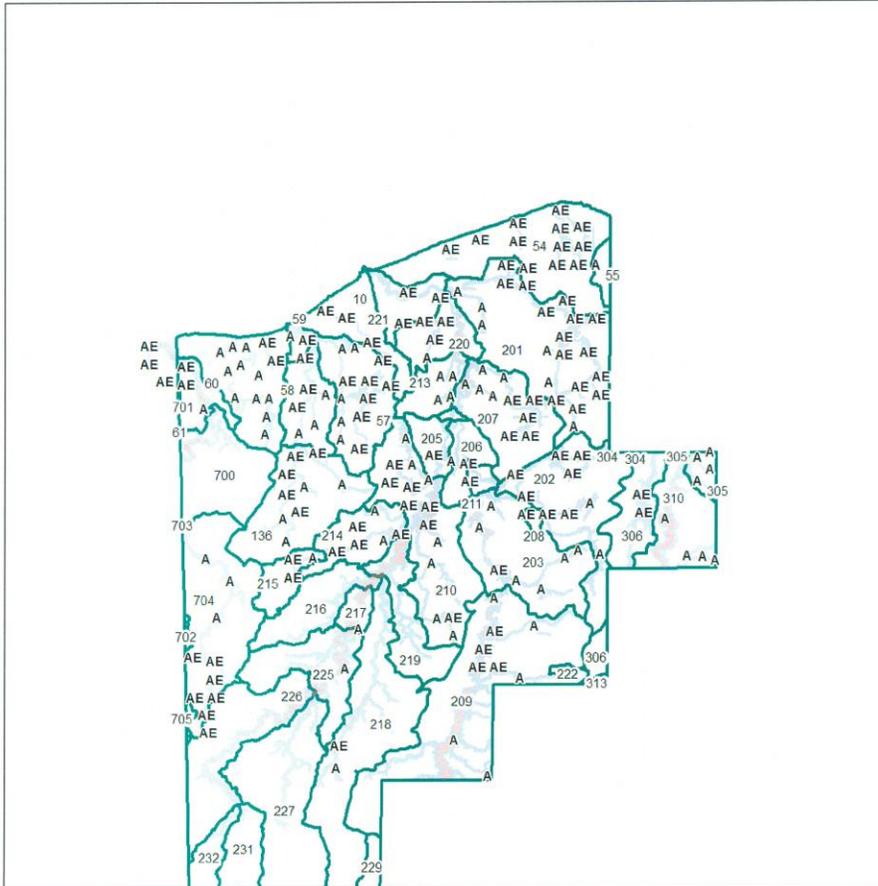
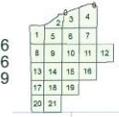


Lorain County Internet Maps

Craig Snodgrass, CPA, CGFM

Map image generated at: 8/26/2014 2:29:42 PM

Township: 06
Tract: 26
Original Lot: 009



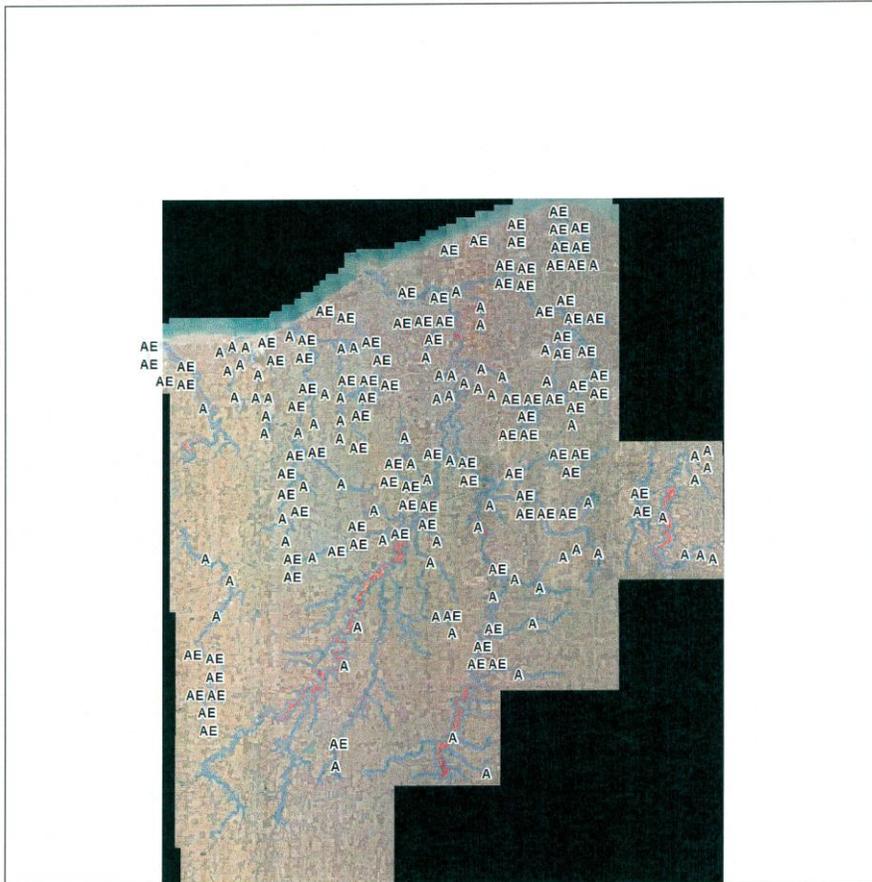
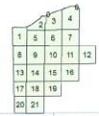
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Lorain County Internet Maps

Craig Snodgrass, CPA, CGFM
 Map image generated at: 8/26/2014 2:23:03 PM

Township: 06
 Tract: 26
 Original Lot: 009



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Repetitive and Severe Repetitive Loss Structures

Lorain County has 51 known severe repetitive loss (4) and repetitive loss structures (47). The list below identifies the location and loss date for these properties as of April 2022 per data provided by the Ohio EMA Mitigation Branch. Each line represents one structure; yellow highlighted lines indicate the property is a severe repetitive loss property. Non-highlighted properties are repetitive loss properties.

Table 2-37: Severe Repetitive Loss and Repetitive Loss Properties

Community	Occupancy	Losses	Building Payments	Contents Payments	Total Payments
Lorain County	Single Family	14	73,642.02	21,252.63	94,894.65
Lorain County	ASSMD Condo	5	212,447.47	39,324.57	251,772.04
South Amherst	Single Family	4	127,625.41	20,000.00	147,625.47
Vermilion	Single Family	6	39,083.71	8,719.85	47,803.56
Avon Lake	Other Residential	2	16,074.96	0.00	16074.96
Avon Lake	Other Residential	2	13,834.02	0.00	13834.02
Avon	Single Family	3	37,587.54	642.31	38229.85
Avon	Single Family	2	20486.64	0.00	20,486.64
Avon	Single Family	2	31,464.16	0.00	31,464.16
Avon	Single Family	2	6,796.51	0.00	6,796.51
Avon	Single Family	2	31,863.08	432.05	32,295.13
Avon	Single Family	2	39,803.56	4,202.82	44,006.38
Lorain County	Single Family	6	16,849.09	10,027.99	26,877.08
Lorain County	Single Family	3	13,421.48	6,656.25	20,077.73
Lorain County	Single Family	3	15,389.41	3,675.16	19,064.57
Lorain County	Single Family	6	26,592.92	7,941.93	34,534.85
Lorain County	Single Family	3	27,445.68	6,628.56	34,074.24
Lorain County	Single Family	2	8,760.58	4,935.83	13,696.41
Lorain County	Single Family	3	9,905.05	939.23	10,844.28
Lorain County	Single Family	2	62,504.21	4,816.31	67,320.52
Lorain County	Single Family	3	55,651.75	7,037.86	62,689.61
Lorain County	Single Family	2	75,320.9	2,456.61	77,777.51
Lorain County	Single Family	2	13,735.4	4,134.77	17,870.17
Lorain	Single Family	3	21,621.47	8,628.58	30,250.05
Lorain	Other Residential	2	290,777.54	0.00	290,777.54
Lorain	Single Family	2	120,975.82	10,424.05	131,399.87
Lorain	Single Family	2	8,7198.6	7,731.08	94,929.68
North Ridgeville	Single Family	2	15,699.57	0.00	15,699.57
North Ridgeville	Single Family	3	15,603.70	394.50	15,998.20
North Ridgeville	Single Family	3	45,243.47	0.00	45,243.47
North Ridgeville	Single Family	4	43,945.35	2,149.46	46,094.81
North Ridgeville	Single Family	3	53,701.77	23,157.02	76,858.79
North Ridgeville	Single Family	3	19,514.38	0.00	19,514.38
North Ridgeville	Single Family	2	17,824.92	0.00	17,824.92
North Ridgeville	Single Family	2	30,166.48	0.00	30,166.48
North Ridgeville	Other Residential	2	22,797.24	0.00	22,797.24
North Ridgeville	Single Family	2	15,283.38	0.00	15,283.38
North Ridgeville	Single Family	2	3,721.47	0.00	3,721.47
North Ridgeville	Single Family	2	2,907.65	0.00	2,907.65
North Ridgeville	Single Family	3	50,021.15	0.00	50,021.15
North Ridgeville	Single Family	2	0.00	7,302.65	7,302.65

North Ridgeville	Single Family	2	94,944.36	0.00	94,994.36
North Ridgeville	Single Family	2	56,009.82	33,533.28	89,543.1
North Ridgeville	Single Family	2	45,927.85	4,596.85	50,524.7
Sheffield	Other Non-Res	2	0.00	11,588.95	11,588.95
South Amherst	Single Family	2	27,825.47	3,041.03	30,866.50
Vermilion	Single Family	3	36,245.18	7,248.18	43,493.36
Vermilion	Single Family	3	6,884.72	6,564.53	13,449.25
Vermilion	Single Family	4	1,5587.46	1,735.12	17,322.58
Vermilion	ASSMD Condo	4	28,409.39	15,881.16	44,290.55
Vermilion	Business Non-Res	2	142,316.36	12,513.33	154,829.69

Local Flood History

Lorain County has experienced 14 floods, 56 flash floods, and 2 storm surge/tide events since 1950., per NCDC records. Property damage from these incidents has been substantial, totaling more than \$58,000,0020.

Table 2-38: Lorain County Flood History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries
Flood	14	7.51M	5M	1	0
Flash Flood	56	51.43M	170K	2	0
Storm Surge/Tide	2	125K	0	0	0
Coastal Flood	0	0	0	0	0

Recent flood events in Lorain County include a flash flood on June 20, 2010. Torrential rain dumped 1-3 inches of rain on most parts of northern Ohio, but some areas had locally heavier rainfall. This event closed several roads in North Ridgeville; both Elyria and Lorain experienced urban flooding and a grocery store in Elyria flooded by evening.

Eight days later, heavy rains hit the northern Eaton township area. Rainfall was so heavy that water flowed through homes in Willow Creek east of the SR 82 – SR 83 intersection.

In May of 2018, 3.21 inches of rain fell in Elyria and the surrounding area. Roads were closed near Lorain, and Mill Creek to the west was so flooded that vehicles became submerged in several feet of water and rescue was necessary.

North Ridgeville was again flooded on May 9, 2021 when 2 to 3 inches of rain fell. Roads were closed as creeks left their banks. Although it received less rain, the Black River rose out of its banks and backed up into Oberlin. There was flooding in Elyria in Carlisle Township and Oberlin. State Route 58 was flooded over as was SR 511.

2.2.4 Hazardous Materials Spill/Incident

A hazardous materials spill or release occurs when a hazardous substance breaches its container. This can occur within a fixed facility or during transportation via ground, rail, or other means. Hazardous substances are stored in different types of containers, including drums, cans,

jars, pipes, and others. Some releases are incidental and can be safely cleaned up by on-site facility personnel. An incidental release does not threaten the health or safety of the immediate area or community because the spill involves only a small quantity. If the release involves a larger quantity than can be handled by facility personnel and requires action by first responders or agencies outside of the spiller’s facility, the incident is considered an emergency response. Evacuating the facility or surrounding area may be necessary.

Every hazardous substance is unique and can have toxic, flammable, explosive, and/or corrosive properties. Each material is assigned a class based on these properties; hazardous materials classifications are described in the table below. When a hazardous substance is released into the environment, it can negatively impact the safety and health of the community by contaminating the air, water, and/or ground.

Class	Description
1	Explosives
2	Gases
3	Flammable liquids and combustible liquid
4	Flammable solid, spontaneously combustible, dangerous when wet
5	Oxidizer and organic peroxide
6	Poison (toxic) and poison inhalation hazard
7	Radioactive
8	Corrosive
9	Miscellaneous

Traffic accidents on roadways can cause the vehicles carrying hazardous substances to overturn, collide with other vehicles, or ignite and burn. The runoff caused by chemical spills, the vapors created as a chemical dissipates, or the burning of a substance can expose anyone in the immediate vicinity of the incident to extreme danger. Vehicular accidents compound the vulnerabilities of people and the environment to include both traumatic injury due to the crash or kinetics of the incident and the negative effects of absorbing the chemical that is released into the atmosphere.

Injuries from exposure to hazardous substances can involve direct contact with the substance and traumatic injuries from explosions or fires. Most hazardous materials releases involve the breach of a container or the unintended combining of chemicals. These spills and leaks can occur in businesses, homes, and industries or anywhere else that hazardous substances exist.

There is no unified reporting system for hazardous materials incidents. Industrial spills involving reportable quantities are documented in accordance with state and federal regulations. Smaller spills often go undocumented unless someone is hurt and requires medical attention. Large industrial spills and leaks are investigated by local hazardous materials teams, regulators, and government responders. Spills that occur on highways and railroads become known because local first responders and emergency management officials are involved in responding to the incident. Incidents of non-lethal exposure, such as a small chemical spill in a residence or a

broken mercury thermometer, may not even be recognized as an emergency. Individuals do not always know the risks associated with these incidents so they clean up the spill as best they can without any additional reporting.

There are nine brownfields listed in Lorain County. Brownfields contain or are contaminated with hazardous materials that prevent the construction of new structures or engagement in new uses of the land. These include St. Joseph Community Center (Lorain), the former RTI Coke Works (Lorain), the former Ford Assembly Plant (Lorain), additional properties in a Lorain industrial park owned by Ford (Lorain), the Garden Street Property (Elyria), a property at 915 West River Road (Elyria), the Cascade Forest (Elyria) and the Tappan #1 property (Elyria.) The Comprehensive Land Use Plan indicates that additional brownfields are likely to exist, but are unmeasured and not registered.

Hazardous Materials Incident Risk Assessment

Lorain County has a moderately high risk for hazardous materials incidents. Their most significant hazard is a highway spill due to a vehicle accident. Not only does the Ohio Turnpike cross the county, State Route 2 is a major multi-lane thoroughfare that crosses the entire north side of Lorain County. Trucks carrying hazardous materials use these two thoroughfares every hour of every day to take chemicals from one location to another, oftentimes at a high rate of speed in excess of 60 mph. There are multiple two-lane state highways that connect the county businesses to Cleveland, Columbus and other metropolitan areas where chemicals are transported to and from. These roads can be narrow, have hills and curves that cause navigational difficulty, and combine truck traffic with personal vehicles that travel at slow speeds. Accidents while passing, failing to stop at intersections, making turns without signals, and simply losing control of a large, cumbersome trailer cause frequent, and sometimes serious, crashes. Rear-end crashes and loss of control are common on the interstates, and can result in fires, explosions, and contamination of natural resources and public or private property.

There is a great deal of agricultural production in the southern half of the county, with corn production being one of the larger crop acreages. Chemicals like anhydrous ammonia and fertilizers, herbicides and pesticides are transported across state and local roads every day. The slow-moving vehicles that carry these products are often overtaken by faster and more agile personal vehicles, and crashes take place at intersections and when passing on two-lane roads.

Several large pipelines cross Lorain County. There are many natural gas lines, some of very large capacity for gases and liquid chemicals. Other lines carry various liquid chemicals from one point to another. Multiple companies own these pipelines and manage the emergencies that arise from leaks and releases of various kinds. These lines are electronically measured for pressure at all times, and response crews are dispatched immediately to investigate any significant changes. The companies work with the local fire departments to train personnel and to create interworking relationships that facilitate rapid response to an emergency and efforts to protect the public from harm.

Pipelines in Lorain County are owned by Buckeye Partners, LP, Sunoco Pipeline L.P, Columbus Gas of Ohio, Inc., Columbia Gas Transmissions, LLC, North Coast Gas Transmission, LLC NEXUS Gas Transmission, LLC (Spectra Energy), Vermilion Power and Dominion Energy Ohio. These companies jointly own 349.73 miles of pipeline. There is one abandoned gas line that is 0.32 miles in length and no owner is identified.

Lorain County maintains a Hazardous Materials Response Team capable of containing spills until commercial cleanup crews arrive. The county requires spillers to use EPA-approved cleanup contractors, and they must restore any property or natural resources to a pre-incident condition at the spiller's cost.

There are over 1100 fixed facilities that are permitted for hazardous waste. The Lorain County LEPC has reports and site plan for approximately 67 industries that hold reportable quantities of extremely hazardous substances. These facilities are in every jurisdiction of the county. The number fluctuates based upon chemical quantities held at any given time in relation to reporting requirements.

Local Hazardous Materials Incident History

According to records from the Ohio Environmental Protection Agency, Lorain County has reported 18 hazardous materials incidents since September 2015. There were no deaths or injuries attributed to any of these incidents.

Table 2-39: Hazardous Materials Spills

Date	Location	UN	Chemical
09-02-215	Grafton	NA 3077	Waste, n.o.s.*
04-18-2016	North Ridgeville	UN 1791	Hypochlorite solution
01-18-2017	Grafton	NA 3077	Waste, n.o.s.*
01-21-2017	Grafton	NA 3077	Waste, n.o.s.
04-12-2017	Amherst	UN 1203	Gasoline
05-16-2019	Avon	UN 1263	Paint
06-18-2019	Grafton	UN 1993	Flammable Liquid, n.o.s.*
08-22-2019	Elyria	UN 1760	Corrosive, n.o.s.*
02-17-2020	Amherst	UN 1268	Petroleum product
08-05-2020	Elyria	UN 1987	Alcohol
10-21-2020	Elyria	UN 1760	Corrosive, n.o.s.*
12-15-2020	Grafton	UN 2465	Dichloroisocyanuric acid salts
02-25-2021	Grafton	NA 3077	Waste, n.o.s.*
03-03-2021	Grafton	UN 1992	Flammable liquid, n.o.s.*
03-04-2021	Elyria	UN 1219	Isopropyl alcohol
04-19-2021	Elyria	UN 1263	Paint
04-23-2021	Elyria	UN 1219	Isopropyl alcohol
06-11-2021	Elyria	UN 1203	Gasoline

*n.o.s. – Not otherwise specified

The Lorain County LEPC reported that there have been four incidents of significance in the past five years. In August 2019 there was a fire at the Lubrizol plant in Avon Lake in a cold storage facility. There were no injuries or complications. In October 2019, a toxic powder was encountered in Oberlin, and 13 responders were contaminated. There were no other consequences. In March of 2020, a truck load of cutting oil spilled as a result of a crash, and required cleanup but there were no injuries. In February 2021, the Elyria wastewater treatment plant had a hydrochloric acid spill that destroyed equipment but resulted in no human injury.

Accidents can be serious, and one such incident occurred while this plan was being written. On April 27, 2022 a semi tractor-trailer hauling resin (glue) broke down near the Elyria Exit on the Ohio Turnpike; another semi tractor-trailer rear-ended the hauler at a high rate of speed. Both semi tractor-trailer units exploded and caught fire. Damages included the total destruction of both trucks and trailers as well as the contents, compromise to the pavement and the overpass associates with the entrance/exit gate, and contamination of nearby soils. There were no injuries, but cleanup crews were on site for more than 48 hours. The Ohio Turnpike as well as the overpass were closed for several hours. Traffic was narrowed into a single lane for more than 24 hours while crews managed cleanup.

Many small incidents that are too small to report occur regularly. Large incidents that require hazardous materials team response happen frequently. The incidents occur on highways and streets during the transportation process, but can also occur on the property of the hauler as goods are transferred from one vessel to another, or at the end-use facility where the chemicals are being unloaded, stored, used, or otherwise handled.

2.2.5 Infrastructure-Dam/Levee Failure

A dam is an artificial barrier built across flowing water. This barrier directs or slows the flow of water and often creates a lake or reservoir. A dam is considered hydrologically significant if it has a height of at least 25 feet from the natural streambed and a storage capacity of at least fifteen acre-feet or an impounding capacity of at least 50 acre-feet and is six feet or more above the natural streambed. Dams are constructed for different purposes, including flood control, water storage for irrigation, water supply, or energy generation. They can be composed of earth, rock, concrete, masonry, timber, or a combination of materials.

Levees are embankments constructed to prevent the overflow of a river and subsequent flooding of the surrounding land. They can be built using earth, rock, or other materials. Levees constructed from concrete or masonry materials are referred to as floodwalls.

Many of the structures classified as dams or levees in Ohio are part of municipal water or wastewater treatment systems. These structures are often referred to as upground reservoirs or lagoons. According to ODNR, an upground reservoir is defined as a reservoir formed by artificial barriers on two or more sides and which impounds water or liquefied material pumped or otherwise imported from an exterior source. Lagoons are considered upground reservoirs.

Dam failure is defined as the uncontrolled release of the water held back by the structure. Depending on the storage volume of the dam and the types of structures surrounding it, a breach or failure can have a significant or limited impact on the surrounding community. In the most significant dam failure incidents, there can be substantial flooding downstream, damage to property, and loss of life. Potential causes of dam failure include, but are not limited to, substandard construction, geological instability, spillway design error, poor maintenance, internal erosion, and/or extreme inflow.

A levee failure occurs when something about the levee failed to prevent flooding on the land side of the levee. The reasons for levee failure can include erosion and damage from wind and water, the sudden or gradual failure of the levee’s foundation, or overtopping of the levee. A levee can also breach if an object hits or falls on the levee (such as a tree or structure) and the force of the object destabilizes the levee, allowing water to flow to the land side of the levee.

The Ohio Department of Natural Resources (ODNR) is responsible for determining dam risk through their Dam Safety Program. ODNR classifies dams based on this scale:

Classification	Description
Class I	Probable loss of life, serious hazard to health, structural damage to high value property (i.e., homes, industries, major public utilities)
Class II	Flood water damage to homes, businesses, 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/Other	Losses restricted mainly to the dam

Dam/Levee Failure Risk Assessment

There are 145 dams and one levee in Lorain County. The county’s dam inventory includes four Class I structures, seven Class II structures, eleven Class III structures, and one hundred twenty-three Class IV/Other structures. The class I, II and III dams serve as water retention structures on waterways, reservoir and lagoon facilities that are part of wastewater treatment plants, and privately owned structures that affect the flow of runoff waters. Five of eleven Class I and II dams are publicly owned, and two of eleven Class II dams are publicly owned. These seven publicly owned dams have emergency plans; the private dam emergency plan status is undetermined but assumed to be no.

Two class I dams are located in the Wellington area. One is at Findley Lake Park and is at the north end of Findley Lake. It holds water back for recreational purposes, and is a dam and spillway that is 1670 feet long and 33 feet high. It is owned by ODNR. The Wellington Upground Reservoir is owned by the Village of Wellington and is part of their water supply system. It is 11,391 feet long and 35 feet high. A third Class I dam is on the southwest

perimeter of Oberlin and is an upground reservoir 6,156 feet long and 20 feet high; it is part of the city’s water system. The fourth, the Willoway Upground No. 5 Dam is part of Willoway Nurseries and feeds their irrigation systems. It is privately owned; the others are public dams.

The Class II dams include Clare-Mar Camp Lake Dam that is an earth fill dam and spillway serving recreational purposes and owned privately. Wellington Reservoir No. 2 is part of the villages water system and is owned by the village. Pheasant Run Lake Dam is a privately owned recreational area. Oberlin Waterworks is an upground structure that serves their water system for the city. East Branch Black River Dam No. 2 is a low head channel dam across the width of the Black River in Lorain and the ownership is unknown. The Hickory Nut Golf Course Lake Dam is owned by a conglomerate of individuals and appears to be part of a golf course. The USS Kobe Lake Dam is part of United States Steel Corporation and is used for industrial purposes. It does not appear to have residential risk in its inundation zone.

Map 2-8: Lorain County Dam Locator Map

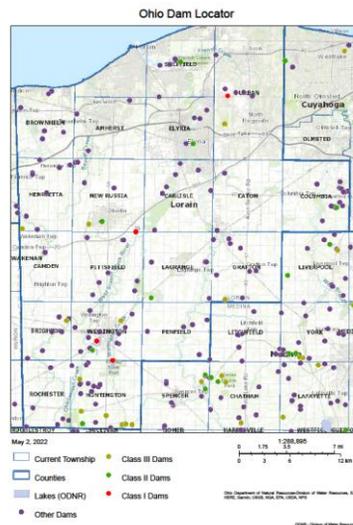


Table 2-40: Lorain County Dams

Dam	Class	Location	Owner	EAP
Findley Lake Dam	I	Wellington Township	ODNR	Y
Oberlin Upground Reservoir	I	New Russia Township	City of Oberlin	Y
Wellington Upground Reservoir	I	Wellington Township	Village of Wellington	Y
Willoway Upground No. 5 Dam	I	Avon	Private	N
Clare-Mar Camp Lake Dam	II	New London	Private	N
East Branch Black River Dam No. 2	II	Elyria	Unknown	Y
Hickory Nut Golf Course Lake Dam	II	Columbia Township	Private	N
Oberlin Waterworks Upground No. 1 and 2	II	Oberlin	City of Oberlin	Y
Pheasant Run Lake Dam	II	Lagrange Township	Private	N

Dam	Class	Location	Owner	EAP
USS/Kobe Lake Dam	II	Sheffield Township	Private	N
Wellington Reservoir No. 2 Dam	II	Wellington Township	Village of Wellington	Y
Charlemont Creek Lake Dam	III	Huntington Township	Private	N
Echo Valley Lake Dam	III	Brighton Township	Private	N
Firelands Lake No.1 Dam	III	Henrietta Township	Private	N
Jordan Lake Dam	III	Wellington Township	Private	N
Oberlin Old Upground Reservoir	III	Oberlin	City of Oberlin	Y
Rustic Lake Dam	III	Huntington Township	Private	N
Sandy Ridge Wetland Dam	III	North Ridgeville	Lorain County Metro Parks	Y
Shiloh Lake Dam	III	Grafton Township	Private	N
Smith Lake Dam	III	Huntington Township	Private	N
Taylor Lake Dam	III	Huntington Township	Private	N
Ukrainian American Youth Lake Dam	III	Huntington Township	Private	N
Andress Lake Dam	IV	Henrietta Township	Private	N/A
Aola Lake	IV	Amherst Township	Private	N/A
Aufdemkamp Lake Dam	IV	Brownhelm Township	Private	N/A
Baker-Nagy Lake Dam	IV	Huntington Township	Private	N/A
Balzer Lake Dam	IV	Henrietta Township	Private	N/A
Baumhart Road Lake Dam	IV	Brownhelm Township	Private	N/A
Bedebe Lake Dam	IV	Pittsfield Township	Private	N/A
Bemis Lake Dam	IV	Grafton Township	Private	N/A
Bender Lake Dam	IV	Grafton Township	Private	N/A
Botsford Lake Dam	IV	Wellington Township	Private	N/A
Brentwood Lake Dam	IV	Carlisle Township	Private	N/A
Briar Lake Dam	IV	Elyria	Private	N/A
Burge Lake Dam	IV	Brighton Township	Private	N/A
Caley Woods Wildlife Lake Dam	IV	Pittsfield Township	Lorain Co. Metro Parks	N/A
Camp Belden Dam	IV	Grafton Township	Private	N/A
Clark Lake Dam	IV	Carlisle Township	Private	N/A
Cleveland Quarries Dam	IV	South Amherst	Private	N/A
Copp Lake Dam	IV	Pittsfield Township	Private	N/A
Darakis Lake Dam	IV	Henrietta Township	Private	N/A
Davidson's Pond Dam	IV	Wellington Township	Private	N/A
Dechant Lake Dam	IV	Pittsfield Township	Private	N/A
East Branch Black River Dam No. 1	IV	Elyria	Private	N/A
East Branch Black River Dam No. 3	IV	Elyria	City of Elyria	N/A
Echo Valley Lake Dam	IV	Brighton Township	Private	N/A
Elyria County Club Low Head Dam	IV	Carlisle Township	Private	N/A
Emerald Woods Golf Course Lake No. 1	IV	Columbia Township	Private	N/A
Emerald Woods Golf Course Lake No. 2 Dam	IV	Columbia Township	Private	N/A
Emerald Woods Golf Course Lake No. 3	IV	Columbia Township	Private	N/A

Dam	Class	Location	Owner	EAP
Eppley Lake Dam	IV	Grafton Township	Private	N/A
Farkas Lake Dam	IV	Lagrange Township	Private	N/A
Firelands Lake No. 2 Dam	IV	Henrietta Township	Private	N/A
Forest Hills Golf Club Lake Dam	IV	Carlisle Township	Private	N/A
Gede Lake Dam	IV	Henrietta Township	Private	N/A
Gest Lake Dam	IV	Grafton Township	Private	N/A
Gilgenbach Lake Dam	IV	Eaton Township	Private	N/A
Grafton Upground Reservoir	IV	Grafton	Village of Grafton	N/A
Grafton WWTP EQ Basin	IV	Grafton	Village of Grafton	N/A
Greenhouse Lake Dam	IV	Columbia Township	Private	N/A
Gulf Road Lake Dam	IV	Elyria	Private	N/A
Hall Lake Dam	IV	Wellington Township	Private	N/A
Handrosh Lake Dam	IV	Penfield Township	Private	N/A
Handy Pond Dam	IV	Rochester Township	Private	N/A
Hartman Lake Dam	IV	Rochester Township	Private	N/A
Hayes Lake Dam	IV	Pittsfield Township	Private	N/A
Heinrich Lake Dam	IV	Columbia Township	Private	N/A
Herburger Lake Dam	IV	Wellington Township	Private	N/A
Hickory Nut Golf Course Lake Dam #1	IV	Columbia Township	Private	N/A
Hickory Nut Golf Course Lake Dam #2	IV	Columbia Township	Private	N/A
Indian Hollow GC – East Lake Dam	IV	Lagrange Township	Private	N/A
Indian Hollow GC – West Lake Dam	IV	Lagrange Township	Private	N/A
Izaak Lake Dam	IV	Penfield Township	Private	N/A
Jewett Lake Dam	IV	Brighton Township	Private	N/A
Jordan Pond Dam	IV	Wellington Township	Private	N/A
Kenska Lake Dam	IV	Brighton Township	Private	N/A
Khoury Lake Dam	IV	Columbia Township	Private	N/A
Kipton Reservoir Dam	IV	Camden Township	City of Oberlin	N/A
Klink Lake Dam	IV	Penfield Township	Private	N/A
Krueck Lake Dam	IV	New Russia Township	Private	N/A
Kurtz Pond Dam	IV	Wellington Township	Private	N/A
Lake Haven Dam	IV	Brownhelm Township	Private	N/A
Lamb Lake Dam	IV	Huntington Township	Private	N/A
Lorain County Park Lake Dam	IV	Rochester Township	Lorain Co. Metro Parks	N/A
Loretta Lake Dam	IV	Huntington Township	Private	N/A
Low Head Dam	IV	Elyria	Private	N/A
Maple Grove Lakes Dam	IV	Grafton Township	Private	N/A
May Lake Dam	IV	Henrietta Township	Private	N/A
Mohrmon Lake Dam	IV	Wellington Township	Private	N/A
Myers Lake Dam	IV	Penfield Township	Private	N/A
Niggle Lake Dam	IV	Brownhelm Township	Private	N/A
Oak Lake Park Dam	IV	New Russia Township	Private	N/A
Oberlin Waterworks Upground No. 2	IV	Oberlin	City of Oberlin	N/A
Oldham's Lake Dam	IV	Brownhelm Township	Private	N/A

Dam	Class	Location	Owner	EAP
Paine Lake Dam	IV	Huntington Township	Private	N/A
Palkovic Lake Dam	IV	New Russia Township	Private	N/A
Patton Lake Dam	IV	Rochester Township	Private	N/A
Pelton Lake Dam	IV	Henrietta Township	Private	N/A
Penfound Lake	IV	Carlisle Township	Private	N/A
Pittsfield Pond Dam	IV	Pittsfield Township	Private	N/A
Pond A Dam	IV	Huntington Township	Private	N/A
Pond B Dam	IV	Huntington Township	Private	N/A
Powers Lake Dam	IV	Pittsfield Township	Private	N/A
Rebold Lake Dam	IV	Grafton Township	Private	N/A
Ridge Hill Memorial Park Lake Dam	IV	Lorain	Private	N/A
Robinson Lake Dam	IV	Henrietta Township	Private	N/A
Rollin Lake Dam	IV	Huntington Township	Private	N/A
Royal Crest Golf Course Lake Dam (2)	IV	Columbia Township	Private	N/A
Royal Crest Golf Course Lake Dam (3)	IV	Columbia Township	Private	N/A
Royal Crest Golf Course Lakes Dam (1)	IV	Columbia Township	Private	N/A
Salem Cemetery Upground Reservoir	IV	Sheffield Township	City of Lorain	N/A
Shady Lake Dam	IV	Brownhelm Township	Private	N/A
Small Pond Dam	IV	Brighton Township	Private	N/A
Smith Lake Dam	IV	Pittsfield Township	Private	N/A
Stoll's Pond Dam	IV	Rochester Township	Private	N/A
Stumph Lake Dam	IV	Columbia Township	Private	N/A
Trout Lake Dam	IV	Huntington Township	Private	N/A
Twining Lake Dam	IV	Huntington Township	Private	N/A
Unknown	IV	Brighton Township	Unknown	N/A
Unknown	IV	Huntington Township	Unknown	N/A
Unknown	IV	Huntington Township	Private	N/A
Unknown	IV	Pittsfield Township	Unknown	N/A
Unknown	IV	Lagrange Township	Unknown	N/A
Unknown	IV	Avon	Unknown	N/A
Unknown	IV	Grafton Township	Unknown	N/A
Upper Isaac Lake Dam	IV	New Russia Township	Private	N/A
USX Corporation Lake Dam	IV	Sheffield Township	Private	N/A
USX Corporation Lake Dam (1 of 3)	IV	Sheffield Township	Private	N/A
USX Corporation Lake Dam (3 of 3)	IV	Sheffield Township	Private	N/A
USX Corporation Pond Dam (2 of 3)	IV	Sheffield Township	Private	N/A
Valentine Lake Dam	IV	Huntington Township	Private	N/A
VonKamp Lake Dam	IV	Rochester Township	Private	N/A
Wallace Lake Dam	IV	Penfield Township	Private	N/A
Wellington Low-Head Dam	IV	Huntington Township	Village of Wellington	N/A
Wellington Reservoir No. 1 Dam	IV	Wellington Township	Village of Wellington	N/A
Wendt Lake Dam	IV	Columbia Township	Private	N/A
West Branch Black River Dam No. 1	IV	Elyria	Private	N/A

Dam	Class	Location	Owner	EAP
Westlake Park Dam	IV	Wellington	Village of Wellington	N/A
Willoway Upground No. 1 Dam	IV	Avon	Private	N/A
Willoway Upground No. 2 Dam	IV	Avon	Private	N/A
Willoway Upground No. 3 Dam	IV	Avon	Private	N/A
Willoway Upground No. 4 Dam	IV	Avon	Private	N/A
Wilson Lake Dam	IV	Huntington Township	Private	N/A
Worden Lake Dam	IV	Huntington Township	Private	N/A
Zacheria Lake Dam	IV	Wellington Township	Private	N/A

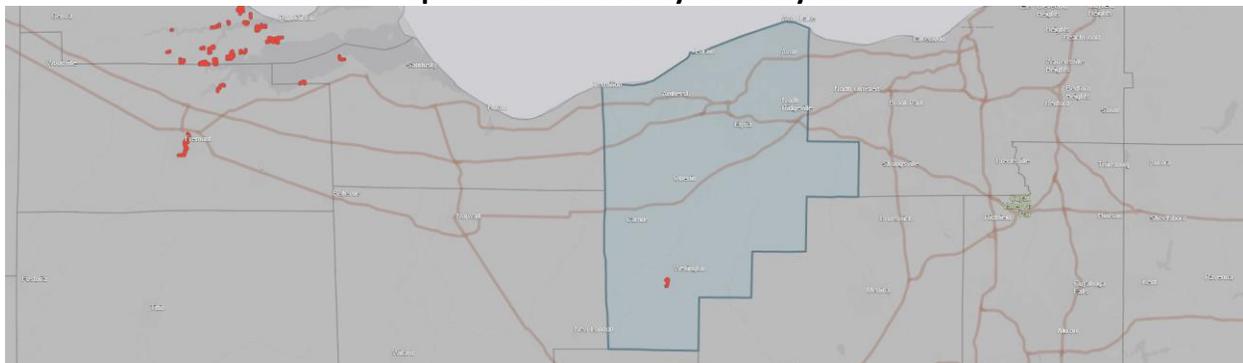
According to the U.S. Army Corps of Engineers National Levee Database, the county’s only levee is considered low risk. Risk data on this levee system is provided in the table and map below. This information is from the U.S. Army Corps of Engineers National Levee Database.

This single levee is in Wellington at the edge of a floodplain, and is called the Inner Grove Heights Levee. It holds floodwater back from a residential area and is considered a flood risk reduction structure. It is a non-accredited levee system and not enrolled in the USACE Rehabilitation program. The levee is 0.98 miles long and covers 0.25 square miles. It surrounds a residential subdivision.

Table 2-41: Lorain County Levee Risk Data

System	Miles	Constructed	Population	Structures	Property Value
Inner Grove Heights Levee (Wellington)	0.98	Unknown	0	0	0

Map 2-9: Lorain County Levee System



The red mark on this map shows the Inner Grove Heights Levee in Wellington, the only such structure in Lorain County according to the National Levee Database. This levee holds water back to protect a residential area; this its primary purpose is flood risk reduction from Wellington Creek. It is 0.98 miles in length and covers one-quarter square mile. It was locally constructed, and is locally operated and maintained. The owner is not identified in the database, but is assumed to be a private sector party. It has not been screened through the

levee performance and potential lost benefits program, and is a non-accredited levee system. It is not enrolled in the USACE Rehabilitation program.

2.2.6 – Infrastructure-Transportation Systems

Transportation infrastructure is a critical part of any community. The roads, bridges, and associated system components that allow people to travel through the community are critical to commerce and daily life. The maintenance of roads and bridges is shared between multiple government entities, depending on the type of roadway. State highways and interstates are maintained by the Ohio Department of Transportation. County roads are the responsibility of the Lorain County Engineer. City and village streets are maintained by municipal street departments. Some townships have road departments while others contract with the county engineer for road maintenance issues. This is especially likely in small jurisdictions that have a limited budget to hire employees or maintain equipment.

Transportation System Risk Assessment

Roads and bridges are critical transportation assets in every community and require continual maintenance and repair, especially in a county with as much vehicle traffic as Lorain County. Their roads serve as a lifeline to and from Cuyahoga County, as well as the highly developed urban areas in Lorain County. Transportation resources are used heavily by the public and are highly vulnerable to damage from water, wind, and general wear. Weather conditions, standing water, continual freezing and thawing, and the salt and chemicals used to treat roads in winter weather all have a long-term impact on the strength of roadways. As communities grow and transportation needs change, roads and bridges must be also upgraded to meet changing traffic patterns. Lorain County and the jurisdictions within the county work diligently to maintain their critical transportation assets and provide safe and reliable transportation routes for the public. In most jurisdictions, road repair and maintenance accounts for a significant portion of the jurisdiction's annual budget. They also apply for grants and pursue other funding opportunities to fund road maintenance and improvements. Even with these efforts, roadways across the county are always in need to repairs or upgrades that aren't feasible within county or municipal budgets.

Lorain County has several active rail lines. These include the CSX line that enters Lorain County near Grafton and exits at the far southwest border near Rochester. Another CSX line enters northwest of Medina near SR 57 and travels through the county to the Port of Lorain in the City of Lorain. Norfolk Southern operates lines along Lake Erie's shoreline, as well as one that enters the county in North Ridgeville and joins the lakeshore Norfolk Southern line in Vermilion. The Wheeling Lake Erie line runs through Wellington, entering to the southeast of the village and exiting to the northwest. Another short line runs along SR 162 to the direct west, joining the CSX line in New London. There are no switching yards in Lorain County. There is an Amtrak facility owned by Norfolk Southern Railway at 410 E. River Street in Elyria; this is an unstaffed passenger terminal.

Local Transportation System Failure History

Lorain County has no documented incidents of major transportation system failure, such as a bridge collapse. Communities do experience ongoing wear and tear issues on roadways that require short-term repairs, such as potholes, patching, and other immediate needs. These issues are addressed as quickly as possible on a case-by-case basis.

Continual assessment of traffic signals, signage and supporting structures is ongoing. The replacement of curbs, berms, and signals takes place on a regular basis. Intersections are assessed for improvements and newer structures like roundabouts and diverging diamond interchanges are always under consideration. Signage is updated and maintained, and replaced when damaged by accidents or weather events.

For larger scale repairs and maintenance, county and jurisdiction road departments maintain priority lists of roads and bridges that need to be repaved, repaired, or completely replaced. Most jurisdictions develop an annual maintenance plan and determine what projects can be addressed with the funding available. For larger scale projects and major upgrades, outside funding through grants is often critical. Without external funding sources, Lorain County and its jurisdictions would be unable to complete these projects.

2.2.7 – Infrastructure-Utility System Failure

Utility system is a broad term to describe the many systems that provide essential services and amenities to the public. This includes water treatment and distribution, wastewater, stormwater, electricity, and natural gas delivery. These systems can be built and maintained by a public entity, usually a jurisdiction or public cooperative, or by private companies. Water, wastewater, and storm water utilities are generally operated by public entities, although privately owned water systems do exist. Electricity in many jurisdictions is provided by private providers. Some municipalities, however, own and operate their own municipal electric systems. In rural areas, many homes receive basic utilities through individual systems, such as water wells and septic systems. Regardless of the type of delivery, utility systems provide critical services to the community. These systems are vulnerable to failure caused by disaster conditions or circumstances that occur independent of any hazard or storm.

Utility Systems Risk Assessment

Utility systems are vulnerable to failure caused by general system malfunction, poor maintenance, aging system components, and overuse. All utility systems, even those that are well maintained, are susceptible to these issues. Utility systems are incredibly expensive to operate and maintain. As time goes on, they require upgrades and replacement to continue meeting the needs of the public. Community growth and development dictate expansion needs so the systems can meet increasing demand. This includes residential growth and changes in the commercial and industrial sectors. Evolving regulations from state and federal entities may also require systems to be upgraded or modified. These actions are extremely expensive. While the cost is often initially the responsibility of the jurisdiction or utility provider, that expense is eventually passed on to the user through increased fees.

Because of the overwhelming expense of maintaining and upgrading these systems, many are not in good repair. Water distribution lines are old and undersized. Wastewater and stormwater systems that were combined when systems were originally built may only be partially separated in spite of regulations requiring separation. Stormwater systems that were adequate 40 years ago are undersized by today's standards and unable to manage the level of precipitation communities experience today. Many electric and natural gas distribution systems have not been upgraded to keep pace with community growth. As is the case in many communities, this is true for utility infrastructure across Lorain County.

While jurisdictions and utility providers have worked diligently to upgrade these critical systems, projects can cost millions of dollars. Many jurisdictions complete infrastructure upgrades in defined phases so the cost can be spread out over multiple years. External funding sources, such as grants, are also critical to moving these projects forward.

Infrastructure failure was considered a high risk across Lorain County, particularly for stormwater, wastewater, and water treatment systems. Sitting at the bottom of two watersheds and having significant urban development along that same line, utility failure is a high concern for officials as dense populations are at risk. Electrical utilities were also considered a high risk because the population is so dependent on electricity for essential daily functions. While the community could withstand a brief outage of any of these systems, anything lasting more than a few hours would be very challenging. Communities recognize the critical status of these systems and are working diligently to identify funding to upgrade and maintain their systems. These efforts include borrowing funds, applying for grants, and increasing user fees and any other funding opportunities they can identify. Because every community relies on utility infrastructure for critical services, infrastructure failure is a countywide hazard that can affect all jurisdictions and areas of Lorain County.

Local Utility System Failure History

It is not uncommon for Lorain County residents to experience power outages. With dense population all along the lakeshore and frequent nor'easter storms or winter blizzards, electrical service is vulnerable. With most neighborhoods receiving their power through above-ground electrical distribution lines, they are highly vulnerable to interrupted service due to wind, ice or severe thunderstorms or tornadoes. While outages happen frequently, the duration of the outages is usually no more than a few hours.

Examples of typical outages include one that affected 1,598 of 122,507 customers on December 11, 2021. The outages occurred as northern Ohio was under a high wind warning by the National Weather Service. On February 24, 2019 there were 945 Lorain County residents in the dark due to high winds. On October 20, 2018 there were 5,579 Lorain County residents without power due to high winds. The outage lasted a few hours.

In 2014, natural gas supply was interrupted to some residents in North Ridgeville as extremely low temperatures caused pressure in natural gas supply lines to fall so low some residents were not served. This lasted intermittently over a few extremely cold days, and since then, suppliers

say that supply lines have been modified to accommodate high usage during harsh winter temperatures.

2.2.8 – Infrastructure-Water Quality

Water quality refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the water relative to the requirements of one or more biotic species and human need or purpose. A water quality emergency occurs when the quality of water available for human consumption is compromised. In the past decade, water quality has become a growing concern in Ohio as Lake Erie and its associated rivers and streams have been affected. Several areas of the state have also experienced water quality issues in inland lakes and reservoirs. Algal blooms are one of the more common causes of water quality issues in Ohio. Algal blooms occur when colonies of algae grow out of control and produce toxic harmful effects on people and animals. In Lake Erie, high phosphorous levels caused by runoff are considered a contributing factor to these harmful algal blooms. Some algal blooms produce microcystin, which is a poisonous bacterium that can sicken or kill people, fish, birds, and other animals. When microcystin or other toxins infiltrate a public water supply, the water becomes contaminated and unsafe for consumption. These incidents can have a drastic human and economic toll on the affected area.

In addition to harmful algal bloom risk, water treatment and distribution systems are susceptible to infrastructure failure. This can include anything from long-term lack of repair, maintenance and/or upgrade to contamination from lead pipes and other substances. Other potential water quality concerns involve contamination of a water table or aquifer that is a source for municipal water systems, well contamination, and lack of water availability to meet the needs of the community.

Water Quality Emergency Risk Assessment

Because a water quality emergency can occur in any water source or treatment facility, water quality is a countywide hazard that can affect all areas and jurisdictions. When water quality is compromised, risks to the community include public health and the economy. From a public health perspective, contaminated water can cause serious illness when consumed. Persons with special medical needs, compromised immune systems, the elderly, and children are most susceptible to this. Animals, including family pets and livestock, are also susceptible to illness from contaminated water. If the water supply is contaminated, residents lose access to drinking water in their homes and businesses that use water in their regular operations are forced to close until water service is restored. Retail and service businesses may be affected if the public travels to other communities for shopping and food service needs during the emergency. This revenue loss, even if only for a short duration, can have a significant economic impact. Businesses lose critical revenue which quickly leads to reduced wages for employees. The longer the emergency lasts, the more significant the economic impact.

To protect the community's water supply, jurisdictions must continually monitor, repair, and upgrade water treatment infrastructure. Because this is costly, jurisdictions must plan and budget for it. If the infrastructure is not well maintained and emergency work is necessary

when a water quality emergency occurs, the economic cost is higher than if work is completed as part of ongoing maintenance and upgrades. In addition to the direct economic loss, the jurisdiction must immediately identify funds to make the repairs. These costs are often recouped through increases in the fees charged to consumers, ultimately costing residents more money through water rates, user fees, and local taxes. Development officials must also balance community growth objectives with the availability of necessary water supplies and utilities. If a community's water treatment facility or water source has limited capacity, some development goals, especially for manufacturing or industrial facilities, must be managed to fall within the available services.

Local Water Quality Emergency History

There is no history of water shortages or water quality issues in Lorain County. Various municipal systems serve their individual areas, and interconnections and redundancy provides alternatives when an issue might occur. Lake Erie is the source of most drinking water, and due to the significant depth of the Lorain basin at approximately 80 feet, the development of algal bloom is far less than in the Western Basin to the west. Both the Huron and the Black River are robust supply sources as well, providing ample source water for Lorain County.

In 2014 and 2015 there were water supply problems as intake pumps on Lake Erie froze amid long periods of extremely low temperatures. During January of each year, temperatures stayed below zero for several days; intake pumps near the lake froze and the water supply was insufficient in some areas. The pumps have been modified and lines have been installed that are deeper and less vulnerable to ice buildup. This incident has not recurred.

Elsewhere in Ohio, similar algal blooms have impacted the western basin of Lake Erie and other bodies of water. The ramifications of these incidents have ranged from loss of tourism revenue to a complete multi-day shutdown of a municipal water system that served over 400,000 people.

2.2.9 Invasive Species

An invasive species is a plant or animal species that is not native to the local ecosystem and whose introduction is likely to cause economic or environmental harm or harm to human life. Across the United States, more than 5,000 species are recognized as invasive. Invasive species are classified as terrestrial plants, terrestrial wildlife, insects and diseases, and aquatic species.

Invasive terrestrial plants can displace native species, impact the wildlife that rely on native species as a source of food or shelter, or form monoculture plant communities that reduce biodiversity. While more than 25% of the plant species in Ohio originate from other areas, most are non-invasive. Fewer than 100 of these are invasive.

Invasive terrestrial wildlife is much less common than other types of invasive species but can still cause significant damage to natural habitats. Aquatic invasive species are plants and animals that impact the quality of waterways. These can affect large bodies of water, such as

Lake Erie and the Ohio River, and much smaller rivers, lakes, and streams. Invasive insects and diseases are insects, fungus, and other small organisms that can negatively impact plants, forests, and the health of wildlife.

Invasive Species Risk Assessment

Lorain County's Lower Black River is considered an area of concern for invasive species. A challenge grant from the National Oceanic and Atmospheric Administration was secured eight years ago to remove invasive plants from a six mile stretch of the Lower Black River. This project sought to remove the common reed, purple loosestrife, Japanese knotweeds, and narrow-leaved hybrid cattails in the identified area within the City of Lorain.

In April of 2022, the Ohio Department of Agriculture asked residents to be on the lookout for eggs of the spotted lanternfly, an invasive species that destroys grapevines, fruit trees and other plants. Evidence of infestation was found in Amherst. This is an ongoing effort. Parks staff and gardeners in Lorain County are being asked to keep an eye out for these insects.

According to the State of Ohio, as stated in their mitigation plan, some invasive species are present across the state. These include the top ten invasive species, specifically bush honeysuckle, autumn olive, buckthorn, common reed, garlic mustard, Japanese honeysuckle, Japanese knotweed, multiflora rose, purple loosestrife, and red canary grass. Maps in the state plan indicate all of these species are present in Lorain County.

While county residents indicated that most Emerald Ash Borer, a species that caused the demise of a huge number of ash trees in Ohio, is gone, maps still indicate that EAB is present in Lorain County.

The Ohio Department of Natural Resources warns Lorain County residents about injurious aquatic invasive fish. They list Amur Sleeper, Bighead Carp, Bitterling, Black Carp, Crucian Carp, Diploid Grass Carp, Eastern Banded Killifish, Eurasian Minnow, European Perch, Ide, Large-scale Silver Carp, Nile Perch, Prussian Carp, Roach, Round Goby, Rudd, Ruffe, Sea Lamprey, Silver Carp, Snakeheads, Stone Moroko, Tench, Three Spine Stickleback, Tubernose Goby, Walking Catfish, Wels Catfish, White Perch and Zander as invasive fish. Golden Mussel, New Zealand Mudsnail, Quagga Mussel, Zebra Mussel are listed as invasive mollusks. Chinese Mitten Crab, Killer Shrimp, Marbled Crayfish, Marron and Tabby are listed as invasive crustaceans.

Like most of Ohio, Lorain County has many trees and wooded areas, all of which are vulnerable to damage from invasive species. When trees that are dead or weakened from invasive species fall, they become storm debris and can damage homes, buildings, vehicles, and anything else in their path. Diseases trees also fall into rivers, creeks, and streams, clogging the waterways and impeding drainage and increasing the county's vulnerability to flooding.

The most recent invasive species to impact Ohio and Lorain County is the Emerald Ash Borer. The county is equally vulnerable to damage caused by other tree-infecting insects. Waterways could also be impacted by invasive plant and animal species. An infestation of any type would

cause damage across the county, making invasive species a countywide hazard that can affect all areas and jurisdictions.

The cost to a community from invasive species is difficult to quantify because it comes from the long-term effects and cleanup costs rather than direct property damage. Actions like removing and disposing of diseased trees and vegetation, repairing damage caused by falling trees, cleaning and dredging debris-filled waterways, and repairing infrastructure damaged by the infestation are all costs associated with invasive species. These tasks are extremely expensive and can cost jurisdictions hundreds of thousands of dollars.

Local Invasive Species History

Emerald Ash Borer (EAB) is the most recent invasive species to impact Ohio. EAB is an ash-tree killing insect native to Asia that kills trees within three to five years of infestation. It was first discovered in Ohio in 2003. To mitigate EAB impact, the Ohio Department of Agriculture and partner agencies worked to protect the state's 3.8 billion ash trees. Lorain County was impacted by the infestation and statewide quarantine on ash wood. The quarantine was lifted in 2011, indicating that the worst of the infestation has passed. While the infestation threat has passed, most communities are still dealing with the thousands of dead and diseased trees that have not been removed. It will take individual property owners and communities thousands of dollars and years of time to remove these trees. From a disaster perspective, these weakened trees create an increased risk for property damage from high wind events. Dead and diseased trees are extremely susceptible to wind damage. Along waterways, diseased trees also increase flood risk as they fall into streams and impeded drainage.

Other invasive species that are currently under quarantine in parts of Ohio include the Gypsy Moth, Walnut Twig Beetle, and Asian Long-horned Beetle.

Across Lorain County, all jurisdictions have experienced significant effects from the EAB infestation. As diseased trees along rivers and streams have died, they have fallen into waterways, impacting drainage and the flow of water. Diseased trees along the public right-of-way have also impacted infrastructure, as they are more likely to fall during a storm or high wind event. County engineers and their staff have aggressively removed diseased trees along the public right-of-way. This has been effective at reducing the impact on utility lines and other infrastructure but has been a significant financial burden for jurisdictions. Public agencies are also not able to remove trees from private property. Individual landowners are responsible for removing dead and diseased trees from their personal property. Because this does not always occur, there are still hundreds of dead and diseased trees that will continue to cause problems across the county.

Other invasive species that are currently under quarantine in parts of Ohio include the Gypsy Moth, Walnut Twig Beetle, and Asian Long-horned Beetle.

2.2.10 Land Subsidence

Land subsidence is the gradual or sudden sinking of the Earth's surface caused by subsurface movement of earth materials. Subsidence is an issue that develops over time. The primary causes are aquifer-system compaction, underground mining, drainage of organic soils, natural compaction, sinkholes, and thawing permafrost. Land subsidence affects more than 17,000 square miles across the United States, an area equivalent to the size of New Hampshire and Vermont. For more than 80% of this area, subsidence is the result of groundwater exploitation and overuse.

Karst is a specific type of topography that can contribute to land subsidence issues. Karst is a landscape shaped by the dissolution of limestone or dolomite layers of bedrock. Surface water percolates through these layers, slowly dissolving the limestone or dolomite and creating voids. The voids may be visible or invisible, depending on their depth. Visible voids can allow surface water to flow directly into the water table. Deeper voids are not visible at the surface. Over time, the water table can change, potentially destabilizing the deeper voids. Lorain County does not have known Karst area.

Similar sub-surface deterioration can occur when limestone, dolomite or gypsum mines are abandoned and left unattended. The water that accumulated in the voids wears away the soils and deposits until collapse occurs when weight is placed on the surface. There is no indication of this in Lorain County. According to the Mines of Ohio map by ODNR, there is one active surface quarry in Kipton, located north of Haigh Rd. and east of SR 511, owned by Johnson Stone Products. There is also a large surface mine area northwest of South Amherst in Amherst Township owned by IRG Amherst LLC and located south of the Ohio. There is no known history of any problems or incidents with these locations regarding land subsidence.

A landslide is defined as the movement of a mass of rock, debris, or earth down a slope. Landslides can occur because of geological (weak, weathers, sheared materials), morphological (tectonic shift, thawing, vegetation removal), or human (excavation, deforestation, mining) causes. Water is the primary cause of landslides, generally due to intense rainfall or snowmelt. Seismic activity can also cause landslides.

Stream bank erosion is the direct removal of banks and beds by flowing water; this typically occurs during periods of high stream flow. The erosion often leads to excessive sediment deposits in the streambed, which can significantly reduce the velocity of the waterway. This can also lead to dramatic changes in the course of the waterway, reduction in water quality, loss of native aquatic habitats, and damage to public utilities.

Land Subsidence Risk Assessment

Stream bank erosion is a risk along the banks of the Huron and Black Rivers is highly possible, but there is no known history of specific properties impacted by this hazard across Lorain County.

According to the National Risk Index, Lorain County’s risk for a landslide is considered Very Low with a score of 7.51. The county’s expected annual loss score of 11.20 is also Relatively Low. Expected annual loss values and exposure values are provided in the table below.

Table 2-42: Landslide Loss Values per NRI

	Expected Annual Loss Values	Exposure Values
Building Value	\$6,584	\$2,908,739,728
Population Equivalence	\$5,620	\$169,442,578,220
Agriculture Value	n/a	n/a
<i>Total</i>	<i>\$12,204</i>	<i>\$172,351,317,948</i>

Local Land Subsidence History

There is no known history of land subsidence in Lorain County. It is logically expected that there are private property vulnerabilities and losses along the riverbanks, but no losses have been reported and no ongoing situations are known to the Lorain County EMA.

2.2.11 Severe Thunderstorm

A thunderstorm is a local storm produced by a cumulonimbus cloud and is a combination of thunder, lightning, and sometimes hail. Lightning is a brief, naturally occurring electrical discharge that occurs between a cloud and the ground. Thunder and lightning occur in conjunction with one another; thunder is a consequence of lightning and provides the auditory evidence of lightning. Hail is frozen rain pellets that can damage buildings, vehicles, and other structures as they fall. Hail forms in the higher clouds and accumulates size as it falls as precipitation. If temperatures close to the ground are warm, the hail can partially melt or become freezing rain. Most thunderstorms include heavy precipitation and wind. These storms can produce hail, flash floods, tornadoes, and damaging winds that pose significant risk to people and property in the area. A thunderstorm that produces a tornado, winds of 58 mph or greater, and/or hail with a diameter of at least 1”, is considered a severe thunderstorm. These storms typically develop as part of a larger storm front and are preceded and followed by regular thunderstorms.

Severe Thunderstorm Risk Assessment

Thunderstorms are frequent in Lorain County, especially during the spring and summer. In these months, heat warms the atmosphere throughout the day, creating an atmosphere ripe for thunderstorms with hail, heavy rain and wind. Microbursts often include strong straight-line winds that can damage or destroy standing crops and develop quickly with little warning. By nature, all thunderstorms include lightning and thunder as the consequence of lightning is thunder. Most thunderstorms include heavy precipitation and wind. Hail is possible but is far less frequent. Thunderstorms are a countywide hazard and can affect all areas and jurisdictions. These storms range from minor to severe, although the most are minor or moderate. Thunderstorms are relatively frequent but generally result in limited property damage.

Even minor thunderstorms can damage property and infrastructure. Hail typically damages vehicles, roofs, and siding but injuries or loss of life are rare. Thunderstorm winds can damage

standing crops, especially those at a vulnerable growth stage. Damage to crops can drastically reduce yields, causing significant or even extreme loss to farmers for that year’s crop. When they occur at a time when grain stalks are heavy with mature grain, the winds can flatten the crop entirely and make it impossible to harvest. Winds can destroy the grain pods and soak the grains in standing water, making the crop unsalvageable. Corn, soybeans, hay, and other crops can be shredded and flattened, preventing further growth and development and severely hampering the development of harvest yields.

The table below describes the vulnerability of countywide property to worst case severe thunderstorm damage, including hail, wind, heavy precipitation and lightning. The HAZUS analysis property values for flood were used as the exposure values, and it was assumed that significant damage to 25% of the property would reasonably illustrate a worst-case scenario for this hazard. Damage estimates were calculated at a 25% of the values established for other scenarios in HAZUS to illustrate widespread severe thunderstorm damage. This was based upon from a variety of past incidents. The HAZUS MH Loss Estimator calculation tool was used to develop this table.

Table 2-43: Building Exposure by Occupancy Type (HAZUS)

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7
Commercial	7,301,068	18.4
Industrial	2,501,600	6.3
Agricultural	198,790	0.5
Religion	554,753	1.4
Government	145,381	0.4
Education	961,473	2.4
Total	39,738,857	100.00

According to the National Risk Index, Lorain County’s risk for a hail is conserved Relatively Low with a score of 9.01. The county’s expected annual loss score of 11.47 is also Relatively Low. Expected annual loss values and exposure values are provided in the table below.

Table 2-44: Hail Loss Values

	Expected Annual Loss Values	Exposure Values
Building Value	\$67,272	\$39,738,857
Population Equivalence	\$29,375	\$2,290,305,600
Agriculture Value	\$4,612	\$133,901
<i>Total</i>	<i>\$101,259</i>	<i>\$2,330,178,358</i>

The National Risk Index rates Lorain County’s risk for lightning as Relatively Low with a score of 15.22. The county’s expected annual loss score of 26.65 is Relatively Moderate. Expected annual loss values and exposure values are provided in the table below.

Table 2-45: Lightning Loss Values

	Expected Annual Loss Values	Exposure Values
Building Value	\$69,631	\$39,738,857
Population Equivalence	\$102,750	\$2,290,305,600
Agriculture Value	n/a	n/a
<i>Total</i>	<i>\$172,381</i>	<i>\$2,330,044,457</i>

Local Severe Thunderstorm History

Thunderstorms are a frequent hazard in Lorain County. According to NCDC records, the county has experienced 66 thunderstorm related incidents between 01-01-2016 and 01-31-2022. While thunderstorm occurrences are minor and cause little or no damage, a few have caused considerable property damage. Collectively, these particular thunderstorm incidents have caused more than \$1,112,000.00 in property damage and \$100,000 in crop damage over the past six years.

Table 2-46: Lorain County Severe Thunderstorm History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries	Avg. Loss
Thunderstorm Wind	392	8.99M	120K	0	5	23.24K
Hail	164	760K	50K	0	0	4.94K
Lightning	10	1M	0	0	3	100K

One of the most agriculturally-damaging thunderstorms struck Lorain County on November 5, 2017. As a cold front moved across Ohio, severe storms developed. A strong wind field allowed the storm to move at 80 mph. Winds within a small microburst southwest of Cleveland developed winds in excess of 100 mph. A downburst of at least 75 mph caused extensive damage across southwestern Lorain County. From the Huron County line to Rochester, Brighton, and Camden Townships, damage includes six homes with blown in garage doors, roof damage, tress damage, and corn crop damage. Crops were flattened by the winds. There was approximately \$200K in property damage and \$100K in crop damage.

This same storm caused havoc in the Village of LaGrange. Winds estimated to be at least 85 mph downed dozens of trees in this village, and damaged many homes and buildings. One business experienced a total exterior wall collapse. The school experienced severe roof damage, and one home was rendered uninhabitable by a fallen tree. State routes 83, 301, and 303 closed due to downed trees and utility poles. 10,000 electric customers were without power for two days.

On June 6, 2020 a severe thunderstorm caused approximately \$85,000 of damage in several communities. Remnant of Tropical Storm Cristobal entered the Great Lakes region, and combined with high heat, humidity and general volatility, caused storms on the next day. There was sporadic wind damage in southern Lorain County and trees were downed near Rochester and Wellington. A tree fell onto a house in LaGrange Township. Social media reports indicated several houses were damaged in Avon and a large restaurant sign was upheaved and thrown

sixty feet. Trees were downed in North Ridgeville and Elyria, damaging several homes and a large gazebo.

2.2.12 Tornado/Windstorm

Windstorms can include rotational or straight-line winds and can occur within a larger weather system or as an independent hazard. Rotational winds events are classified as tornadoes or funnel clouds while straight-line wind events are generally identified as windstorms.

A tornado is an intense, rotating column of air in the shape of a funnel or rope whose circulation is present on the ground. If the column of air does not touch the ground, it is referred to as a funnel cloud. Tornadoes usually range from 300 to 2,000 feet wide and form ahead of advancing cold fronts. They tend to move from southwest to northeast because they are most often driven by southwest winds. When a single storm system produces more than one distinct tornado or funnel cloud, it is referred to as a tornado outbreak.

Tornado magnitude is measured using the Enhanced Fujita scale, abbreviated as EF. The ratings range from EF-0 to EF-5 and are based on wind speeds and related damage. The Enhanced Fujita Scale has been used as the official tornado rating scale since 2007. Prior to 2007, tornado severity was rated using the Fujita Scale (abbreviated as F-0 through F-5). The difference between these two rating scales is that the Enhanced Fujita scale bases the rating on wind speed while the earlier Fujita scale is based on the amount of destruction.

The following table is provided by FEMA and indicates the type of damages typically caused by a tornado according to the Enhanced Fujita Scale.

EF-Scale	Wind Speed	Typical Damage
0	65 – 85 mph	Light damage. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over.
1	86 – 110 mph	Moderate damage. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
2	111 – 135 mph	Considerable damage. Roofs torn off well-constructed houses; mobile homes completely destroyed; large trees snapped or uprooted.
3	136 – 165 mph	Severe damage. Entire stories of well-constructed houses destroyed; structures with weak foundations blown away some distance.
4	166 – 200 mph	Devastating damage. Whole frame and well-constructed houses completely leveled.
5	>200 mph	Incredible damage. Strong frame houses leveled off foundations and swept away; high-rise buildings have significant structural damage.
No rating		Inconceivable damage.

A windstorm is a weather event with very strong winds but little to no precipitation. Sustained wind speeds in a windstorm can reach at least 34 mph with gusts significantly higher.

Regardless of wind speed, any wind event that causes property damage can be considered a windstorm.

A derecho is a widespread, long-lived windstorm. It is often associated with bands of rapidly moving thunderstorms. This type of storm can produce damaging straight-line winds over extremely large areas, sometimes spanning hundreds of miles. To be classified as a derecho, the storm must produce damage over at least 250 miles, have wind gusts of at least 58 mph across most of the storm's length, and multiple gusts of 75 mph or greater. The destruction produced by a derecho can be very similar to that of a tornado but generally occurs in one direction along a straight path.

Tornado/Windstorm Risk Assessment

In Ohio, tornadoes are typically narrow and do not reach size of the tornadoes that occur in the Great Plains and southern states. Locally, tornadoes are typically 25-500 yards wide and stay on the ground for a few miles. Ohio ranks among the top twenty states in injuries, fatalities, and property damage from tornado events. Tornadoes are not a frequent occurrence in Lorain County but can have a significant impact when they do occur. The magnitude of most tornadoes has ranged from F/EF0 to F/EF1. The only stronger tornado on record occurred in 1953 and was rated an F4. The tornado that struck Allen Township in 2010 was an EF-4 tornado before it dissipated over Lake Erie.

The flat topography of north central Ohio is vulnerable to damage from high wind incidents. Most severe wind events are part of larger storm systems that typically include heavy rain, hail, ice, snow, or thunderstorms. Extreme winds can also occur independent of other hazards. Property damage from tornadoes and windstorms can include damaged roofs, gutters, downspouts, and trees. Outbuildings, barns, and storage buildings are at risk for damage because these structures are less resistant to wind damage and are frequently built on concrete slabs or dirt foundations. Damage to agriculture during the growing season when fields are plants is also a risk. High winds can damage crops and reduce yields, leaving a negative impact on the local economy.

Most residential structures in the county are constructed from wood, concrete, brick, or stone. Older homes typically have limestone or other masonry materials and are built on traditional foundations with basements or crawl spaces. Newer residential structures are often built on concrete slabs with no basement. These homes are prone to superficial damage, roof damage, and falling trees during wind events. Mobile and manufactured homes are more vulnerable to wind damage because they are less secured to the ground than buildings with foundations and are constructed of less wind-resistant material than traditionally built homes.

Tornadoes and windstorms are a countywide hazard that can affect all areas and jurisdictions.

Table 2-33 describes the vulnerability of countywide property to a worst-case tornado scenario. The HAZUS analysis property values for flood were used as the property valuation basis. Damage estimates were calculated to illustrate significant property damage to 10% of the

properties as a worst-plausible case scenario for tornado damage to local areas. This 10% was selected as a reasonable value of potential damages for this hazard based upon comparative data from past incidents. The HAZUS MH Loss Estimator calculation tool was used to develop this table.

Table 2-47: Building Exposure by Occupancy Type (HAZUS)

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7
Commercial	7,301,068	18.4
Industrial	2,501,600	6.3
Agricultural	198,790	0.5
Religion	554,753	1.4
Government	145,381	0.4
Education	961,473	2.4
Total	39,738,857	100.00

According to the National Risk Index, Lorain County’s risk for strong wind is Relatively Low with a score of 14.22. The county’s expected annual loss score of 28.71 for this hazard is Relatively Moderate. Expected annual loss values and exposure values are provided in the table below.

Table 2-48: Strong Wind Loss Values (NRI)

	Expected Annual Loss Values	Exposure Values
Building Value	\$301,901	\$39,738,857
Population Equivalence	\$116,372	\$2,290,305,600
Agriculture Value	\$6,343	\$133,901
<i>Total</i>	<i>\$424,615</i>	<i>\$2,330,178,358</i>

The National Risk Index rates Lorain County’s risk for tornadoes as Relatively High with a score of 27.62. The county’s expected annual loss score of 32.34 is Relatively High. Expected annual loss values and exposure values are provided in the table below.

Table 2-49: Tornado Loss Values (NRI)

	Expected Annual Loss Values	Exposure Values
Building Value	\$3,070,869	\$39,738,857
Population Equivalence	\$1,675,795	\$2,290,305,600
Agriculture Value	\$684	\$133,901
<i>Total</i>	<i>\$4,747,349</i>	<i>\$2,330,178,358</i>

Local Tornado/Windstorm History

Since the beginning of 2016, Lorain County has experienced nine high wind events and two tornadoes. The table below gives incident numbers for all of the NOAA duration of statistic maintenance since 1950.

Table 2-50: Lorain County Tornado History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries
Tornado	32	36.75M	50K	18	160
High Wind	76	23.76M	595K	2	2

The first tornado that has hit Lorain County in the past six years struck on April 7, 2020 in the Belden area just north of SR 303. At EF1 magnitude, it damaged a farm along Island Road. One barn and a small outbuilding were destroyed. It blew in a garage door on Law Road. The tornado continued its southeastern travel into Medina County. There were no deaths or injuries.

In late April 2022, a tornado struck Eaton Township and destroyed a barn. Data about this storm was not yet available when this document was prepared. NWS Cleveland had confirmed the tornado and rated it an EF-1.

2.2.13 Winter Storm

A winter storm is a weather event that includes several winter weather hazards and can develop anytime between late fall and early spring. These storms can include any combination of extremely cold temperatures, wind, snowfall, sleet, ice, or freezing rain. These severe winter storms are common in Ohio but the specific components of each storm event depend on the weather conditions at the time. Winter temperatures can be mild and relatively warm (above freezing), or they can fall below the freezing point and stay there for long periods, occasionally dipping below zero. A winter season typically includes multiple fluctuations between extremely cold and mild conditions.

A blizzard is a specific type of winter storm characterized by sustained winds or frequent gusts of 35 mph or greater and falling or blowing snow that reduces visibility to less than $\frac{1}{4}$ mile. Both of these conditions must be present for at least three hours for the event to be considered a blizzard.

A non-blizzard severe winter storm often begins with warmer air followed by very cold temperatures and heavy precipitation. An initial blast of warm air can cause temperatures to hover at the freezing point as precipitation falls, causing $\frac{1}{4}$ "to $\frac{1}{2}$ " ice (or more) to form on roads, trees, electrical lines, gutters and roofs, and vegetation. The precipitation starts out as freezing rain and/or sleet and, as the temperatures drop, turns to snow that adheres to the ice and forms heavy clumps that bring down power lines and trees. As the storm system moves through and winds increase, temperatures drop and the heavy falling snow drifts across roads, ice damages trees and buildings, and road conditions becomes treacherous. This type of storm can drop several inches of heavy, wet snow across the area.

Another type of severe winter storm that can affect Ohio begins with extremely cold weather (below 10 degrees Fahrenheit) and heavy snowfall, high winds, and extreme cold. A severe storm of this nature would likely pack sustained winds of 15-25 miles per hour, over ten inches of snow, and temperatures below ten degrees Fahrenheit for more than 24 hours. This kind of storm can easily deposit a foot or more of snow and disrupt daily activities for several days.

Because the ice is not part of this kind of storm, damages are generally less as power lines are not destroyed and structural damage is not severe. However, the amount of snow is challenging because of the extreme low temperatures. The snow tends to be fluffy and creates deep snowdrifts and blocks roads.

Ice storms are another type of winter storm event that can impact the area. An ice storm occurs when damaging ice accumulations occur during freezing rain situations. The accumulated ice can cause trees and utility lines to come down, resulting in loss of utilities and communications systems. As ice accumulates on roadways, travel also becomes dangerous. A significant ice accumulation is considered anything $\frac{1}{4}$ " or more.

Winter Storm Risk Assessment

Severe winter weather is a risk across all of Ohio. Winter storms range from short, mild bursts of snow and ice to multi-day events incidents with significant snowfall. In Lorain County, winter storms are a countywide hazard and can affect all areas and jurisdictions. The county is vulnerable to lake-effect snow when conditions are right, and this phenomenon can drop heavy amounts of snow in areas that are surrounded by unaffected areas.

Winter storms often include multiple hazards, such as ice and snow. Frequently winter storms begin when temperatures are above freezing, and initial precipitation comes as rain or freezing rain. Ice accumulates as temperatures fall then turns to snow, creating a dangerous layer of snow-covered ice, increasing the potential for vehicular accidents. Road crews work continuously to clear roadways. Occasionally, ice storms occur independent of other winter weather hazards. Although rare, when this occurs it can have a significant negative effect on the community. Power outages are a frequent outcome of ice storms when precipitation accumulates on trees and power lines causing them to break. Extremely cold temperatures can also occur without other accompanying winter weather hazards, although this is infrequent. These incidents are typically very short, lasting only a day or two, and are an inconvenience to residents and businesses more than the direct cause of property loss.

Across the county, the greatest risk from winter storms is the loss of utilities, cancellation of work or school, and difficulty with travel. Power outages can occur during ice storms or winter storms that include significant wind or snowfall. Because most electric lines are above ground, they are vulnerable to damage from wind and ice. While many electric providers have improved their distribution systems in recent years and new construction generally includes underground utilities, the main transmission lines are still above ground and vulnerable to weather-related damage. In spite of this, power outages are infrequent and generally not widespread outside of an extreme ice event.

Anticipated losses from winter storms include content loss, such as food and perishables due to power interruptions, and minor economic loss due to short-term business closures. Except for the extreme but rare blizzard, loss of residential and commercial structures or infrastructure is not expected. Most winter storms are a short-term inconvenience that make residents uncomfortable but last for a few hours up to several days. Casualties are extremely rare, with the exception of traffic accidents resulting from dangerous road conditions or fatalities due to

cold exposure if properly heated residential resources are not available. The homeless population is especially vulnerable to cold, and the economically disadvantaged are vulnerable to not having adequate heat or power, and thus suffering injury.

Table 2-52 describes the overall vulnerability of countywide property to a worst-case winter storm scenario. The HAZUS analysis property values for flood were used as the potential exposure, and damage estimates were calculated at a 2% as a worst-plausible scenario for winter storm or blizzard loss. This 2% was based upon a variety of past incidents. The HAZUS MH Loss Estimator calculation tool was used to develop this table.

Table 2-51: Building Exposure by Occupancy Type (HAZUS)

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7
Commercial	7,301,068	18.4
Industrial	2,501,600	6.3
Agricultural	198,790	0.5
Religion	554,753	1.4
Government	145,381	0.4
Education	961,473	2.4
Total	39,738,857	100.00

According to the National Risk Index, Lorain County's risk for a cold wave is conserved Relatively Moderate with a score of 25.69. The county's expected annual loss score of 31.40 for this hazard is Relatively Moderate. Expected annual loss values and exposure values are provided in the table below.

Table 2-52: Cold Wave Loss Values (NRI)

	Expected Annual Loss Values	Exposure Values
Building Value	\$11,675	\$39,738,856
Population Equivalence	\$189,190	\$2,290,305,596
Agriculture Value	\$638	\$133,901
<i>Total</i>	<i>\$201,503</i>	<i>\$2,330,178,354</i>

The National Risk Index rates Lorain County's risk for ice storms as Relatively Moderate with a score of 20.32. The county's ice storm expected annual loss score of 30.80 is Relatively Moderate. Expected annual loss values and exposure values are provided in the table below.

Table 2-53: Ice Storm Loss Values (NRI)

	Expected Annual Loss Values	Exposure Values
Building Value	\$319,806	\$38,870,957
Population Equivalence	\$1,170	\$2,237,094,482
Agriculture Value	n/a	n/a
<i>Total</i>	<i>\$320,976</i>	<i>\$2,275,965,439</i>

The risk rating for winter weather is Relatively High with a score of 32.42. The county's winter weather expected annual loss score of 47.25 is Very High. Expected annual loss values and exposure values are provided in the table below.

Table 2-54: Winter Weather Loss Values

	Expected Annual Loss Values	Exposure Values
Building Value	\$608,339	\$39,738,856
Population Equivalence	\$70,122	\$2,290,305,596
Agriculture Value	\$613	\$133,901
<i>Total</i>	<i>\$679,073</i>	<i>\$2,330,178,354</i>

Local Winter Storm History

Lorain County has experienced 38 winter storm-related incidents since 1950, according to records maintained by NCDC. While some of these incidents were mild and caused limited property damage, several were major events. In total, winter storms have caused more than \$17,215,000 in cost and property damage.

Table 2-55: Lorain County Winter Storm History

Hazard	Incidents	Property Loss	Crop Loss	Deaths	Injuries	Avg. Loss
Blizzard	0	0	0	0	0	0
Extreme Cold/Wind Chill	8	150K	0	2	0	18.75K
Ice Storm	1	4.8M	0	0	0	4.8M
Winter Storm	38	12.11M	0	0	2	318.68K
Lake Effect Snow	3	155K	0	0	0	51.67K

Of recent winter storm event, the extreme cold of January 30, 2019 was catastrophic in that it caused one death. A homeless woman died from hypothermia in a vacant house in Lorain. Temperatures were the coldest seen in several years, reaching a -6 degrees Fahrenheit at the Lorain County Airport that date. Winds gusted to 30-35 mph and wind chill dropped to -25 degrees Fahrenheit. Schools and other businesses closed due to the cold temperatures.

Lake effect snow can have an isolated and damaging effect on Lorain County, although most significant lake effect snow falls to the east in Cuyahoga and Geauga counties. In December 2016, Lorain County received 7+ inches of lake effect snow overnight, making travel difficult and road conditions dangerous. Blowing and drifting snow reduced visibility to less than a quarter mile. In November 2019, lake effect snow again hit Lorain County. 11.7 inches of snow fell in Wellington, 8 inches in Pittsfield Township, and 6 inches in Oberlin and Kipton.

A winter storm in mid-January 2019 dumped 8-12 inches of snow on Lorain County, caused blowing and drifting snow to make travel difficult and disrupted business. Schools were not affected because they were already closed in recognition of MLK Day. Wellington received 12 inches of snow, Lorain and Oberlin 11 inches, Sheffield Lake 10 inches and Elyria 9 inches.

2.3 VULNERABILITY ASSESSMENT

This section addresses each jurisdiction's vulnerability to the identified hazards. Information for this section was provided direct feedback from planning team members and research.

2.3.1 Lorain County

In general, Lorain County's primary concern is severe thunderstorms. These storms come up suddenly sometimes, and bring along heavy precipitation, strong winds, occasional rotational winds, and once in a while, hail. These storms can crop up quickly and sometimes with little warning. In the rural areas, notification can be problematic due to low population concentration and lack of outdoor sirens or other public warning systems. Damages can include buildings blown down, roofs damaged, and trees uprooted. Crop damages and livestock injuries are not uncommon when hail and high winds are involved. Although new software has been implemented for wireless notification, in compliance with strategies in the immediate past mitigation plan, the county must work hard to ensure residents are signed up for the notifications and are aware of the system's function.

Winter storms ranked as the second highest risk to the county. In the rural areas and small communities, this translates to blowing and drifting snow that makes roadways difficult to keep open and power lines vulnerable to damage. When roads are closed, delivery of fuels to farms and rural homes is interrupted. The delivery of farm products like raw milk are delayed. Winter storms in Ohio often come with ice as temperatures drop from beginning to end, and when close to Lake Erie, lake effect snow makes that situation worse. Ice causes damage to power lines and further impedes highway/roadway travel. Winter storms do not last more than a few days in Ohio, but for the short duration, systems and services can be interrupted and ineffective.

Tornadoes, in Ohio, are most frequent in Lorain County. The county ranks #1 in the state for frequency of tornadoes that cause property damage and loss of life. However, while Ohio is in the top twenty states affected by tornadoes, they tend to be lower intensities on the EF Scale. Tornado damage, however, even at an EF-0 and EF- 1 magnitude, causes severe structural damage, uprooted trees, and utility interruption.

While Lorain County does not have a history of wildfire like the western states, Lorain County's concern in this area is for large field fires. Oftentimes the summers have significant dry spells. In rural areas, crops like wheat and oats that cover the ground for hundreds of acres can catch fire with the toss of a lit cigarette or a spark from lightening. When a field begins to burn, the houses built on single-acre rural lots are jeopardized as are the businesses, farms, and industries based in these areas. The sections of forested area are at risk for this kind of fire as they pepper the countryside across the county. These areas have significant amounts of underbrush which fuels field fires, and frequent blustery winds spread the fires faster than fire departments can extinguish them.

Lorain County is prone to various kinds of flooding. First, riverine flooding occurs during heavy precipitation. In rural areas, farmers have tiled their fields, causing the water to drain quicker

and move faster. That often overwhelms the municipal water systems where the runoff ends up, and the small villages and towns experience heavier flooding of streets, homes, and basements. There are no storm sewers to handle this water in the outlying areas, and countywide storm water management systems do not exist. Therefore, the rural areas can experience flooding in areas not particularly identified through maps and topographical analysis. Municipal areas like Lorain, Elyria, North Ridgeville and Avon experience flash flooding as rapid rainfall overwhelms their wastewater systems and floods neighborhoods and closes streets. Residential areas are especially vulnerable in Lorain where storm sewers are slowly being replaced and increased in capacity. Some areas along the Black River flood quickly and dangerously as the river carries water from up the watershed to Lake Erie, and becomes a fast-flowing, all-consuming waterway. As Lorain County sits at the bottom of the watershed, surface drainage from higher areas reaches quickly on its route to the lake. The water takes the path of least resistance, which is usually through houses, properties, businesses and roadways.

The 23-mile coastline in Lorain County is mostly developed and incorporated into municipalities, but small lengths of unincorporated coastline exist in the western part of the county. This area is prone to coastal flooding when winds come from the north or northeast, blowing lake water back into the shoreline.

Coastal flooding along Lake Erie is far more likely when lake levels are high as they have been for the past five years. While much of the coastline is a rocky ledge, there are residential properties where individual docks are now below the surface of the water, and recreational areas are below the lake levels. Nor'easter storms push water onto some properties in a more robust manner than previously, and property is destroyed or damaged. Some properties in parts of the coastline with a traditional beach are flooded because the water rises more easily now. The higher lake levels facilitate the wear and tear on lakefront roads and streets, walkways, and other concrete structures through the constant wave action and ebb and flow of high water. Berms, seawalls, and other structures intended to lessen the effects of flooding are under much greater stress and wear than when lake levels were lower.

There is no evidence of Karst flooding or sinkhole development in Lorain County, although the adjacent Erie County does have areas of Karst formations.

The county is not especially vulnerable to drought and extreme heat. Lake effects on temperatures keep the hottest of days slightly cooler. Electrical supply is dependable in all areas of the county, and outages are not extremely prevalent. Therefore, air conditioning is usually available. Because Lorain County is coastal, and both the Huron River Watershed and the Black River Watersheds drain to the lake, Lorain County is the last area to experience drought within natural drainage patterns. There is little history of true drought, although dry spells that make fire risks higher than normal are common.

Lorain County does not have history of, nor is there much expressed concern, over earthquake risk. While the digital projections of earthquake damage are horrendous assuming a worst-case scenario, the likelihood of a severe earthquake is low enough that not a lot of concern is

expressed, especially in rural areas where buildings are single and two-story, and infrastructure is simple.

Windstorms, without precipitation, are not common in Ohio and rural Lorain County expressed little concern over this phenomenon. Wind-driven erosion is a very slightly concerning consequence, enough that Lorain County Agricultural Services has written an Erosion Control Plan for the county that relates to farming practices and conservation advocacy. However, with the slightly rolling topography and the relatively small fields that are commonly no-till farmed, significant erosion is not common. Sediment in waterways and erosion of the higher riverbanks is common and the rivers from up the watershed into Lorain County, so ditch maintenance and debris management are concerns.

2.3.2 Amherst

Vulnerabilities in Amherst that come to the top of the list include severe thunderstorms, heavy precipitation, and utility outages caused by severe winter storms and severe thunderstorms.

As an area of transition from rural areas to urban sprawl, Amherst is mostly vulnerable to runoff flooding from areas upstream. The city is rapidly growing, consuming the last of the rural coastline in the county. The city is supportive of comprehensive land use planning so it does not end up the recipient of excessive runoff and sedimentation in the waterways. Because their population is growing, their concern is to keep warning and notification systems upgraded and adequate to warn the residents of impending dangers. Because coastal storms can develop quickly and change course over the water, it is important that they be able to quickly and efficiently send warnings, communicate with first responders, and get cooperation from property owners in protecting their buildings and assets.

Much of Amherst's infrastructure is relatively new in the newly developed areas, but keeping up with development trends is difficult. They struggle to maintain services in a rapidly expanding environment. The utility lines and services, along with some of the older water and sewer lines, are aging just as most of America's, so they are concerned about keeping all of this older infrastructure up to date.

Flash floods are of particular concern as strip malls, commercial developments, and highways cover the area. The Ohio Turnpike Commission works with Amherst to support construction of retention ponds for runoff from the interstate highway that cuts through Amherst Township and dumps storm water on Amherst. In times of heavy downfall, this can create challenges for Amherst.

2.3.3 Avon

Situated between developing North Ridgeville and Avon Lake on the coastline, the City of Avon is concerned about storm water management during severe thunderstorms. Avon is on the receiving end of runoff from the Black River Watershed area, and at times it is difficult to manage the very rapid drainage into the city. The agricultural tiling to the far south, the heavy development to the immediate south, and the extensive development within the city all

contribute to great amounts of rapid runoff reaching the city's streets, homes, and businesses. Keeping ditches open, storm sewers operational, and water flowing as fast as it arrives is Avon's biggest challenge. Officials feel that their solutions to flood issues rests in multiple tactics, including acquisition and demolition, vegetative buffers and habitat restoration, retention ponds, and flood insurance programs.

Avon officials are also concerned about utilities in heavy-use times. The natural gas supply is sometimes, during extreme winter cold spells, insufficient and supplies are interrupted. The winter of 2014 brought challenges in gas supply during an extended cold snap early in the year. Concerns about propane supply, electrical grid stability and sufficiency, and water sources are of concern as water inlets froze and clogged during winter thaws. The officials want to make sure residents and others who might be displaced during these kinds of incidents have a safe and well-managed shelter to utilize.

Avon is supportive of development standards and building codes, and enforces their own at this point. They are proponents of staying current in this area of management to keep development appropriate and sustainable. They are well aware that economic development has a benefit side and a cost of business one, and that they need to keep in pace with the problems caused when even good development happens.

2.3.4 Avon Lake

This city sits on the coastline of Lake Erie just north of Avon. It receives the runoff from Avon and the areas south of Avon, and serves as the location where storm water finally makes it to its Lake Erie destination. Flooding happens in Avon as the water arrives faster than it can be pushed into Lake Erie, flooding homes, filling basements, and rendering streets unusable until the water drains. Coastal flooding can affect Avon Lake as lake levels have risen significantly.

As lakefront property, Avon Lake is a fast-developing community of many kinds of housing. Development standards are necessary to guide the management of storm and sewer water, installation of retention ponds, and restoration of vegetative buffers as runoff is kept from properties during storms. Avon Lake suffers from flooded homes, washed out streets, and compromised bridges during severe storms. They struggle to maintain the capacity to notify and warn, and then shelter and support, thousands of residents in an evacuation or utility outage that was extensive.

Avon Lake shares Avon's concerns about utilities, natural gas supply, and distribution systems. They experienced the same problems in 2014 as their residents were out of natural gas and propane. At the end of distribution lines, the natural gas supply ran out before product arrived in Avon Lake residences, and propane suppliers had insufficient supplies of their product. Whether Avon Lake is supplying utilities or sheltering residents when utilities are out, they experience some breaks in capability when circumstances become unusually demanding.

Avon Lake experiences communications problems with first responders. In a county where departments use various frequencies on two-way radios, Avon Lake is sometimes out of the

loop. As they move toward current radio standards for first responders, they are concerned about “plugging in” with countywide departments, and being able to maintain wireless services that are sometimes not resilient.

2.3.5 Elyria

Severe storms, tornadoes, and other natural disasters can cripple Elyria in ways that only a large city is crippled. With socioeconomic groups from homeless and extremely poor to the very wealthy, and everything in between, Elyria must be able to serve multiple clients during disasters. Providing the support services to help with broken transportation systems, utility interruptions, injuries and damages, and flooded neighborhoods and streets all at the same time is a challenge.

Elyria has neighborhoods that flood extensively as the Black River winds its way through the city. As water finds its way to the river from the height of the riverbank, the floodwaters sweep homes and properties away. Roads can be washed out and rapid precipitation takes on a new personality, destroying everything in its way.

As the waters reach Elyria from upstream, the force and quantity of water is often too much for the storm sewers. The city is an older city in some parts, and infrastructure is unable to support the quantity of runoff, or the rapid and forceful waters. Infrastructure failure is an outcome of deterioration and demand. It can't keep up, so basements flood, streets are covered, homes are damaged, and property is destroyed. Elyria is prone to this kind of damage in heavy, rapid rainfall.

Utility protection is a concern for Elyria as they attempt to keep electric lines, water lines, and distribution systems functioning. There have been some problems in the past with these structures. Elyria intends to work diligently to harden supplies and to replace, replenish, and refurbish physical components as needed to prevent failures during storms.

Elyria is charged with caring for many people without homes, without adequate income, and with special disabilities when disaster strikes. In order to assure these special populations that their needs will be met, Elyria has placed special emphasis upon developing and ensuring the availability of the assistance they need.

During disasters, Elyria faces transportation problems. When streets are closed or compromised in snowstorms or by debris from severe thunderstorms, people cannot get to work, hospitals, or homes. The city faces the challenge of being able to meet this need. Elevation of streets, protection of bridges and culverts, and installation/repair of storm sewers is critical to their capability to achieve this.

Elyria is the county seat. By that virtue, management of infrastructure and functionality is critical to all of Lorain County. Without Elyria up and running, the county comes to a service-provider halt, and resources are compromised to the entire population.

2.3.6 Grafton

This village is significantly upstream in the Black River Watershed, and so does not experience quite the same kind of widespread flooding as other communities. They do have some flooding in rapid and heavy precipitation, but not with runoff like the communities closer to the lake experience. Grafton is in the midst of agricultural land, and maintains a much more rural atmosphere than much of Lorain County, so they don't have the population concentration either.

Grafton faces utility outages due to their distance from suppliers and their small population. They face shortages in propane and gas supply like many communities have during heavy use periods. They are most challenged by water supply issues, and need to develop a redundant supply source. They are further from cities, and thus face challenges in having comparable public safety services that include inspectors to help with new development and prevention.

Grafton could face a serious problem if a tornado or other severe incident damaged the prison just outside of the village. While corrections facilities must have and maintain their own disaster response capability, a large incident would likely require Grafton officials to assist. Therefore, Grafton is very concerned about communications in a disaster, warning and notification systems, and coordination of various levels of responders.

2.3.7 Kipton

Kipton is a small community of a few hundred people. It sits on relatively high ground on the west side of Lorain County, and is not especially prone to heavy flooding due to runoff, but it is prone to flash floods. The dangers in Kipton relate to being remote from other communities, with Oberlin being the closest city. Kipton is intersected by State Route 511 and is close to Interstate 20 where many hazardous materials are transported across Ohio.

Kipton is vulnerable to storm damages from wind, heavy precipitation, and hail. It is also prone to power outages during winter storms and other severe storms. Because it has so few houses, the village may not be a priority for service restoration when compared to the large cities and population centers.

2.3.8 LaGrange

This rural village sits on relatively high ground, and is at the initial portion of the Black River. It is not especially prone to riverine flooding, but flash floods and storm back up is a threat. LaGrange has an industrial park area that floods extensively during rapid or heavy rainfall due, in part, to the installation of drainage tile on farmland that causes drainage to flow into a creek that goes through the area of industries. When this occurs, these businesses close, usually for several days, because the road that serves them floods extensively and is impassable. LaGrange also has some flooding concerns and incidents where a ditch was changed by construction, now dumping runoff into a housing development and damaging houses. This village is adding residences and businesses regularly, and without continued enforcement of building standards and land use plans, inconsistencies could make the effects of flooding worse.

2.3.9 Lorain

As the most populated city in Lorain County, the City of Lorain faces many challenges in disasters. City management is concerned about providing shelters and necessities for its residents in times of need, and is concerned about having enough shelters, adequate protections, and effective warning systems.

Parts of Lorain are aged and deteriorating. Some buildings are multi-story and under-occupied. Building conditions can be deficient and not able to withstand the winds, hail, heavy rain, and abuse thrust on them by severe storms and lake effect weather. Because the city sits on the lakeshore, there is little natural protection for its properties.

The sanitary and sewer water lines are deteriorating in Lorain. The lines are undersized for today's population. While some lines have been replaced and upsized, there is still much work to do. This causes flooding and flash flooding when storm clouds dump extensive amounts of precipitation on the city. As some large creeks and the Black River flow directly through the city, the banks overflow and homes, factories, and institutions are damaged. Streets flood and become impassable. Basements fill with water. Utilities fail due to the water. Residents need to leave their homes.

Lorain takes a beating from coastal storms. Sitting right on the lake, its downtown bears the brunt of winds and sleet, waves crashing against city properties, parks, and businesses. The streets flood and the businesses are damaged. Higher lake levels have accentuated this issue.

The concentrated population of Lorain includes all socioeconomic groups. Some of the poor community live in sub-standard housing and are not privy to warnings other than outdoor warning sirens. Special needs populations are concentrated within the city, but are difficult if not impossible to identify quickly. Some of them can do little to take cover when necessary. Therefore, the city is concerned about warnings and notifications, shelters, mass care, and making sure its entire population is afforded safety in a storm.

As the city develops and improves, they are prone to substandard construction practices for lakefront communities. Therefore, they are concerned about maintaining building code enforcement and construction standards, vendor registration, and land use regulation. They are trying to keep pace with communication needs with responders to be able to enhance protection of their residents.

2.3.10 North Ridgeville

Voted the fourth best place to own a home in Ohio in 2014 by Nerd-facts and published by Yahoo, North Ridgeville is an up-and-coming city full of development activities and new residences, businesses, and industries.

North Ridgeville, on French Creek, one of the main tributaries of the Black River, is vulnerable to flooding, water intake problems when extreme cold hits, and utility supply issues under heavy use. Even though the city has been aggressive about development standards, flood

prevention and retention pond installation, and residential building codes, they still experience the negative effects of heavy rainfall and severe storms.

North Ridgeville is prone to flooding, and because of that has taken on an aggressive program of ditch cleaning and erosion control. The city maintains all ditches within the incorporation as a means to move runoff rapidly and effectively through the city and on to Lake Erie. However, the runoff from developed townships upstream makes keeping up with the amount of water difficult, and North Ridgeville experiences flooding amid the best of efforts.

North Ridgeville is prone to utility outages, and because distribution lines are at the end of the grid, they look for redundant supplies and alternatives. When water intake valves freeze or jam with ice, they search for alternatives to the water supply with the City of Cleveland to their nearby east.

The city is vulnerable to communications gaps as they work to make communication systems meet their ever-growing needs. They work with wireless providers, two-way radio suppliers, and first response departments to decrease response times and always improve the city's ability to respond to disasters.

2.3.11 Oberlin

Plum Creek flows through Oberlin and could potentially cause flooding of some residential neighborhoods. Although Oberlin sits on high ground and isn't particularly prone to flooding, when rapid and heavy rainfall happens, flash floods do occur. As development is completed and water flow sometimes changes, the city is vulnerable to residential flooding and flash flooding. There are some homes that flood, and the city would like to decrease that vulnerability.

Oberlin is home to a residential college, and slightly less than 3,000 college students live in the city in various forms of temporary housing. This population is difficult to track and serve because until a disaster happens, there is no way for the city to be able to segregate college students from city residents. Dependent upon the time of a severe storm or extensive power outage, the students could constitute a significant increase in storm victims, or not. The city wants to be able to provide the same, high quality service to all residents but is vulnerable to inaccurate guesstimates of needs under some conditions (such as holiday weekends or late summer moving-in times).

Oberlin is vulnerable to tornadoes and high velocity wind events. Most homes are older, frame homes built of wood and masonry. They are exactly the type home that loses a roof or has a flooded basement in severe storms. The city is concerned about providing safe rooms for multi-family structures built on slabs, as well as homes without basements and shelter.

Because Oberlin is out in the country, and lies at the western end of the county, they feel prone to inadequate warning and notification. They work to keep outdoor warning sirens and other

notification systems working well, and diminish their vulnerability by establishing redundant warning systems when possible. They work hard to keep their first responders in communication with all others, upgrading and maintaining a good communication system.

2.3.12 Rochester

Known as Lorain County's "quiet little corner", Rochester sits in the far southwest corner of the county. With less than 150 residents, the small village is prone to flooding in extremely heavy rainfall, and is prone to damage from severe storms and power outages. The village works to stay in the communication loop so its residents are abreast of storm warnings and emergency notifications.

2.3.13 Sheffield Lake

Sitting on the shores of Lake Erie, Sheffield Lake is vulnerable to the beating of severe storms and coastal flooding, riverine flooding, flash flooding, hail, and ice. Their streets flood, storm sewers back up, and homes flood when Mother Nature dishes out her worst. When water intakes freeze or jam with ice, Sheffield Lake experiences loss of adequate water supply. They can experience utility outages as lines are damaged, or as distribution in other areas consumes excessive amounts of natural gas. Due to rapid development, some difficulty in mapping and location identification makes first response difficult at times.

Sheffield Lake is vulnerable to storm water back up, water supply shortages or interruptions, and flooded streets and roadways. They have homes that flood. Development projects threaten drainage and retention ponds are needed to hold excessive runoff and prevent flooding.

Sheffield Lake works to maintain warning and notification systems and first responder communications to facilitate rapid response to disasters. They work to keep wireless services dependable. They strive to maintain and improve utilities and infrastructure systems to serve their population.

2.3.14 Sheffield Village

This village is on the eastern, densely populated side of Lorain County, and sits just south of Sheffield Lake and to the east of Lorain. It is rapidly developing in residential, commercial, and industrial ways. It sits just one jurisdiction away from Lake Erie, and thus takes on storm water runoff from a large part of Lorain County as waterways traverse the village. It is prone to flooding, flash flooding, and coastal flooding. The storms can be severe as they rip off the lake onto shore, easily sustaining velocity through the village.

Sheffield Village is prone to home and business damage from flooding, tornadoes, wind, and hail. The streets can flood under rapid rainfall as storm sewers are unable to keep up with the drainage. They are prone to utility shortages, and experienced natural gas and water problems in the winter of 2014. Their water supply is from Lake Erie, and when intakes freeze or jam with ice, their water supply is compromised.

The village is vulnerable to shelter needs for a growing population. They work to maintain warning and notification systems when coastal storms develop quickly, striking their population without much time to prepare. They are prone to lack of awareness and knowledge of local disaster procedures due to the rapidly growing population so they work hard to maintain public information campaigns about disaster preparedness and response actions. They work to establish fire prevention and building inspection services to maintain high quality construction in new developments and renovations.

2.3.15 South Amherst

This small village lies immediately to the south of Amherst, thus the name South Amherst. It is an older residential community on the verge of city vs. country in Lorain County. The village is not especially prone to flooding, although in one corner there are a few residents with repeated flooding issues during heavy rains. As a rural community, they are prone to the negative effects of inefficient storm water management and have interest in countywide efforts to improve flooding and flash flooding situations.

As an outlying community, South Amherst is prone to utility outages, especially electricity. Wireless communications are problematic at times when towers are a distance away. Communication between first responders is challenging as they lie adjacent to the cities in the county, but have all volunteer forces.

2.3.16 Vermilion

This city lies on the border of Erie and Lorain Counties on the far northwest edge of Lorain County. Vermilion's worst vulnerability is flooding due to ice jams in the Vermilion River as it meanders through town to Lake Erie. Vermilion sits on the shore of Lake Erie, and is part of the Vermilion River Watershed. There are many low-lying properties that flood when the river jams with ice, and snowmelt cannot get away.

Vermilion is vulnerable to lake storms, heavy winds, and Nor'easters. Homes are damaged when roofs are destroyed by wind or hail, and basements fill with water. The city works to communicate property protection, insurance coverage, and quality building standards to its residents. Sitting on a county line, the city is prone to communication glitches, and strives to override those problems through redundancy and strong efforts to communicate with both counties.

2.3.17 Wellington

This village is on the far southern border of Lorain County. They are prone to utility outages and severe storms, and due to their position in the warning progression, feel vulnerable to rapid onset storms without notice. The village is not exceptionally prone to flooding and sits at the upstream end of the Black River Watershed.

The chart below provides a summary of the hazard rank developed by each jurisdiction. Each jurisdiction was asked to rank hazards from 1 to 13, most concerning to least concerning. The

rankings were then added together per hazard and averaged for an overall hazard ranking for the county. The jurisdictional rankings, the total rank-points, and the average are shown, with the final table showing the overall ranking of hazards from most-concerning to least-concerning.

Table 2-56: Jurisdictional Vulnerability

Jurisdiction	Drought/ Extreme Heat	Earthquake	Flood	Hazardous Materials Spill/Incident	Infrastructure – Dam/Levee Failure	Infrastructure – Transportation System	Infrastructure – Utility Systems	Infrastructure – Water Quality	Invasive Species	Land Subsidence	Severe Thunderstorm	Tornado/Windstorm	Winter Storm
Townships	12	13	1	7	9	8	5	6	11	10	4	2	3
Amherst	13	11	3	7	8	9	5	6	12	10	1	2	4
Avon	13	12	1	7	11	9	5	3	10	8	4	2	6
Avon Lake	13	12	1	7	10	11	6	4	9	8	2	3	5
Elyria	13	12	1	7	8	9	4	6	11	10	2	5	3
Grafton	13	10	1	6	9	12	5	7	8	11	2	3	4
Kipton	9	10	6	4	12	13	5	8	7	11	2	1	3
LaGrange	9	12	1	6	7	10	4	5	8	13	3	2	5
Lorain	12	13	1	7	8	9	5	6	10	11	2	3	4
North Ridgeville	13	10	1	7	9	8	3	5	12	11	4	2	6
Oberlin	13	12	5	7	8	9	3	6	10	11	2	1	4
Rochester	7	11	6	3	10	12	5	8	9	13	1	2	4
Sheffield Lake	13	9	1	6	10	11	8	7	12	5	3	2	4
Sheffield Village	12	11	1	7	13	8	4	6	10	9	2	3	5
South Amherst	9	10	5	4	12	11	6	7	8	13	1	2	3
Vermilion	10	11	1	6	8	13	5	7	12	9	2	3	4
Wellington	8	12	6	9	7	13	4	5	10	11	1	2	3
Total Points	192	191	42	107	159	175	82	102	169	174	38	40	69
Rank	13	12	3	7	8	11	5	6	9	10	1	2	4

Table 2-57: Countywide Hazard Ranking

Overall Rank	Hazard Type
1	Severe thunderstorm
2	Tornado/Windstorm
3	Flood
4	Winter Storm
5	Utility Outage
6	Water Quality Emergency
7	Hazardous Materials Spill

8	Dam or Levee Failure
9	Invasive Species
10	Land Subsidence
11	Transportation System Failure
12	Earthquake
13	Drought/Extreme Heat

2.4 RISK ANALYSIS

To determine Lorain County’s overall risk, each hazard was evaluated and scored based on common criteria. This section describes the criteria used and the overall rank based on feedback from stakeholders. The scores identified in table 2-56 were determined based on survey responses from stakeholders and the planning team’s review of the survey results. A copy of the survey instrument used to collect this information is included in Appendix C: Hazard Assessment Survey Tool.

Frequency

Frequency measures how often each hazard occurs. Hazard events that occur regularly are a higher risk than those that occur infrequently.

- 1 = None/Rare (every 50 years or less)
- 2 = Low (every 20-25 years)
- 3 = Moderate (every 10-15 years)
- 4 = High (every 3-5 years)
- 5 = Excessive (at least once per year)

Response Duration

Response duration is defined as the length of time needed to manage the incident and return the community to relatively normal function.

- 1 = Brief (half a day or less)
- 2 = Low (1 day)
- 3 =Moderate (2 to 7 days)
- 4 = Long (2 to 4 weeks)
- 5 = Extended (more than 1 month)

Speed of Onset

Speed of onset is the amount of warning time the community has when an incident occurs or conditions indicate that it could occur. This includes, but is not limited to, warnings issued by the National Weather Service and other government agencies.

- 1 = Extended (more than 24 hours)
- 2 = Moderate (12 to 24 hours)
- 3 = Low (6 to 12 hours)
- 4 = Minimal (less than 6 hours)
- 5 = Immediate (no warning time)

Magnitude

Magnitude is the overall effect an incident has on the community, including property damage, injuries or human impact, and business impact.

- 1 = Localized (less than 10% of community)
- 2 = Limited (11 to 25% of community)
- 3 = Widespread (26-50% of community)
- 4 – Catastrophic (more than 50% of community)

Business Impact

Business impact refers to the length of time it takes for businesses to resume normal operations during/after an incident. Impact could include lack of access to critical utilities, inability of employees to report to work, limited ability to purchase necessary supplies or inventory, etc.

- 1 = Brief (less than 24 hours)
- 2 = Limited (1 to 7 days)
- 3 = Moderate (1 to 4 weeks)
- 4 = Extended (more than 1 month)

Human Impact

Human impact the level of injuries or fatalities in the community following an incident.

- 1 = Minimum (some minor injuries, no deaths)
- 2 = Low (multiple minor injuries, no deaths)
- 3 = Moderate (many minor injuries, some severe injuries)
- 4 = High (many severe injuries, some deaths)

Property Impact

Property impact is the level of damage to buildings and structures, including residential, business/commercial, and critical facilities (such as public safety, healthcare, education, government, religion, etc.)

- 1 = Minimal (less than 10% of structures damaged, most damage is minor)
- 2 = Moderate (11 to 25% of structures damaged, some minor and moderate damage)
- 3 = Widespread (26-50% of structures damaged, many structures with major damage, some destroyed)
- 4 = Catastrophic (more than 50% of structures damaged, many destroyed or with major damage)

Table 2-58: Risk Analysis

Hazard	Frequency	Response Duration	Speed of Onset	Magnitude	Business Impact	Human Impact	Property Impact	Score	Rank
Severe Thunderstorm	5	4	4	4	2	1	4	24	1
Tornado/Windstorm	4	4	4	4	2	2	4	24	2
Flood	4	5	3	3	2	2	4	23	3
Winter Storm	5	3	3	4	3	1	3	22	4
Infrastructure – Utility Systems	5	3	5	4	2	1	1	21	5
Infrastructure – Water Quality	3	3	5	4	3	1	1	20	6
Hazardous Material Spill/ Incident	3	3	5	2	2	3	1	19	7
Infra – Dam/Levee Failure	1	5	3	2	4	2	2	19	8
Invasive Species	3	5	1	4	1	1	3	18	9
Land Subsidence	3	4	5	1	2	1	1	17	10
Infra – Transportation System	2	3	3	2	2	2	1	15	11
Earthquake	1	5	4	1	1	1	1	14	12
Drought/Extreme Heat	2	4	1	1	1	1	1	11	13

3.0 MITIGATION STRATEGIES

Lorain County’s planning team developed mitigation goals and strategies to address the identified risks and vulnerabilities for the county and individual jurisdictions. While there are similarities in the goals and strategies identified by each jurisdiction, each community included actions designed to address risks and vulnerabilities in their community.

3.1 STATUS OF PAST MITIGATION EFFORTS

The 2015 Lorain County Hazard Mitigation Plan included mitigation goals and strategies for the Lorain County, all cities and villages in the county, plus Carlisle Township. The current mitigation planning team reviewed these goals and activities to determine their current status, which is described in table 3-1.

Table 3-1: 2015 Mitigation Strategies

Strategy	Status
LORAIN COUNTY	
1. Lorain County will reduce the damages caused by flooding in all areas across the county.	
1.1. Lorain County will support land use regulation measures to minimize the effects of flooding.	Ongoing
1.1.1. Lorain County will sustain, support, adopt, and enforce building codes, floodplain regulations, zoning regulations, and other use and construction standards as applied to development of commercial and residential neighborhoods.	Ongoing
1.1.2. Lorain County will develop and adopt a countywide comprehensive land use plan.	Ongoing
1.1.3. Lorain County will educate and advocate for development practices across the county that take into consideration cross-jurisdictional consequences of development, and requires counter-measures to prevent negative effects on neighboring communities.	Ongoing
1.1.4. Lorain County will protect the floodplains from all development through adoption of flood maps and floodplains established by FEMA, and through enforcement of floodplain regulation.	Ongoing
1.2. Lorain County will educate residents and businesses about the need for casualty insurance to cover the cost of losses due to storms, disasters, and other emergency incidents.	Ongoing
1.2.1. Lorain County will support the NFIP program.	Ongoing
1.2.2. Lorain County will maintain adoption of FEMA flood mapping.	Ongoing
1.2.3. Lorain County will advocate for property owners’ utilization of adequate casualty insurance to reduce the individual cost of disaster related damages.	Ongoing
1.3. Lorain County will decrease the effects of flooding by managing storm water so that properties are not damaged by excessive runoff or storm water, especially during periods of heavy precipitation or snow melt.	Ongoing

Strategy	Status
1.3.1.Lorain County will facilitate, conduct, support, and complete a countywide storm water study that results in a storm water management plan for the whole county.	Ongoing
1.3.2.Lorain County will implement a countywide storm water management action plan as finances and jurisdictional participation allows.	Ongoing
1.3.3.Lorain County will support jurisdictions in the improvement and/or replacement of worn and inadequate storm water infrastructure.	Ongoing
1.3.4.Lorain County will educate, advocate, and facilitate effective waterway clearing and cleaning to remove built-up debris and sediment and to facilitate natural runoff for storm water	Ongoing
1.4. Lorain County will restore developed floodplains to a natural habitat state where repeated flooding occurs and causes damage to property.	Ongoing
1.4.1.Lorain County will utilize grant programs to fund the acquisition of properties and the restoration of natural habitat in areas where development has taken place on at-risk property.	Ongoing
1.4.2.Lorain County will support and advocate for the establishment of vegetative buffer zones, retention ponds, dams, levees, and other structural devices to manage storm water and flood water so it does not cause property damage.	Ongoing
1.4.3.Lorain County will support, encourage, and conduct projects to repair and maintain dams, levees, and other structures that control the flow of water and limit or prevent flooding in developed areas.	Ongoing
1.5. Lorain County will investigate, support, sustain, and/or conduct acquisition and relocation projects for properties with severe and/or repetitive flood losses.	Ongoing
1.5.1.Lorain County will identify properties with severe and repeated severe losses due to flooding.	Ongoing
1.5.2.Lorain County will participate in Pre-Disaster Mitigation programs that facilitate and implement acquisition and demolition with relocation of the occupants of such property.	Ongoing
1.5.3.Lorain County will conduct acquisition, relocation, and demolition projects as funding becomes available and property owners are willing to participate.	Ongoing
1.6. Lorain County will support and install modifications and improvements to county roadways that decrease flooding and erosion of those roadways, such as elevation of the roadway.	Ongoing
2. Lorain County will implement timely and effective pre-incident warning and notification of dangerous weather and emergency incidents, as well as timely dissemination of updated information during an incident.	
2.1. Lorain County will install and sustain a countywide warning and notification system that utilizes digital methods and traditional electronics to notify residents and workers of impending inclement weather and immediate dangers by as many means as is possible.	Ongoing
2.2. Lorain County will identify those areas most prone to flash flooding, and will support development of data that links weather events to flooding outcomes using GIS technology, floodplain mapping, and other technology; the County will	Ongoing

Strategy	Status
work to notify those affected populations in a rapid and effective manner when necessary.	
3. Lorain County will identify and utilize protective facilities that enable residents and others to take shelter from severe weather, including storms that include rotational or straight-line winds, and other life-threatening conditions such as hail, heavy precipitation, and dust.	
3.1. Lorain County will identify the need for and facilitate the construction of safe rooms for residents and workers who live or work in structures that lack basements or other structural protection during tornadoes or high wind incidents.	Ongoing
3.2. Lorain County will facilitate the development and equipping of shelters, comfort stations, and service centers to be used before, during, and after disasters to help the people of Lorain County recover rapidly and effectively from disaster losses.	Ongoing
3.2.1. Lorain County will help residents have access to information about the location of shelters, comfort stations and service centers as part of preparedness for disasters.	Ongoing
3.2.2. Lorain County will support volunteers and organizations to be utilized during disasters to provide, supplement, sustain, or expand sheltering and gathering services available to victims.	Ongoing
4. Lorain County will facilitate, support, and at times conduct public awareness campaigns about disaster preparedness, safety, response, and recovery to mitigate losses and casualties because of disasters.	
4.1. Lorain County will develop and make available to residents and others information regarding the dangerous weather and other emergent incidents that are typical to occur in the county, and will identify the actions and counter-measures that are effective in safely enduring those incidents.	Ongoing
4.2. Lorain County will develop and make available to residents information regarding response and safety during disasters uncommon to Lorain County, such as earthquakes and landslides.	Ongoing
5. Lorain County will harden utility service and supply to residents and businesses, especially during extreme heat or cold that intensifies dependency upon utility services.	
5.1. Lorain County will work to advocate for underground electrical service lines across the county.	Ongoing
5.2. Lorain County will advocate for capital improvements to the electrical distribution systems to harden electrical service across the county.	Ongoing
5.3. Lorain County will advocate for improved natural and propane gas availability and distribution to residents and businesses during times of excessive need.	Ongoing
5.4. Lorain County will advocate for improved water intake and availability for residents, including sustainment of redundancy in distribution and supply, for times of extreme weather conditions or needs.	Ongoing
5.5. Lorain County will identify and establish redundant emergency sources for all utility services and supplies during heavy use and disaster circumstances.	Ongoing
6. Lorain County will improve communications between all first responders and first receivers during disasters and emergencies.	

Strategy	Status
6.1. Lorain County will support two-way radio upgrades and improvements by individual jurisdictions.	Ongoing
6.2. Lorain County will advocate and facilitate interoperability of communication systems between jurisdictions, disciplines, and departments.	Ongoing
6.3. Lorain County will coordinate and support interoperability in the 911 centers and EOC facilities across the county.	Ongoing
7. Lorain County will sustain mitigation efforts.	
7.1. Lorain County will serve as the primary monitor of strategies across the county in order to facilitate and encourage accomplishment of the identified strategies in this plan.	Ongoing
AMHERST	
1. Amherst will reduce the negative effects of flooding on the residents and properties in Amherst.	
1.1. Amherst will maintain and support land use planning efforts to lessen the impact of disaster upon the community.	Ongoing
1.1.1. Amherst will support and enhance residential building codes.	Ongoing
1.1.2. Amherst will support and enhance floodplain regulation and participation in NFIP flood insurance programs.	Ongoing
1.2. Amherst will support land conservation and preservation of natural wetlands as a means to prevent development in areas that are prone to flooding.	Ongoing
1.3. Amherst will research and assess the effects of upstream and downstream development upon the city as well as the impact of city development on adjacent jurisdictions.	Ongoing
1.4. Amherst will work with the Ohio Turnpike Commission and the State of Ohio to utilize the Turnpike Mitigation Program to resolve issues with storm water runoff caused by roadway system development near the city.	Ongoing
1.5. Amherst will consider acquisition, demolition, and relocation projects to eliminate flood losses where property owners are willing and funds exist to complete such projects.	Ongoing
2. Amherst will improve and expand its public warning and notification systems for the purpose of preventing casualties and damages by natural disasters.	
2.1. Amherst will work with and implement a reverse calling system in collaboration with the Lorain County EMA.	Ongoing
2.2. Amherst will use and improve warning and notification systems that utilize local cable television, websites, and other electronic means of mass communication.	Ongoing
3. Amherst will enhance and improve communications between responders and others to effectively communicate before, during, and after incidents.	
3.1. Amherst will support and implement the digital MARCS radio system P-25 standards among first responders and other departments as appropriate.	Ongoing
3.2. Amherst will work to complete mapping and CAD interface software in city departments to aid in management of storm water and other utilities during storms.	Ongoing
4. Amherst will conduct a public information campaign directed at property owners to lessen the damages, including utility outages, due to storms.	
4.1. Amherst will advocate for the proper maintenance of trees on private property to lessen the damages from severe storms.	Ongoing

Strategy	Status
4.2. Amherst will advocate for the proper maintenance of public property regarding tree trimming and vegetation control around and about utility lines.	Ongoing
5. Amherst will decrease utility outages during disasters.	
5.1. Amherst will harden the power services to critical facilities by acquiring and installing alternate power sources at critical and key facilities.	Ongoing
AVON	
1. Avon will reduce the negative effects of flooding on its residents and properties.	
1.1. Avon will advocate and educate officials and residents about the need to develop countywide storm water management planning and regulation.	Ongoing
1.1.1. Avon will participate in studies and analysis of storm water in Lorain County.	Complete
1.1.2. Avon will support the development of retention ponds, detention structures, and vegetative buffers to lessen flooding in downstream areas.	Complete
1.1.3. Avon will establish and support economic development standards that utilize current building codes, zoning standards and other land use planning regulations that take into consideration the consequences of development on storm water and flooding effects.	Complete
1.1.4. Avon will advocate for the proper maintenance of streams, ditches, and rivers to reduce debris and vegetation that causes water to back up and flood areas inside the city and upstream from the city.	Ongoing
1.1.5. Avon will advocate for property owners in floodplains to carry flood insurance as a way to protect and mitigate flood losses.	Complete
1.1.6. Avon will adopt and support current FEMA floodplain mapping by federal, state, and local agencies.	Complete
1.1.7. Avon will identify, establish, and maintain erosion control measures along streams, ditches and rivers, as well as along the shoreline of Lake Erie.	Complete
1.2. Avon will support and implement the proper maintenance of storm sewers and water lines to minimize flooding and maximize the ability for the city to manage storm runoff.	Complete
1.3. Avon will identify, seek funding for, and complete projects that acquire, relocate, and demolish repetitive flood loss structures.	Complete
1.4. Avon will create retention ponds, vegetative buffer zones, natural habitats, and barriers where flooding waterways cause repeated damages to properties that cannot feasibly be relocated or otherwise protected.	Complete
2. The City of Avon will support improvements to notification and warning systems.	
2.1. Avon will support and participate in the development of warning and notification systems that include digital methods of contact including text messaging, emails, as well as outdoor sirens to warn residents and workers of immediate dangers and inclement weather conditions.	Complete
3. Avon will improve storm shelter options for residents of the city.	
3.1. Avon will identify, support, and/or construct safe rooms for residents who live in multi-family housing developments and mobile homes without shelters for tornadoes and other severe wind incidents.	Ongoing
4. Avon will improve public awareness and education outreach for its residents regarding warning, notification, and information sharing.	

Strategy	Status
4.1. Avon will conduct and promote educational programs for children and families regarding flood safety, fire safety and prevention, and weather awareness and safety during storms and disasters.	Ongoing
4.2. Avon will create information to be posted electronically for resident and worker safety during and after an earthquake.	Ongoing
4.3. Avon will educate the public about heat and cold emergencies and how to be safe during those times as a way to minimize the emergency needs of the city during temperature extremes, and to minimize how significantly safety forces are overwhelmed during those times.	Ongoing
5. Avon will improve utility services' reliability during storms.	
5.1. Avon will work with utility providers to improve and harden utility services by burying utility lines in new and renovated residential areas, and by replacing old worn supply lines in older neighborhoods.	Ongoing
AVON LAKE	
1. The City of Avon Lake will build community-wide resiliency by minimizing the negative effects of all natural disasters on the city's property and residents.	
1.1. The City of Avon Lake will sustain awareness and advocacy of good regular maintenance procedures such as ditch bank maintenance, retention basin maintenance, upkeep and trimming of trees on properties, and clearing of excessive vegetation from streams and waterways.	Ongoing
1.2. The City of Avon Lake will work with conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion, and maintain natural habitats for the purpose of reducing flood and erosion risks.	Ongoing
1.3. The City of Avon Lake will update the existing comprehensive plan for land use within the jurisdiction, taking into account the consequences of development and the effect of existing properties and businesses, as well as the consequences on the communities downstream.	Ongoing
1.4. The City of Avon Lake will maintain and sustain building standards for construction, including contractor-vendor approval, industry stands for construction and reasonable construction materials guidance.	Ongoing
1.5. The City of Avon Lake will follow the Ohio Basic Building Code as a reference for disaster-resistant construction standards.	Ongoing
1.6. The City of Avon Lake will maintain land use ordinances that protect and preserve the best use and least damaging use of properties within the jurisdiction.	Ongoing
1.7. The City of Avon Lake will sustain requirements that new development follow sustainable design in planning new structures and land uses.	Ongoing
2. The City of Avon Lake will develop projects to lessen the damages to property from flooding.	
2.1. The City of Avon Lake will conduct acquisition and demolition/relocation projects to remove severe and repetitive loss structures and to prevent further losses.	Ongoing
2.2. The City of Avon Lake will require construction of retention ponds to hold runoff water during periods of heavy precipitation. Retention ponds will be required to contain the 100-year frequency storm runoff.	Ongoing

Strategy	Status
2.3. The City of Avon Lake will improve storm sewer systems to more adequately manage runoff water for all areas and enhance prevention /minimization of flooding in residential and commercial areas.	Ongoing
2.3.1.The City of Avon Lake will complete efforts to revise the city’s storm water master plan to include computer modeling.	Ongoing
2.3.2.The City of Avon Lake will maintain/repair retention basins and structures that hold or contain water that otherwise may flood homes and other properties.	Ongoing
2.4. The City of Avon Lake will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	Ongoing
3. The City of Avon Lake will educate the community about the notification system that warn them of impending disasters and the actions they should take immediately to protect themselves and their property.	
3.1. The City of Avon Lake will maintain the current Code Red communication system that enables the city to notify residents in numerous ways of impending danger and/or inclement weather risks.	Ongoing
3.2. The City of Avon Lake will improve the communication systems between first responders and other critical resources in the event of an emergency or disaster.	Ongoing
3.3. The City of Avon Lake will develop partnerships with Lorain County Emergency Management Agency and others to develop information dissemination capabilities that might include 2-1-1 and other community agencies that would enhance the community’s ability to communicate with all populations, including those with functional and special needs.	Ongoing
3.4. The City of Avon Lake will identify and communicate with special populations within the jurisdiction as it relates to disasters, warning and notification, and response.	Ongoing
3.5. The City of Avon Lake will educate the community about evacuation procedures and how to identify shelter locations, comfort stations, and service centers during disasters.	Ongoing
4. The City of Avon Lake will establish sites to be used as shelters, comfort stations, and service centers during disasters, and will strive to equip these sites with features necessary to adequately serve the community during storms, power outages, and other disasters.	
4.1. The City of Avon Lake will investigate and implement means to create and provide safe rooms for residents who live in homes built on concrete slabs, and other structures that lack storm shelters used as protection in wind and other severe storms.	Ongoing
5. The City of Avon Lake will work with utility providers to harden utility services and to prevent excessive outages during storms and inclement weather.	
5.1. The City of Avon Lake will bury power and utility lines in new neighborhoods, homes, and businesses.	Ongoing
5.2. The City of Avon Lake will replace deteriorating power, water, sewer, and other utility distribution systems.	Ongoing

Strategy	Status
5.3. The City of Avon Lake will develop protective actions to prevent or lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	Ongoing
5.4. The City of Avon Lake will work with wireless service providers to establish dependable and resilient wireless service within the jurisdiction to improve the capability to communicate during inclement weather and disasters.	Ongoing
6. The City of Avon Lake will improve structure identification systems in the city.	
6.1. Avon Lake will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	Ongoing
7. The City of Avon Lake will develop a solid waste and debris management plan for the city to facilitate rapid storm clean-up.	
7.1. Avon Lake will identify and approve disposal sites for disaster debris, including segregated solid waste such as construction materials, wood and combustible waste, masonry and concrete waste, metal waste, paper and general garbage, and hazardous waste.	Ongoing
8. The City of Avon Lake will implement a redundant secondary water supply to be used for purposes such as firefighting.	
8.1 Avon Lake will identify and implement a water supply plan for emergencies that supports, supplements, or serves in place of the municipal or county water supply during large fires.	Ongoing
8.2 The City of Avon Lake will advocate and support construction of ponds with the capability of being used as an alternative water supply that are equipped with dry hydrants.	Ongoing
CARLISLE TOWNSHIP	
1. Carlisle Township will work to minimize the effects of flooding on residents and properties in the township.	Defer to Lorain County
1.1. Carlisle Township will improve storm sewer systems to more adequately manage runoff water for all areas thus preventing/lessening flooding in residential and/or commercial properties.	Defer to Lorain County
1.2. Carlisle Township will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	Defer to Lorain County
1.3. Carlisle Township will construct retention ponds to hold runoff waters during periods of heavy precipitation.	Defer to Lorain County
1.4. Carlisle Township will maintain, repair, and replace dams, dikes, and reservoirs that hold or contain waters that otherwise might flood homes and other properties.	Defer to Lorain County
1.5. Carlisle Township will acquire, demolish and relocate families as a means to remove repetitive loss structures and prevent further losses.	Defer to Lorain County
1.6. Carlisle Township will work with conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion and maintain natural habitats to reduce flood and erosion risks and losses.	Defer to Lorain County
2. Carlisle Township will improve and harden utility services and infrastructure to improve the city's ability to manage storms, disasters, and other catastrophes without unnecessary loss.	Defer to Lorain County

Strategy	Status
2.1. Carlisle Township will replace aging and deteriorating power, sewer, and other utility distribution systems.	Defer to Lorain County
2.2. Carlisle Township will identify and implement a water supply plan for emergency purposes that support, supplement, or serve in place of a municipal or county water supply during large fires.	Defer to Lorain County
2.3. Carlisle Township will develop protective actions to lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	Defer to Lorain County
2.4. Carlisle Township will acquire a backup generator for public safety facilities and shelters.	Defer to Lorain County
2.5. Carlisle Township will bury power and utility lines in new neighborhoods, homes, and businesses.	Defer to Lorain County
3. Carlisle Township will develop, improve, and sustain effective communications during disasters for the purpose of saving lives and preserving property.	Defer to Lorain County
3.1. Carlisle Township will improve communication between first responders and other Critical resources before, during, and after disaster incidents.	Defer to Lorain County
3.2. Carlisle Township will partner with Lorain County Emergency Management Agency and others to develop communications capabilities such as text messages, phone call systems, and others to notify the public of impending danger or inclement weather risks.	Defer to Lorain County
3.3. Carlisle Township will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	Defer to Lorain County
3.4. Carlisle Township will develop, expand, and/or maintain an outdoor warning siren system.	Defer to Lorain County
3.5. Carlisle Township will work with wireless service providers to establish dependable and resilient wireless service within the city to improve the capability to communicate during inclement weather and disasters.	Defer to Lorain County
3.6. Carlisle Township will identify and communicate with special populations including those with functional and special needs regarding disaster related needs and recovery needs.	Defer to Lorain County
4. Carlisle Township will inform and advocate preventive and sustainable actions of property owners to decrease the damages to property during disasters, and to foster rapid recovery from storms and floods.	Defer to Lorain County
4.1. Carlisle Township will advocate to property owners about regular maintenance practices that result in preventing excessive damage to structures during storms such as ditch bank maintenance, tree trimming and clearing excessive vegetation from streams and waterways.	Defer to Lorain County
5. Carlisle Township will develop a comprehensive plan for land use within the township, taking into account the consequences of development and the effect on existing properties and businesses, as well as consequences on communities downstream.	Defer to Lorain County
5.1. Carlisle Township will consider establishing land use ordinances that protect and preserve the best and least damaging property use within the city.	Defer to Lorain County
5.2. Carlisle Township will consider the creation of building standards for construction, including such practices as contractor-vendor approval,	Defer to Lorain County

Strategy	Status
acceptable industry standards for construction, and reasonable construction materials guidance.	
6. Carlisle Township will develop storm shelters, community rooms, and other protective measures for residents and visitors during severe storms.	Defer to Lorain County
6.1. Carlisle Township will investigate and implement safe rooms for residents who live in mobile homes, homes built on concrete slabs, and other structures that lack storm shelters used as protection in wind and other severe storms.	Defer to Lorain County
6.2. Carlisle Township will educate the community about evacuation procedures and how to identify shelters, comfort stations, and service centers.	Defer to Lorain County
6.3. Carlisle Township will update lists of sites to be used as shelters, comfort stations, and service centers during storms, power outages, and other disasters.	Defer to Lorain County
7. Carlisle Township will develop improved debris management to make recovery faster and more effective.	Defer to Lorain County
7.1. Carlisle Township will identify and approve disposal sites for disaster debris including segregated solid waste, construction materials, wood combustibles, masonry, concrete, and metal waste, paper, general garbage, and hazardous waste.	Defer to Lorain County
ELYRIA	
1. The City of Elyria will develop, improve, and sustain effective communications during disasters for the purpose of saving lives and preserving property.	
1.1. The City of Elyria will improve communication between first responders and other critical resources.	Ongoing
1.2. The City of Elyria will partner with Lorain County Emergency Management and other agencies to develop or acquire communications tools such as text messages phone call systems, and others to notify the public of impending danger or inclement weather risks.	Ongoing
1.3. The City of Elyria will educate the community about evacuation procedures and how to identify shelters, comfort stations, and service centers.	Ongoing
1.4. The City of Elyria will develop expand, and/or maintain an outdoor warning siren system.	Ongoing
1.5. The City of Elyria will identify and communicate with special populations including those with functional and special needs.	Ongoing
1.6. The City of Elyria will identify and communicate with special populations including those with functional and special needs.	Ongoing
2. The City of Elyria will engage in property and natural resources mitigation.	
2.1. The City of Elyria will educate and advocate to property owners about regular maintenance practices that result in preventing excessive damage to structures during storms such as ditch bank maintenance, tree trimming and clearing excessive vegetation from streams and waterways.	Ongoing
2.2. The City of Elyria will consider development of a comprehensive plan for land use within the city, taking into account the consequences of development and the effect on existing properties and businesses, as well as consequences on communities downstream.	Ongoing
2.3. The City of Elyria will investigate and implement means to create and provide safe rooms for residents who live in mobile homes, homes built on concrete	Ongoing

Strategy	Status
slabs, and other structures that lack storm shelters used as protection in wind and other severe storms.	
2.4. The City of Elyria will consider establishing land use ordinances that protect and preserve the best and least damaging property use within the city.	Ongoing
2.5. The City of Elyria will consider the creation of building standards for construction, including such practices as contractor-vendor approval, acceptable industry standards for construction, and reasonable construction materials guidance.	Ongoing
2.6. The City of Elyria will work with conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion and maintain natural habitats to reduce flood and erosion risks.	Ongoing
3. The City of Elyria will work to mitigate flood consequences.	
3.1. The City of Elyria will work to improve storm sewer systems to more adequately manage runoff water for all areas thus preventing/lessening flooding in residential and/or commercial properties.	Ongoing
3.2. The City of Elyria will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	Ongoing
3.3. The City of Elyria will consider construction of retention ponds to hold runoff waters during periods of heavy precipitations.	Ongoing
3.4. The City of Elyria will work to maintain/repair/replace dams, dikes, and reservoirs that hold or contain waters that otherwise might flood homes and other properties.	Ongoing
3.5. The City of Elyria will consider acquisition and demolition projects to remove repetitive loss structures and prevent further losses.	Ongoing
4. The City of Elyria will protect utilities as part of the mitigation efforts.	
4.1. The City of Elyria will work to replace aging and deteriorating power, sewer, and other utility distribution systems.	Ongoing
4.2. The City of Elyria will work to develop protective actions to lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	Ongoing
4.3. The City of Elyria will work with wireless service providers to establish dependable and resilient wireless service within the city to improve the capability to communicate during inclement weather and disasters.	Ongoing
4.4. The City of Elyria will work to bury power and utility lines in new neighborhoods, homes, and businesses.	Ongoing
5. The City of Elyria will take other actions to promote disaster mitigation and lessen damages due to storms and natural hazards.	
5.1. The City of Elyria will identify and implement a water supply plan for emergency purposes that supports, supplements, or serves in place of a municipal or county water supply during large fires.	Ongoing
5.2. The City of Elyria will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	Ongoing
5.3. The City of Elyria will acquire backup generators for public safety facilities and shelters.	Ongoing

Strategy	Status
5.4. The City of Elyria will update the list of sites to be used as shelters, comfort stations, and service centers during storms, power outages, and other disasters.	Ongoing
5.5. The City of Elyria will advocate and support the construction of ponds with the capability of being used as an alternative water supply and equip these with dry hydrants.	Ongoing
5.6. The City of Elyria will identify and approve disposal sites for disaster debris including segregated solid waste (construction materials, wood, combustibles, masonry, concrete, and metal), paper, general garbage and hazardous waste.	Ongoing
GRAFTON	
1. The Village of Grafton will maintain residential and commercial building codes to include a regular inspection program and contractor registration for work within the village.	
1.1. The Village of Grafton will establish and support a Fire Safety inspection Bureau at the fire department to enhance the enforcement and application of building codes in the village.	Ongoing
1.2. The Village of Grafton will provide special rescue and technical training to first responders to minimize the loss of life during disasters, and to facilitate the safe conduct of rescue operations during incidents.	Ongoing
2. The Village of Grafton will harden utility service in the village so that life-sustaining services are not interrupted during storms and disasters.	
2.1. The Village of Grafton will install upgrades and updates to the electrical and water supply systems.	Ongoing
2.2. The Village of Grafton will add a redundant water supply source to decrease dependency during disaster upon a single supply.	Ongoing
2.3. The Village of Grafton will install a replacement water tower with the purpose of hardening water supply to residents and businesses during disasters and inclement weather conditions.	Ongoing
2.4. The Village of Grafton will remove old and deteriorated utility systems equipment and facilities with the purpose of decreasing the likelihood of damage to property caused by these structures during a disaster or severe storm.	Ongoing
2.5. The Village of Grafton will identify and implement proactive maintenance procedures to decrease the incidence of failure during disasters and storms.	Ongoing
3. The Village of Grafton will improve emergency and crisis communications systems and interoperability.	
3.1. Grafton will improve emergency and crisis communications equipment for the purpose of interoperability with Lorain County and other jurisdictions during large scale and extended emergencies and disasters.	Ongoing
4. The Village of Grafton will reassess, improve, and identify shelters, community gathering rooms, and comfort stations for use during disasters and long-term power outages.	
4.1. The Village of Grafton will evaluate and plan for appropriate acquisition and installation of safe rooms as funding becomes available for those residents who live in mobile homes, homes built on concrete slabs, or those who live in buildings that lack subsurface shelters.	Ongoing
5. The Village of Grafton will inform residents about disaster preparedness.	

Strategy	Status
5.1. Grafton will conduct a public education campaign to educate the residents about disaster preparedness and response, including natural and transportation disaster risks.	Ongoing
6. The Village of Grafton will protect properties from flooding through acquisition, demolition, and relocation projects to eliminate flood losses where property owners are willing and funds exist to complete such projects.	Ongoing
KIPTON	
1. The Village of Kipton will improve notification and warning systems for residents of Kipton.	
1.1. Kipton will support and advocate for use of a countywide emergency notification system that utilizes various forms of technology to notify residents of impending danger or inclement weather.	Complete
2. The Village of Kipton will minimize the losses from flooding.	
2.1. Kipton will identify repetitive or severe loss structures for acquisition and demolition and relocation for the occupants and by applying for and using funds to complete these projects.	Ongoing
2.2. The Village of Kipton will support and participate in a countywide storm water assessment and implementation of a countywide plan to manage storm water to minimize flooding across the county.	Complete
3. The Village of Kipton will support improvement to individual sheltering options during severe storms in the village.	
3.1. Kipton will work to establish safe rooms for households that lack basements or other appropriate shelter during severe storms such as tornadoes.	Ongoing
LAGRANGE	
1. Lagrange will support and maintain land use planning efforts that lessen the effects of natural disasters on the properties located in the village.	
1.1. Lagrange will continue its contractor registration process to ensure high quality services are provided after storms have damaged properties.	Ongoing
1.2. Lagrange will maintain residential and commercial building codes, zoning regulations, flood plain regulations, and other standards intended to protect and preserve high quality construction, renovation, and repair.	Ongoing
2. Lagrange will support and maintain warning and notification systems.	
2.1. Lagrange will maintain a notification system that advise residents and workers of dangerous or critical situations, and that communicate weather alerts in a timely fashion.	Ongoing
3. Lagrange will support and construct projects that lessen the effects of flooding on the village.	
3.1. Lagrange will complete and sustain a storm water improvement project funded through user fees charged to property owners under an assessment program.	Ongoing
3.2. Lagrange will identify publicly owned locations in the village that flood repeatedly during or after heavy precipitation or runoff, and analyze the effects of that flooding on the community.	Ongoing
3.3. Lagrange will develop corrective actions to alleviate flooding that prevents access to specific properties during times of heavy rain or runoff.	Ongoing

Strategy	Status
3.4. Lagrange will participate in acquisition, demolition, and relocation projects for properties that have severe or repetitive flood loss and property owners are willing to take action.	Ongoing
4. Lagrange will identify service facilities for use by residents during storms and disasters.	
4.1. Lagrange will establish an approved overnight shelter within the village limits to be used during evacuations, extended power outages, and other emergency situations.	Ongoing
4.2. Lagrange will establish a community comfort station to be used during daytime emergencies for the purpose of feeding and hydration, communication, supply distribution, and social gathering.	Ongoing
LORAIN	
1. The City of Lorain will improve warning and notification systems that alert residents of impending dangers or inclement weather.	
1.1. Lorain will support and participate in a countywide warning and notification system that includes digital notification, social media, and reverse telephone notifications to warn residents about immediate dangers and inclement weather.	Ongoing
1.2. Lorain will assess the need for additional outdoor warning sirens, and will install additional devices in areas where current coverage is minimal or insufficient.	Ongoing
2. The City of Lorain will identify, establish, and utilize protective measures to shelter residents during dangerous weather or other inclement situations.	
2.1. Lorain will support the Lorain County EMA and American Red Cross in the identification of, support for and use of shelters during evacuations and extreme weather conditions, power outages, or other disasters.	Ongoing
2.2. Lorain will work with Lorain County to identify and establish comfort stations and service centers to be used to serve residents quickly and efficiently during disasters.	Ongoing
3. Lorain will restore natural habitat in areas prone to flooding, or those that have been developed and would best be returned to natural habitat due to flood risk.	
3.1. Lorain will work with conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion, and to maintain natural habitats for the purpose of reducing flood and erosion/beachfront erosion during weather incidents.	Ongoing
4. The City of Lorain will enforce, support, and enhance building codes, zoning regulations, and other land use regulation where disaster losses can be prevented by such actions.	
4.1. Lorain will improve and sustain a contractor registration process for work done inside the city with the purpose of preventing inadequate and improper construction practices during disaster response and recovery, and as a way to ensure compliance with current land use and building regulations.	Ongoing
4.2. Lorain will develop a comprehensive land use plan for the city, including sustainment of regulations that lessen the negative effects of disasters.	Ongoing
5. The City of Lorain will maintain, improve, and sustain adequate power lines, utility lines, and other infrastructure to prevent extreme losses during inclement weather and disasters.	

Strategy	Status
5.1. Lorain will utilize fees and assessments to property owners to fund the improvements to infrastructure for the purpose of constructing more resilient utilities.	Ongoing
5.2. Lorain will bury utilities in new neighborhoods or commercial developments.	Ongoing
6. The City of Lorain will improve location identification and communication for emergency responders.	
6.1. Lorain will improve GIS mapping and addressing in the city to facilitate rapid location and assistance to residents and businesses by public safety and public works during disasters, thus decreasing the loss and casualty occurrences during those incidents.	Ongoing
7. The City of Lorain will improve services to special populations during disasters to minimize loss of life and injuries.	
7.1. Lorain will work to identify, analyze, and establish critical services for the children of the city who are economically disadvantaged or considered in need of assistance for safety and security needs.	Ongoing
NORTH RIDGEVILLE	
1. The City of North Ridgeville will minimize the negative effects of flooding on its residents and properties.	
1.1. North Ridgeville will educate and advocate to property owners good regular maintenance practices that result in preventing excessive damages to structures during storms, such as ditch bank maintenance, trimming trees, and clearing excessive vegetation from streams and waterways.	Ongoing
1.2. North Ridgeville will support the construction of retention ponds to hold runoff waters during periods of heavy precipitation.	Ongoing
1.3. North Ridgeville will improve storm sewer systems to more adequately manage runoff water for all areas and thus prevent/lessen flooding in residential and/or commercial properties.	Ongoing
1.4. North Ridgeville will construct new storm sewers to adequately handle runoff and drainage loads where development, wear and tear, or lack of structures makes flooding likely.	Ongoing
1.5. North Ridgeville will reduce the impact of natural hazard by preserving or restoring natural areas and their mitigation functions through erosion and sediment control of waterways.	Ongoing
1.6. North Ridgeville will work with other conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion, and maintain natural habitats for the purpose of reducing flood and erosion risks.	Ongoing
1.7. North Ridgeville will participate in acquisition, demolition, and relocation projects for properties that have severe or repetitive losses and property owners are willing to participate.	Ongoing
2. North Ridgeville will improve warning and notification systems and will improve general communication with residents during disasters to more effectively recover from disasters.	
2.1. North Ridgeville will investigate and identify communication tools such as text messages, phone call systems, and others, perhaps as part of a countywide system, to effectively notify the community of impending danger and/or inclement weather risks.	Ongoing

Strategy	Status
3. North Ridgeville will conduct preparedness outreach and education programs for residents of the city.	
3.1. North Ridgeville will educate the community about evacuation procedures and how to identify shelter locations, comfort stations, and service centers during disasters.	Ongoing
4. The City of North Ridgeville will identify, establish, and utilize protective measures to shelter residents during dangerous weather or other inclement situations.	
4.1. North Ridgeville will support the Lorain County EMA and American Red Cross in the identification of, support for and use of shelters during evacuations and extreme weather conditions, power outages, or other disasters.	Ongoing
4.2. North Ridgeville will work with Lorain County to identify and establish comfort stations and service centers to be used to serve residents quickly and efficiently during disasters.	Ongoing
OBERLIN	
1. The City of Oberlin will reduce the negative effects of flooding on city residents and properties.	
1.1. Oberlin will support progressive storm water management by facilitating widespread development of countywide storm water planning to help prevent downstream flooding.	Ongoing
1.2. Oberlin will strive to install vegetative buffer zones and natural habitat restoration in areas that flood on a repeated basis, especially along Plum Creek, and will work with property owners to facilitate those conservation measures.	Ongoing
1.3. Oberlin will support residential and commercial building code enforcement, floodplain management, and zoning regulations in an attempt to minimize flooding and property loss due to flooding.	Ongoing
1.4. Oberlin will use, when funding is available, acquisition, relocation, and demolition projects for structures that incur repeated flooding and/or are located in a high-risk flood zone.	Ongoing
2. Oberlin will work to harden utilities within the city to foster rapid recovery from disasters.	
2.1. Oberlin will continue to search for a means to provide alternate power supplies for all critical facilities within the city to insure the continuation of life-saving services during severe weather, disasters, and long periods of power outages and other storms.	Ongoing
3. Oberlin will improve sheltering and protective measures available to residents during severe storms.	
3.1. Oberlin will support a countywide program for identification of safe rooms for residents and visitors in wind-resistant shelters.	Ongoing
4. Oberlin will improve emergency communications within the city and with all entities in Lorain County to lessen the loss of life and property during disasters.	
4.1. Oberlin will participate in a countywide interoperable communications system that includes tactical frequencies for public safety as well as city administration and other important service providers.	Ongoing
4.2. Oberlin will support the maintenance of its current notification system, and will consider support of a countywide emergency notification system that includes text messaging, mobile apps, emails, and other digital and social media.	Complete

Strategy	Status
5. Oberlin will identify and plan for emergency operations with all populations in order to protect the life and safety residents, visitors, and workers during natural disasters.	
5.1. Oberlin will strive to clarify and coordinate emergency efforts with special populations and groups so that those who reside in multi-family housing are adequately served during emergencies and disasters.	Ongoing
ROCHESTER	
1. The Village of Rochester will improve rapid warning and notification systems.	
1.1. Rochester will support and a countywide emergency notification system that utilizes various forms of technology to notify residents of impending danger or inclement weather.	Complete
2. The Village of Rochester will decrease the impact of flooding on village residents.	
2.1. Rochester will identify repetitive or severe loss structures for acquisition and demolition and relocation for the occupants and by applying for and using funds to complete these projects.	Ongoing
3. The Village of Rochester will support countywide flood mitigation studies.	
3.1. Rochester will participate in a countywide storm water assessment and implementation of a countywide plan to manage storm water to minimize flooding across the county.	Ongoing
SHEFFIELD VILLAGE	
1. Sheffield will advocate and educate officials and residents about the need to develop countywide storm water management planning and regulation.	
1.1. Sheffield will participate in storm water study in Lorain County, and will develop retention ponds, detention structures, and vegetative buffers to lessen flooding in downstream areas.	Ongoing
1.2. Sheffield will establish and support economic development standards that utilize current building codes, zoning standards, and other land use planning regulations that take into consideration the effect of development on storm water and flooding effects.	Ongoing
2. The Village of Sheffield will reduce the negative effects of flooding on village residents and properties.	
2.1. Sheffield will advocate for the proper maintenance of streams, ditches, and rivers to reduce debris and vegetation that causes water to back up and flood areas inside the city and upstream from the city.	Ongoing
2.2. Sheffield will advocate for property owners in floodplains to carry flood insurance as a way to protect and mitigate flood losses.	Ongoing
2.3. Sheffield support current FEMA floodplain mapping by federal, state, and local agencies.	Ongoing
2.4. Sheffield will identify, establish, and maintain erosion control measures along streams, ditches and rivers, as well as along the shoreline of Lake Erie.	Ongoing
2.5. Sheffield will implement the proper maintenance of storm sewers and water lines to minimize flooding and maximize the ability for the city to manage storm runoff.	Ongoing
2.6. Sheffield will identify and complete projects that acquire, relocate, and demolish repetitive flood loss structures.	Ongoing

Strategy	Status
2.7. Sheffield will create retention ponds, vegetative buffer zones, natural habitats, and barriers where flooding waterways cause repeated damages to properties that cannot feasibly be relocated or otherwise protected.	Ongoing
3. The Village of Sheffield will improve warning and notification for residents.	
3.1. Sheffield will participate in the development of warning and notification systems that include digital methods of contact including text messaging, emails, as well as outdoor sirens to warn residents and workers of immediate dangers and inclement weather conditions.	Ongoing
4. The Village of Sheffield will improve protective actions available during severe storms.	
4.1. Sheffield will provide safe room programs for residents who live in congregate housing developments and mobile homes without shelters for tornadoes and other severe wind incidents.	Ongoing
5. The Village of Sheffield will harden utility services during storms and disasters.	
5.1. Sheffield will collaborate with utility providers to improve and harden utility services by burying utility lines in new and renovated residential areas, and by replacing old worn supply lines in older neighborhoods.	Ongoing
6. The Village of Sheffield will conduct public outreach and education programs to minimize the loss of life and property during disasters.	
6.1. Sheffield will conduct educational programs for children and families regarding flood safety, fire safety and prevention, and weather awareness and safety during storms and disasters.	Ongoing
6.2. Sheffield will create information to be posted electronically for resident and worker safety during and after an earthquake.	Ongoing
6.3. Sheffield will educate the public about heat and cold emergencies and how to be safe and secure during those times as a way to minimize the emergency needs of the city during temperature extremes, and to minimize how badly safety forces are overwhelmed during those times.	Ongoing
SHEFFIELD LAKE	
1. The City of Sheffield Lake will educate the community about the notification systems that warn them of impending disasters and the actions they should take immediately to protect themselves and their property.	
1.1. Sheffield Lake will investigate and identify communication tools such as text messages, phone call systems, and others, perhaps as part of a countywide system, to effectively notify the community of impending danger and/or inclement weather risks.	Ongoing
1.2. Sheffield Lake will improve the communication systems between first responders and other critical resources in the event of an emergency or disaster.	Ongoing
1.3. Sheffield Lake will develop partnerships with Lorain County Emergency Management and other agencies to develop information dissemination capabilities that might include 2-1-1 and other community agencies, and would enhance the community's ability to communicate with all populations, including those with functional and special needs.	Ongoing

Strategy	Status
1.4. Sheffield Lake will effectively identify and communicate with special populations within the jurisdiction as it relates to disasters, warning and notification, and response.	Ongoing
1.5. Sheffield Lake will educate the community about evacuation procedures and how to identify shelter locations, comfort stations, and service centers during disasters.	Ongoing
2. The City of Sheffield Lake will improve protective options for residents during severe storms and disasters.	
2.1. Sheffield Lake will establish sites to be used as shelters, comfort stations, and service centers during disasters, and will strive to equip these sites with the features necessary to adequately serve the community during storms, power outages, and other disasters.	Ongoing
3. The City of Sheffield Lake will identify and implement a water supply plan for emergency purposes that support, supplement, or serve in place of a municipal or county water supply during large fires.	
3.1. Sheffield Lake will construct ponds with the capability of being used as an alternate water supply, and that are equipped with dry hydrants.	Ongoing
4. The City of Sheffield Lake will conduct public outreach and education for property owners to reduce the effects of disasters.	
4.1. Sheffield Lake will educate about and advocate to property owners good regular maintenance practices that result in preventing excessive damages to structures during storms, such as ditch bank maintenance, trimming trees, and clearing excessive vegetation from streams and waterways.	Ongoing
5. The City of Sheffield Lake will develop projects to lessen the damages to property from flooding.	
5.1. Sheffield Lake will use acquisition and demolition projects to remove repetitive loss structures and prevent further losses.	Ongoing
5.2. Sheffield Lake will construct retention ponds to hold runoff waters during periods of heavy precipitation.	Ongoing
5.3. Sheffield Lake will improve storm sewer systems to more adequately manage runoff water for all areas and thus prevent/lessen flooding in residential and/or commercial properties.	Ongoing
5.4. Sheffield Lake will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	Ongoing
6. The City of Sheffield Lake will work with utility providers to harden utility services and to prevent excessive outages during storms and inclement weather.	
6.1. Sheffield Lake will bury power and utility lines in new neighborhoods, homes, and businesses.	Ongoing
6.2. Sheffield Lake will replace aging and deteriorating power, water, sewer, and other utility distribution systems.	Ongoing
6.3. Sheffield Lake will develop protective actions to prevent or lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	Ongoing

Strategy	Status
6.4. Sheffield Lake will work with wireless service providers to establish dependable and resilient wireless service within the jurisdiction to improve the capability to communicate during inclement weather and disasters.	Ongoing
7. The City of Sheffield Lake will improve location identification capability to lower response times and increase accuracy in response.	
7.1. Sheffield Lake will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	Ongoing
8. The City of Sheffield Lake will improve recovery times by more effectively managing storm clean-up.	
8.1. Sheffield Lake will identify and approve disposal sites for disaster debris, including segregated solid waste such as construction materials, wood and combustible waste, masonry and concrete waste, metal waste, paper and general garbage, and hazardous waste.	Ongoing
SOUTH AMHERST	
1. The Village of South Amherst will support effective notification and warning systems.	
1.1. South Amherst will maintain an emergency notification system that utilizes various forms of technology to notify residents of impending danger or inclement weather.	Ongoing
2. The Village South Amherst will minimize the losses from flooding.	
2.1. South Amherst will participate in countywide planning to assess and manage storm water to minimize flooding across the county.	Ongoing
3. The Village of South Amherst will participate in a countywide storm water assessment.	
3.1. South Amherst will participate in countywide planning to assess and manage storm water to minimize flooding across the county.	Ongoing
4. The Village of South Amherst will harden utility supplies during disasters.	
4.1. South Amherst will bury utility lines for all new construction.	Ongoing
4.2. South Amherst will make improvements to the storm sewer system in the village to lessen flooding by facilitating good and rapid drainage capabilities.	Ongoing
4.3. South Amherst will develop a redundant water supply for the village with the purpose of lessening water outages when intake is impeded by extremely cold weather.	Ongoing
5. The Village of South Amherst will support improvements and clarity to emergency communications components.	
5.1. South Amherst will improve GIS mapping for the village to eliminate confusion when first responders must find specific locations.	Ongoing
5.2. South Amherst will improve communications interoperability between local first responders as well as between village responders and other adjacent and county departments.	Ongoing
6. The Village of South Amherst will improve shelter capacity in the village.	
6.1. South Amherst will facilitate placement of safe rooms on properties that lack wind-safe shelter.	Ongoing
VERMILION	
1. The City of Vermilion will lessen the negative effects of flooding within the city.	

Strategy	Status
1.1. Vermilion will use acquisition and relocation programs for repetitive flood loss properties.	Ongoing
1.2. Vermilion will educate property owners and advocate for flood insurance coverage for properties in locations where flood damage is likely.	Ongoing
1.3. Vermilion will acquire properties prone to flooding, and to restore the properties to a natural state, as appropriate, through cooperation with park and recreations groups, conservation groups, state agencies, and other appropriate resources.	Ongoing
1.4. Vermilion will improve storm sewer systems to more adequately manage runoff water for all areas and thus prevent or lessen flooding in residential and/or commercial properties.	Ongoing
2. The City of Vermilion will ensure the availability of potable drinking water for residents during extremely cold periods or extended cold periods.	
2.1. Vermilion will identify, design, and implement improvements to water supply intake systems to lessen the negative effect of ice jams on the water supply.	Ongoing
2.2. Vermilion will maintain relationships with water providers such as Erie County, Lorain, and Northern Ohio Rural Water to provide a redundant water supply when intake sources are not operational for the city's normal water system.	Ongoing
3. The City of Vermilion will develop and sustain resilient utility services through communication with property owners that advocate and educate them about responsible property ownership.	
3.1. Vermilion will advocate regular and effective tree trimming, debris management, and ditch maintenance for private property owners.	Ongoing
3.2. Vermilion will identify funding for and purchase alternate power supplies for critical facilities within the city.	Ongoing
3.3. Vermilion will identify funding for and purchase at least one large, portable generator to be used to sustain critical services on site during storms or aftermath.	Ongoing
4. The City of Vermilion will maintain public outreach efforts to lessen the effects of natural disasters on the residents of the city.	
4.1. Vermilion will maintain their municipal warning and notification system.	Ongoing
4.2. Vermilion will distribute educational materials about evacuation, shelters, and comfort stations to the residents for their use and safety during evacuations and severe storms.	Ongoing
WELLINGTON	
1. The Village of Wellington will improve warning and notification systems.	
1.1. Wellington will expand the outdoor warning siren system to harden and improve warning and notification capabilities. As the geographic footprint of the community has expanded, and development on the periphery of the village has occurred, the current central siren needs to be improved with the installation of outlying sirens to more effectively inform the public. The current system does not have a verbal warning capability, so that will be considered as a feature in a new system.	Ongoing
1.2. Wellington will install additional siren/voice notification nodes at strategic locations to improve warning capabilities.	Ongoing

Strategy	Status
2. Wellington, through its Electric Department, will create a redundant and separate electrical grid interconnection to harden utility services and to prevent excessive outages during storms and inclement weather.	
2.1. Wellington will build a new substation that will be a second interconnection to the grid power supply and will be fed by a separate distribution line from the area electrical transmission company. This will provide redundancy at both the local interconnection level and at the distribution level and should significantly harden the utility to storm impacts.	Ongoing

3.2 RISK PRIORITIES

The Hazard Identification and Risk Assessment provides a detailed explanation of the hazards and risks identified by Lorain County. This strategy section builds on that information by identifying mitigation strategies that would reduce vulnerability to the identified hazards.

Strategies were prioritized based on the hazard rank in the HIRA. The hazards were ranked using a comprehensive process that included frequency, response duration, speed of onset, magnitude, business impact, human impact, and property impact. Each set of strategies includes a goal statement related to the specific hazard. Under each goal, multiple mitigation strategies, or objectives, were created based on the proposed actions to reduce vulnerability.

The planning team considered actions that would benefit the greatest number of people and how the strategy would be funded. For some strategies, funding will come from the jurisdiction’s general budget while others will require special funding such as state or federal grants. Feasibility of the action and cost of implementation were also considered. In general, strategies that were less expensive or easier to implement were prioritized higher because they were more likely to be completed. Projects requiring state or federal grant funding, extensive multi-agency collaboration, or other more complicated processes were considered lower priority because they would take more time to complete.

At strategy review meetings and during the final plan review phase, jurisdictions and stakeholders had the opportunity to revise strategies and adjust the prioritization. The final strategies presented in this section reflect those adjustments and revisions.

3.3 MITIGATION GOALS AND STRATEGIES

Planning Team members and stakeholders worked by jurisdiction and collaboratively as a county to develop appropriate mitigation goals and strategies. Draft strategies were developed based on the input provided by the stakeholders and presented to the planning team and community for public review and comment. Strategies were revised accordingly to finalize the mitigation goals and strategies presented in this section. Strategies for specific jurisdictions vary from the countywide in priority of the problem and the potential solution.

Each strategy developed was assigned a priority, status, action type, funding source, project lead, and timeline, as described below. While these specific details may change prior to implementation of a strategy, the exercise of developing this information required stakeholders to consider the resources, staffing, and funding that would be necessary to implement mitigation strategies.

Priority

Priority identifies the order of importance jurisdictions assigned to each strategy. Strategies may not be addressed in this exact order, depending on availability of funds and other circumstances. Strategies will be prioritized based upon funding, hazard impact, and availability of staff to manage the project.

Status

Status identifies if the strategy is new to this mitigation plan or a strategy that was carried over from the previous plan.

- New: Strategy is new to the mitigation plan.
- Ongoing: Strategy is carried over from the previous mitigation plan but may be revised to better reflect the current need. Work has not been achieved in its entirety; more activity is necessary to complete this action.
- Unchanged: Strategy is carried over from the previous mitigation plan with no changes. The action is still necessary, but no progress has been made at this time.

Action Type

Action type describes the kind of activity described in the strategy.

- Natural Resource Protection – Reduce the impacts of natural hazard by preserving or restoring natural areas and their mitigation functions
- Prevention – Avoid hazard problems or stop impact from worsening
- Property Protection – Protect structures by modifying or strengthening building to withstand impact
- Public Information – Advise the public about hazards, hazardous areas, and mitigation techniques to protect people and property
- Structurally Engineered– Lessen the impact of a hazard by modifying the environment or progression of the hazard event through designed and engineered projects

Funding Source

Mitigation strategies can be funded through a variety of sources. Depending on the type and cost of the project, different funding sources will be available and appropriate. Each strategy identifies potential funding sources based on this list:

- CWSRF – Clean Water State Revolving Fund
- CRP – Conservation Reserve Program
- CRGP – Coastal Resilience Grant Program
- GLRI – Great Lakes Restoration Initiative
- TMP – Turnpike Mitigation Program
- CDBG – Community Development Block Grants
- H2Ohio – Program that provides assistance for wetland and floodplain projects
- HHPD – High Hazard Potential Dam Grant Program
- HMGP – Hazard Mitigation Grant Program
- FMA – Flood Mitigation Assistance
- BRIC – Building Resilient Infrastructure in Communities
- SRL – Severe Repetitive Loss Program
- EMPG – Emergency Management Performance Grant
- HSGP – Homeland Security Grant Program
- ICC – Increased Cost of Compliance (including fees, rate increases or premiums)
- LOC – Local Funds
- Other– Other (including private funds and non-governmental agency funding)

Project Lead

The project lead is the individual or agency charged with championing the strategy and ensuring that jurisdiction officials look for opportunities to complete the strategy over the five-year planning cycle. The lead is responsible for coordinating the overall effort and/or is the entity most appropriate to lead project development at the initial state but may not necessarily be responsible for project oversight or completion should the strategy develop into an actionable and funded project.

Timeline

The timeline identifies the time frame in which a mitigation strategy could realistically be implemented. The actual time frame may vary from what is described in this plan, depending on funding, grant opportunities, or changes in priorities as other critical activities are adjusted to meet evolving community needs.

3.4 IMPLEMENTATION

The mitigation strategies are general actions to reduce the negative impact of disasters and large-scale emergencies. For a strategy to become an actionable item, it must be converted to a specific project with funding, action steps, timelines, and project goals. For example, a project to acquire and demolish a repetitive loss property begins by identifying the specific property to be acquired and securing funding for the project. The property owner must agree to participate in the program and the jurisdiction must accept its share of cost, planning responsibility, and project management roles. Only when all of these pieces are in place can the project become a reality. A similar process must be followed for any of the strategies identified here to become projects.

In some situations, an entity other than the jurisdiction may be the most appropriate organization to initiate, manage, or administer a mitigation project. These entities could include, but are not limited to, park districts, sewer district, water districts, school districts, colleges/universities, non-profit organizations, property owners' associations, and others. In these situations, the jurisdiction and alternate entity can work together to determine the best process to implement the mitigation project, from grant application through project completion. Throughout the project, all codes, requirements, and regulations will be followed

The EMA will monitor progress on these strategies through ongoing communication with jurisdiction officials and stakeholders. When mitigation grants or other funding sources become available, reasonable efforts will be made to notify stakeholders and jurisdiction officials of the funding opportunity so that applications can be submitted. Jurisdictions will also work to identify local funding sources that can be used to address disaster vulnerability. When funding is secured, a detailed project timeline will address the steps necessary to complete the project. Upon completion, the jurisdiction will evaluate project effectiveness and share that information with the EMA and planning team for consideration in developing future projects.

For stakeholders in Lorain County, the collaboration that occurred while developing these strategies was the most valuable part of the mitigation planning process. The planning process required stakeholders to evaluate hazards and risks in their community through extensive discussion and analysis. The mitigation goals and actions that resulted from these discussions were developed to maximize benefit to the community while minimizing cost. The process required whole community involvement so that all sectors of the community were represented in the planning process. Ultimately, Lorain County developed comprehensive, relevant, and effective solutions to their unique risks and vulnerabilities. Given the availability of funding, personnel, and support, Lorain County and its jurisdictions are positioned to move forward and implement these strategies and accomplish their goal of making the county more resilient.

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
LORAIN COUNTY								
GOAL 1: Lorain County will reduce the damages caused by flooding in all areas across the county.								
County 1.1	Lorain County will support and implement land use regulation measures to minimize the effects of flooding.	1	Ongoing	Prevention	LOC: ICC	Community Development Director	5/1/22	5/1/27
County 1.2	Lorain County will sustain, support, adopt, and enforce building codes, floodplain regulations, zoning regulations, and other use and construction standards as applied to development of commercial and residential neighborhoods.	2	Ongoing	Property Protection	LOC: ICC	Community Development Director	5/1/22	5/1/27
County 1.3	Lorain County will develop, adopt and maintain a countywide comprehensive land use plan.	3	Ongoing	Prevention	LOC: ICC	Community Development	5/1/22	5/1/27
County 1.4	Lorain County will educate and advocate for development practices across the county that take into consideration cross-jurisdictional consequences of development, and requires counter-measures to prevent negative effects on neighboring communities.	4	Ongoing	Public Information	LOC: ICC	Community Development Director	5/1/22	5/1/27
County 1.5	Lorain County will protect the floodplains from unwise development through adoption of flood maps and floodplains established by FEMA, and through enforcement of floodplain regulation.	5	Ongoing	Prevention	LOC; ICC	Community Development Director	5/1/22	5/1/27
County 1.6	Lorain County will educate residents and businesses about the need for casualty insurance to cover the cost of losses due to storms, disasters, and other emergency incidents.	6	Ongoing	Protection	LOC	EMA Director	5/1/22	5/1/27
County 1.7	Lorain County will support the NFIP program through ongoing participation.	7	Ongoing	Prevention	LOC	EMA Director	5/1/22	5/1/27
County 1.8	Lorain County will maintain adoption of FEMA flood mapping.	8	Ongoing	Prevention	LOC	EMA Director	5/1/22	5/1/27
County 1.9	Lorain County will advocate for property owners' utilization of flood insurance when property is located in floodplains or areas that are vulnerable to flooding even if not actually located in a floodplain.	9	Ongoing	Public Information	LOC	EMA Director	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
County 1.10	Lorain County will decrease the effects of flooding by managing storm water so that properties are not damaged by excessive runoff or storm water, especially during periods of heavy precipitation or snow melt.	10	Ongoing	Property Protection	LOC; BRIC; FMA; CDBG	Lorain County Engineer	5/1/22	5/1/27
County 1.11	Lorain County will facilitate, conduct, support, and complete a countywide storm water study that results in a storm water management plan for the whole county.	11	Ongoing	Property Protection	LOC; HMGP; BRIC; FMA; CDBG	Lorain County Engineer	5/1/22	5/1/27
County 1.12	Lorain County will study, develop and implement a countywide storm water management action plan as finances and jurisdictional participation allows.	12	Ongoing	Property Protection	LOC; CDBG; BRIC	Lorain County Engineer	5/1/22	5/1/27
County 1.13	Lorain County will support jurisdictions in the improvement and/or replacement of worn and inadequate storm water infrastructure.	13	Ongoing	Structurally Engineered Projects	LOC; CDBG; BRIC	Lorain County Engineer	5/1/22	5/1/27
County 1.14	Lorain County will educate, advocate, and facilitate effective waterway clearing and cleaning to remove built-up debris and sediment and to facilitate natural runoff for storm water, including management of log jams and beaver dams that impede drainage.	14	Ongoing	Natural Resource Protection	LOC	Lorain County Engineer	5/1/22	5/1/27
County 1.15	Lorain County will restore developed floodplains to a natural habitat state where repeated flooding occurs and causes damage to property; the county will advocate and implement the creation of wetlands and other natural habitat in these properties.	15	Ongoing	Natural Resource Protection	LOC; FMA; HMGP; H2Ohio ; Other	Community Development Director	5/1/22	5/1/27
County 1.16	Lorain County will utilize grant programs to fund the acquisition and demolition of flood prone structures and the restoration of natural habitat in areas where development has taken place on high-risk property.	16	Ongoing	Prevention	HMGP; FMA; LOC; GLRI;	Community Development Director	5/1/22	5/1/27
County 1.17	Lorain County will support and advocate for the establishment of vegetative buffer zones, retention ponds, dams, levees, and other structural devices to manage storm water and flood water so it does not cause property damage.	17	Ongoing	Natural Resource Protection	HMGP; FMA; LOC	Lorain County Engineer	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
County 1.18	Lorain County will support, encourage, and implement projects to repair and maintain dams, levees, and other structures that control the flow of water and limit or prevent flooding in developed areas. This will include waterways that are affected by beaver dams, excess debris, fallen trees due to Emerald Ash Borer damage, log jams and other causes.	18	Ongoing	Structurally Engineered Projects	HHPD; HMGP; FMA; OTHER; LOC	Lorain County Engineer	5/1/22	5/1/27
County 1.19	Lorain County will investigate the removal of some dams that are no longer useful and do not serve a practical purpose, but are a contributing cause of flooding and water management problems, and will remove dams that are found to be without benefit.	19	Ongoing	Prevention	FMA; SRL; HMGP; CDBG; OTHER	EMA Director	5/1/22	5/1/27
County 1.20	Lorain County will identify properties with severe and repeated severe losses due to flooding and advocate for the identification of practical solutions to the incidents, including acquisition, demolition and relocation projects.	20	Ongoing	Prevention	LOC	EMA Director	5/1/22	5/1/27
County 1.21	Lorain County will work with owners of high-risk dams in any area of the county, and require that they develop and implement emergency plans that are shared with the Lorain County EMA.	21	NEW	Prevention	LOC; Other	EMA Director	5/1/22	5/2/27
County 1.21	Lorain County will study, consider and participate in programs that channelize or relocate waterways away from roads, structures, and other property that floods and causes extreme damages.	22	Ongoing	Prevention	LOC; FMA; SRL; HMGP; OTHER	EMA Director	5/1/22	5/1/27
County 1.22	Lorain County will implement acquisition, relocation, and demolition projects as funding becomes available and property owners are willing to participate.	23	Ongoing	Prevention	SRL; HMGP; FMA; OTHER	EMA Director	5/1/22	5/1/27
County 1.23	Lorain County will advocate the implementation of conservation practices by local farmers that include, but are not limited to, creation of sod strips, grassy drainage systems, no-till techniques, and ditchbank protection.	24	New	Natural Resource Protection	H2Ohio, CRP, CRGP, LOC; Other	Soil Conservation Director	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
County 1.24	Lorain County will support and install modifications and improvements to county roadways that decrease flooding and erosion of those roadways, such as elevation of the roadway or relocation of a section of waterway.	25	Ongoing	Property Protection	LOC; CDBG; BRIC	Lorain County Engineer	5/1/22	5/1/27
County 1.25	Lorain County will use beach nourishment and vegetation to protect recreational areas and beaches from the damage caused by high lake levels and coastal flooding.	26	New	Natural Resource Protection	CRGP; CRP; GLRI; H2Ohio ; LOC; Other	Lorain County Engineer	5/1/22	5/1/27
County 1.26	Lorain County will use bulkheads, structurally engineered drainage systems, revetments, regrading and terracing, and seawalls to protect infrastructure and critical resources like roads, bridges and utilities from damages caused by coastal flooding, extremely high lake levels and other types of flooding	27	New	Structurally Engineered Projects	BRIC; HMGP; CRP; LOC; Other	Lorain County Engineer	5/1/22	5/1/27
GOAL 2: Lorain County will implement timely and effective pre-incident warning and notification of dangerous weather and emergency incidents, as well as timely dissemination of updated information during an incident.								
County 2.1	Lorain County will imaintain a countywide warning and notification system that utilizes digital methods and traditional electronics to notify residents and workers of impending inclement weather and immediate dangers by as many means as is possible.	28	Ongoing	Public Information	LOC; HSGP	EMA Director	5/1/22	5/1/27
County 2.2	Lorain County will identify those areas most prone to flash flooding, and will support development of data that links weather events to flooding outcomes using GIS technology, floodplain mapping, and other technology; the County will work to notify those affected populations in a rapid and effective manner when necessary.	29	Ongoing	Property Protection	LOC; CDBG	EMA Director	5/1/22	5/1/27
GOAL 3: Lorain County will identify and utilize protective facilities that enable residents and others to take shelter from severe weather, including storms that include rotational or straight-line winds, and other life-threatening conditions such as hail, heavy precipitation, and dust.								

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
County 3.1	Lorain County will identify the need for and facilitate and implement the construction of safe rooms for residents and workers who live or work in structures that lack basements or other structural protection during tornadoes or high wind incidents.	30	Ongoing	Property Protection	HMGP; EMPG	EMA Director	5/1/22	5/1/27
County 3.2	Lorain County will facilitate the development and equipping of shelters, comfort stations, and service centers to be used before, during, and after disasters to help the people of Lorain County be able to take shelter during storms and to be able recover rapidly and effectively from disaster losses.	31	Ongoing	Property Protection	LOC; EMPG	EMA Director	5/1/22	5/1/27
County 3.3	Lorain County will help residents have access to information about the location of shelters, comfort stations and service centers as part of preparedness for disasters.	32	Ongoing	Public Information	LOC; EMPG	EMA Director	5/1/22	5/1/27
County 3.4	Lorain County will support volunteers and organizations to be utilized during disasters to provide, supplement, sustain, or expand sheltering and gathering services available to victims.	33	Ongoing	Property Protection	LOC; EMPG	EMA Director	5/1/22	5/1/27
GOAL 4: Lorain County will facilitate, support, and at times conduct public awareness campaigns about disaster preparedness, safety, response, and recovery to mitigate losses and								
County 4.1	Lorain County will develop and make available to residents and others information regarding the dangerous weather and other emergent incidents that are typical to occur in the county, and will identify the actions and counter-measures that are effective in safely enduring those incidents.	34	Ongoing	Public Information	LOC; EMPG	EMA Director	5/1/22	5/1/27
County 4.2	Lorain County will develop and make available to residents information regarding response and safety during disasters uncommon to Lorain County, such as earthquakes and landslides.	35	Ongoing	Public Information	LOC; EMPG	EMA Director	5/1/22	5/1/27
GOAL 5: Lorain County will harden utility service and supply to residents and businesses, especially during extreme heat or cold that intensifies dependency upon utility services.								
County 5.1	Lorain County will work to advocate for underground electrical service lines across the county, with an emphasis upon new development and areas where service is being improved.	36	Ongoing	Prevention	LOC; ICC; CDBG	Lorain County Engineer	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
County 5.2	Lorain County will advocate for capital improvements to the electrical distribution systems to harden electrical service across the county.	7	Ongoing	Prevention	LOC; ICC	Lorain County Engineer	5/1/22	5/1/27
County 5.3	Lorain County will advocate for improved natural and propane gas availability and distribution to residents and businesses during times of excessive need.	38	Ongoing	Property Protection	LOC	Lorain County Engineer	5/1/22	5/1/27
County 5.4	Lorain County will advocate for improved water intake and availability for residents, including sustainment of redundancy in distribution and supply, for times of extreme weather conditions or needs.	39	Ongoing	Property Protection	CWSRF; LOC; CDBG; Other	Lorain County Engineer	5/1/22	5/1/27
County 5.5	Lorain County will identify and establish redundant emergency sources for all utility services and supplies during heavy use and disaster circumstances.	40	Ongoing	Property Protection	LOC; ICC	EMA Director	5/1/22	5/1/27
GOAL 6: Lorain County will improve communications between all first responders and first receivers during disasters and emergencies.								
County 6.1	Lorain County will support two-way radio upgrades and improvements by individual jurisdictions.	41	Ongoing	Property Protection	LOC; ICC;	Lorain County 911 Director	5/1/22	5/1/27
County 6.2	Lorain County will advocate and facilitate interoperability of communication systems between jurisdictions, disciplines, and departments.	42	Ongoing	Property Protection	LOC; ICC	Lorain County 911 Director	5/1/22	5/1/27
County 6.3	Lorain County will coordinate and support interoperability in the 911 centers and EOC facilities across the county.	43	Ongoing	Property Protection	LOC; ICC	EMA Director	5/1/22	5/1/27
GOAL 7: Lorain County will sustain mitigation efforts.								
County 7.1	Lorain County will serve as the primary monitor of strategies across the county in order to facilitate and encourage accomplishment of the identified strategies in this plan.	44	Ongoing	Prevention	LOC	EMA Director	5/1/22	5/1/27
GOAL 8: Lorain County will protect and improve infrastructure to reduce damages to critical systems and other assets.								
County 8.1	Lorain County will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	45	New	Structurally Engineered	LOC; HMGP; CWSRF; CDBG	County Commissioners	5/1/22	5/1/27
County 8.2	Lorain County will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	46	New	Property Protection	LOC	EMA Director	5/1/22	5/1/27

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
County 8.3	Lorain County will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	47	New	Structurally Engineered	HHGP; HMGP; CDBG; Other; LOC	County Commissioners	5/1/22	5/1/27
County 8.4	Where jurisdictions allow, Lorain County will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	48	New	Structurally Engineered	LOC; CDBG; BRIC; HMGP	County Engineer	5/1/22	5/1/27
County 8.5	Lorain County will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	49	New	Property Protection	LOC; CDBG; HMGP;	County Engineer	5/1/22	5/1/27
County 8.6	Lorain County will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	50	New	Structurally Engineered	LOC; BRIC; Other	County Commissioners	5/1/22	5/1/27
AMHERST								
GOAL 1: The City of Amherst will reduce the negative effects of flooding on the residents and properties in Amherst.								
Amherst 1.1	Amherst will maintain and support land use planning efforts to lessen the impact of disaster upon the community.	1	Ongoing	Prevention	LOC; ICC	Safety Services Director	5/1/22	5/1/27
Amherst 1.1.1	Amherst will support and enhance residential building codes.	2	Ongoing	Property Protection	LOC; ICC	Safety Services Director	5/1/22	5/1/27
Amherst 1.1.2	Amherst will support and enhance floodplain regulation and participation in NFIP flood insurance programs.	3	Ongoing	Prevention	LOC; ICC	Safety Services Director	5/1/22	5/1/27
Amherst 1.2	Amherst will support land conservation and preservation of natural wetlands as a means to prevent development in areas that are prone to flooding.	4	Ongoing	Natural Resource Protection	FMA; CDBG; CRP; LOC,	Safety Services Director	5/1/22	5/1/27
Amherst 1.3	Amherst will research and assess the effects of upstream and downstream development upon the city as well as the impact of city development on adjacent jurisdictions.	5	Ongoing	Prevention	LOC; ICC	Safety Services Director	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Amherst 1.4	Amherst will work with the Ohio Turnpike Commission and the State of Ohio to utilize the Turnpike Mitigation Program to resolve issues with storm water runoff caused by roadway system development near the city.	6	Ongoing	Property Protection	TMP; LOC; Other	Safety Services Director	5/1/22	5/1/27
Amherst 1.5	Amherst will consider acquisition, demolition, and relocation projects to eliminate flood losses where property owners are willing and funds exist to complete such projects.	7	Ongoing	Prevention	HMGP; FMA; SRL; Other; LOC	Safety Services Director	5/1/22	5/1/27
GOAL 2: The City of Amherst will improve and expand its public warning and notification systems for the purpose of preventing casualties and damages by natural disasters.								
Amherst 2.1	Amherst will work with and implement a reverse calling system in collaboration with the Lorain County EMA.	8	Ongoing	Property Protection	LOC; HSGP;	Safety Services Director	5/1/22	5/1/27
Amherst 2.2	Amherst will use and improve warning and notification systems that utilize local cable television, websites, and other electronic means of mass communication.	9	Ongoing	Property Protection	LOC; ICC	Safety Services Director	5/1/22	5/1/27
GOAL 3: The City of Amherst will enhance and improve communications between responders and others to effectively communicate before, during, and after incidents.								
Amherst 3.1	Amherst will support and implement the digital MARCS radio system and P-25 standards among first responders and other departments as appropriate.	10	Ongoing	Property Protection	LOC; Other	Safety Services Director	5/1/22	5/1/27
Amherst 3.2	Amherst will work to complete mapping and CAD interface software in city departments to aid in management of storm water and other utilities during storms.	11	Ongoing	Property Protection	LOC	Safety Services Director	5/1/22	5/1/27
GOAL 4: The City of Amherst will conduct a public information campaign directed at property owners to lessen the damages, including utility outages, due to storms.								
Amherst 4.1	Amherst will advocate for the proper maintenance of trees on private property to lessen the damages from severe storms.	12	Ongoing	Property Protection	LOC; Other; ICC	Safety Services Director	5/1/22	5/1/27
Amherst 4.2	Amherst will advocate for the proper maintenance of public property regarding tree trimming and vegetation control around and about utility lines.	13	Ongoing	Property Protection	LOC	Safety Services Director	5/1/22	5/1/27
GOAL 5: The City of Amherst will decrease utility outages during disasters.								
Amherst 5.1	Amherst will harden the power services to critical facilities by acquiring and installing alternate power sources at critical and key facilities.	14	Ongoing	Property Protection	LOC; ICC	Safety Services Director	5/1/22	5/1/27
GOAL 6: The City of Amherst will protect and improve infrastructure to reduce damages to critical systems and other assets.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Amherst 6.1	Amherst will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	15	New	Structurally Engineered	Local; HMGP; Other	Safety Services Director	5/1/22	5/1/27
Amherst 6.2	Amherst will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	16	New	Property Protection	Local	Safety Services Director	5/1/22	5/1/27
Amherst 6.3	Amherst will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	17	New	Structurally Engineered	Local; HMGP; Other	Safety Services Director	5/1/22	5/1/27
Amherst 6.4	Amherst will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	18	New	Structurally Engineered	Local; HMGP; Other	Safety Services Director	5/1/22	5/1/27
Amherst 6.5	Amherst will conduct or participate in multijurisdictional studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	19	New	Property Protection	Local; HMGP; Other	Safety Services Director	5/1/22	5/1/27
Amherst 6.6	Amherst will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	20	New	Structurally Engineered	Local; HMGP; Other	Safety Services Director	5/1/22	5/1/27
AVON								
GOAL 1: The City of Avon will reduce the negative effects of flooding on its residents and properties.								
Avon 1.1	Avon will advocate and educate officials and residents about the need to develop countywide storm water management planning and regulation.	1	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Avon 1.2	Avon will participate in studies and analysis of storm water in Lorain County.	2	Ongoing	Property Protection	LOC; FMA; HMGP; H2Ohio	Mayor	5/1/22	5/1/27
Avon 1.3	Avon will support the development of retention ponds, detention structures, and vegetative buffers to lessen flooding in downstream areas.	3	Ongoing	Structurally Engineered Projects	HMGP; FMA; CDBG; LOC;	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon 1.4	Avon will establish and support economic development standards that utilize and reinforce current building codes, zoning standards and other land use planning regulations that take into consideration the consequences of development on storm water and flooding.	4	Ongoing	Prevention	LOC; ICC	Mayor	5/1/22	5/1/27
Avon 1.5	Avon will advocate for the proper maintenance of streams, ditches, and rivers to reduce debris, log jams and vegetation that causes water to back up and flood areas inside the city and upstream from the city.	5	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
Avon 1.6	Avon will advocate for property owners in floodplains to carry flood insurance as a way to protect and mitigate flood losses.	6	Ongoing	Public Information	LOC; ICC	Mayor	5/1/22	5/1/27
Avon 1.7	Avon will adopt and support current FEMA floodplain mapping.	7	Ongoing	Prevention	LOC; ICC	Mayor	5/1/22	5/1/27
Avon 1.8	Avon will identify, establish, and maintain erosion control measures along streams, ditches and rivers.	8	Ongoing	Natural Resource Protection	CRP; HMGP; FMA; CDBG	Mayor	5/1/22	5/1/27
Avon 1.9	Avon will support and implement the proper maintenance of storm sewers and water lines to minimize flooding and maximize the ability for the city to manage storm runoff.	9	Ongoing	Property Protection	HMGP; BRIC; FMA; SRL; LOC; ICC;	Mayor	5/1/22	5/1/27
Avon 1.10	Avon will identify, seek funding for, and complete projects that acquire and demolish repetitive flood loss structures, and facilitate the relocation of residents in those structures.	10	Ongoing	Prevention	LOC	Mayor	5/1/22	5/1/27
Avon 1.11	Avon will create retention ponds, vegetative buffer zones, natural habitats, and barriers where flooding waterways cause repeated damages to properties that cannot feasibly be relocated or otherwise protected.	11	Ongoing	Property Protection	HMGP; FMA; SRL; LOC;	Mayor	5/1/22	5/1/27

GOAL 2: The City of Avon will support improvements to notification and warning systems.

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon 2.1	Avon will support and maintain warning and notification systems that include digital methods of contact including text messaging, emails, as well as outdoor sirens to warn residents and workers of immediate dangers and inclement weather conditions.	12	Ongoing	Property Protection	LOC; HSGP; Other	Mayor	5/1/22	5/1/27
GOAL 3: The City of Avon will improve storm shelter options for residents of the city.								
Avon 3.1	Avon will identify, support, and/or construct safe rooms for residents who live in multi-family housing developments and mobile homes without shelters for tornadoes and other severe wind incidents.	13	Ongoing	Property Protection	HMGP; LOC; Other	Mayor	5/1/22	5/1/27
GOAL 4: The City of Avon will improve public awareness and education outreach for its residents regarding warning, notification, and information sharing.								
Avon 4.1	Avon will conduct and promote educational programs for children and families regarding flood safety, fire safety and prevention, and weather awareness and safety during storms and disasters.	14	Ongoing	Public Information	LOC; EMPG	Mayor	5/1/22	5/1/27
Avon 4.2	Avon will create information to be posted electronically for resident and worker safety during and after an earthquake.	15	Ongoing	Public Information	LOC; EMPG	Mayor	5/1/22	5/1/27
Avon 4.3	Avon will educate the public about heat and cold emergencies and how to be safe during those times as a way to minimize the emergency needs of the city during temperature extremes, and to minimize how significantly safety forces are overwhelmed during those times.	16	Ongoing	Public Information	LOC; EMPG	Mayor	5/1/22	5/1/27
GOAL 5: The City of Avon will improve utility services' reliability during storms.								
Avon 5.1	Avon will work with utility providers to improve and harden utility services by burying utility lines in new and renovated residential areas, and by replacing old worn supply lines in older neighborhoods.	17	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 6: The City of Avon will protect and improve infrastructure to reduce damages to critical systems and other assets.								
Avon 6.1	Avon will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	18	New	Structurally Engineered Projects	Local; HMA; Other	Mayor	5/1/22	5/1/27
Avon 6.2	Avon will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	19	New	Property Protection	Local	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon 6.3	Avon will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	20	New	Structurally Engineered PProjects	Local; HMA; Other	Mayor	5/1/22	5/1/27
Avon 6.4	Avon will repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	21	New	Structurally Engineered Projects	Local; HMA; Other	Mayor	5/1/22	5/1/27
Avon 6.5	Avon will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable	22	New	Property Protection	Local; HMA; Other	Mayor	5/1/22	5/1/27
Avon 6.6	Avon will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	23	New	Structurally Engineered Projects	Local; HMA;	Mayor	5/1/22	5/1/27
AVON LAKE								
GOAL 1: The City of Avon Lake will build community-wide resiliency by minimizing the negative effects of all natural disasters on the city's property and residents.								
Avon Lake 1.1	Avon Lake will sustain awareness and advocacy of good regular maintenance procedures such as ditch bank maintenance, retention basin maintenance, upkeep and trimming of trees on properties, and clearing of excessive vegetation from streams and waterways.	1	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Avon Lake 1.2	The City of Avon Lake will work with conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion, and maintain natural habitats for the purpose of reducing flood and erosion risks.	2	Ongoing	Natural Resource Protection	H2Oho; CRP; LOC; Other	Mayor	5/1/22	5/1/27
Avon Lake 1.3	Avon Lake will update the existing comprehensive plan for land use within the jurisdiction, taking into account the consequences of development and the effect of existing properties and businesses, as well as the consequences on the communities downstream.	3	Ongoing	Prevention	LOC	Mayor	5/1/22	5/1/27
Avon Lake 1.4	Avon Lake will maintain and sustain building standards for construction, including contractor-vendor approval, industry stands for construction and reasonable construction materials guidance.	4	Ongoing	Prevention	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 1.5	Avon Lake will follow the Ohio Basic Building Code as a reference for disaster-resistant construction standards.	5	Ongoing	Prevention	LOC; ICC	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon Lake 1.6	Avon Lake will maintain land use ordinances that protect and preserve the best use and least damaging use of properties within the jurisdiction.	6	Ongoing	Prevention	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 1.7	Avon Lake will sustain requirements that new development follow sustainable design in planning new structures and land uses.	7	Ongoing	Prevention	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 2: The City of Avon Lake will develop projects to lessen the damages to property from flooding.								
Avon Lake 2.1	Avon Lake will conduct acquisition and demolition/relocation projects to remove severe and repetitive loss structures and to prevent further losses.	8	Ongoing	Prevention	HMGP; FMA; SRL;	Mayor	5/1/22	5/1/27
Avon Lake 2.2	Avon Lake will require construction of retention ponds to hold runoff water during periods of heavy precipitation. Retention ponds will be required to contain the 100-year frequency storm runoff.	9	Ongoing	Structurally Engineered Projects	BRIC; HMGP; FMA; LOC; Other	Mayor	5/1/22	5/1/27
Avon Lake 2.3	Avon Lake will improve storm sewer systems to more adequately manage runoff water for all areas and enhance prevention /minimization of flooding in residential and commercial areas.	10	Ongoing	Property Protection	BRIC; CDBG; LOC; Other	Mayor	5/1/22	5/1/27
Avon Lake 2.3.1	Avon Lake will complete efforts to revise the city's storm water master plan to include computer modeling.	11	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 2.3.2	Avon Lake will maintain/repair retention basins and structures that hold or contain water that otherwise may flood homes and other properties.	12	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 2.4	Avon Lake will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	13	Ongoing	Property Protection	BRIC; HMGP; FMA;	Mayor	5/1/22	5/1/27
GOAL 3: The City of Avon Lake will educate the community about the notification system that warn them of impending disasters and the actions they should take immediately to protect themselves and their property.								
Avon Lake 3.1	Avon Lake will maintain the current Code Red communication system that enables the city to notify residents in numerous ways of impending danger and/or inclement weather risks.	14	Ongoing	Public Information	LOC; ICC	Mayor	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon Lake 3.2	Avon Lake will improve the communication systems between first responders and other critical resources in the event of an emergency or disaster.	15	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
Avon Lake 3.3	Avon Lake will develop partnerships with Lorain County Emergency Management Agency and others to develop information dissemination capabilities that might include 2-1-1 and other community agencies that would enhance the community's ability to communicate with all populations, including those with functional and special needs.	16	Ongoing	Public Information	LOC; Other	Mayor	5/1/22	5/1/27
Avon Lake 3.4	Avon Lake will identify and communicate with special populations within the jurisdiction as it relates to disasters, warning and notification, and response.	17	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Avon Lake 3.5	Avon Lake will educate the community about evacuation procedures and how to identify shelter locations, comfort stations, and service centers during disasters.	18	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
GOAL 4: The City of Avon Lake will establish sites to be used as shelters, comfort stations, and service centers during disasters, and will strive to equip these sites with features necessary to adequately serve the community during storms, power outages, and other disasters.								
Avon Lake 4.1	Avon Lake will investigate and implement means to create and provide safe rooms for residents who live in homes built on concrete slabs, and other structures that lack storm shelters used as protection in wind and other severe storms.	19	Ongoing	Property Protection	HMGP; LOC; Other	Mayor	5/1/22	5/1/27
GOAL 5: The City of Avon Lake will work with utility providers to harden utility services and to prevent excessive outages during storms and inclement weather.								
Avon Lake 5.1	Avon Lake will bury power and utility lines in new neighborhoods, homes, and businesses.	20	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 5.2	Avon Lake will replace deteriorating power, water, sewer, and other utility distribution systems.	21	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 5.3	Avon Lake will develop protective actions to prevent or lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	22	Ongoing	Natural Resource Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 5.4	Avon Lake will work with wireless service providers to establish dependable and resilient wireless service within the jurisdiction to improve the capability to communicate during inclement weather and disasters.	23	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 6: The City of Avon Lake will improve structure identification systems in the city.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon Lake 6.1	Avon Lake will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	24	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 7: The City of Avon Lake will develop a solid waste and debris management plan for the city to facilitate rapid storm clean-up.								
Avon Lake 7.1	Avon Lake will identify and approve disposal sites for disaster debris, including categories of solid waste such as construction materials, wood and combustible waste, masonry and concrete waste, metal waste, paper and general garbage, and hazardous waste.	25	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 8: The City of Avon Lake will implement a redundant secondary water supply to be used for purposes such as firefighting.								
Avon Lake 8.1	Avon Lake will identify and implement a water supply plan for emergencies that supports, supplements, or serves in place of the municipal or county water supply during large fires.	26	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Avon Lake 8.2	The City of Avon Lake will advocate and support construction of ponds with the capability of being used as an alternative water supply that are equipped with dry hydrants.	27	Ongoing	Structurally Engineered Projects	LOC; BRIC; ICC; CWSRF; Other	Mayor	5/1/22	5/1/27
GOAL 6: The City of Avon Lake will protect and improve infrastructure to deduce damages to critical systems.								
Avon Lake 9.1	Avon Lake will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	28	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Avon Lake 9.2	Avon Lake will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	29	New	Property Protection	LOC	Mayor	5/1/22	5/1/27
Avon Lake 9.3	Avon Lake will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	30	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Avon Lake 9.4	Avon Lake will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	31	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Avon Lake 9.5	Avon Lake will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	32	New	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Avon Lake 9.6	Avon Lake will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	33	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
ELYRIA								
GOAL 1: The City of Elyria will develop, improve, and sustain effective communications during disasters for the purpose of saving lives and preserving property.								
Elyria 1.1	Elyria will improve communication between first responders and other critical resources through hardware and software improvements as well as procedural review.	1	Ongoing	Property Protection	LOC	Safety Service Director	5/1/22	5/1/27
Elyria 1.2	Elyria will partner with Lorain County Emergency Management and other agencies to develop or acquire communications tools such as text messages phone call systems, and others to notify the public of impending danger or inclement weather risks.	2	Ongoing	Public Information	LOC; HSGP; Other	Safety Service Director	5/1/22	5/1/27
Elyria 1.3	Elyria will educate the community about evacuation procedures and how to identify and access shelters, comfort stations, and service centers.	3	Ongoing	Public Information	LOC	Safety Service Director	5/1/22	5/1/27
Elyria 1.4	Elyria will develop expand, and/or maintain an outdoor warning siren system.	4	Ongoing	Public Information	LOC; HSGP; CDBG	Safety Service Director	5/1/22	5/1/27
Elyria 1.5	Elyria will identify methods to communicate with special populations including those with functional and special needs in a manner that is linguistically appropriate and understandable.	5	Ongoing	Public Information	LOC	Safety Service Director	5/1/22	5/1/27
Elyria 1.6	Elyria will identify and communicate with elderly residents, school systems, and others with higher levels of disaster-related vulnerability.	6	Ongoing	Public Information	LOC	Safety Service Director	5/1/22	5/1/27
GOAL 2: The City of Elyria will engage in property and natural resources mitigation.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Elyria 2.1	Elyria will educate and advocate to property owners about regular maintenance practices that result in preventing excessive damage to structures during storms that include performing ditch bank maintenance, tree trimming and clearing excessive vegetation from private property.	7	Ongoing	Public Information	LOC	Safety Service Director	5/1/22	5/1/27
Elyria 2.2	Elyria will consider development of a comprehensive plan for land use within the city, taking into account the consequences of development and the effect on existing properties and businesses, as well as consequences affecting communities downstream.	8	Ongoing	Prevention	LOC; CGBG	Safety Service Director	5/1/22	5/1/27
Elyria 2.3	The City of Elyria will investigate and implement projects that provide safe rooms for residents who live in mobile homes, homes built on concrete slabs, and other structures that lack storm shelters used as protection in wind and other severe storms.	9	Ongoing	Property Protection	LOC; HMGP; Other	Safety Service Director	5/1/22	5/1/27
Elyria 2.4	Elyria will consider establishing land use ordinances that protect and preserve the best and least damaging property use within the city.	10	Ongoing	Prevention	LOC; ICC	Safety Service Director	5/1/22	5/1/27
Elyria 2.5	Elyria will consider the creation of enhanced building standards for construction, including such practices as contractor-vendor approval, acceptable industry standards for construction, and reasonable construction materials guidance.	11	Ongoing	Prevention	LOC; ICC	Safety Service Director	5/1/22	5/1/27
Elyria 2.6	Elyria will work with conservancy and soil conservation groups to implement practices to conserve topsoil, prevent erosion and maintain natural habitats to reduce the effects of flooding.	12	Ongoing	Natural Resource Protection	H2Ohio ; GLRI; CRGP; TMP; LOC; Other	Safety Service Director	5/1/22	5/1/27
GOAL 3: The City of Elyria will work to mitigate flood consequences.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Elyria 3.1	Elyria will work to improve storm sewer systems to more adequately manage runoff water for all areas thus preventing/lessening flooding in residential and/or commercial properties.	13	Ongoing	Property Protection	LOC; BRIC; FMA; CDBG	Safety Service Director	5/1/22	5/1/27
Elyria 3.2	Elyria will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	14	Ongoing	Structurally Engineered Projects	BRIC; HMGP; SRL; Other; LOC	Safety Service Director	5/1/22	5/1/27
Elyria 3.3	Elyria will consider construction of retention ponds to hold runoff waters during periods of heavy precipitations.	15	Ongoing	Structurally Engineered Projects	LOC; ICC; BRIC;	Safety Service Director	5/1/22	5/1/27
Elyria 3.4	Elyria will work to maintain/repair/replace or remove dams, dikes, and reservoirs that hold or contain waters that otherwise might flood homes and other properties but may be in desrepair or need improvements.	16	Ongoing	Structurally Engineered Projects	HHPD; HMGP; FMA; OTHER;	Safety Service Director	5/1/22	5/1/27
Elyria 3.5	Elyria will utilize acquisition and demolition to remove repetitive loss structures and prevent further losses.	17	Ongoing	Prevention	HMGP; FMA;	Safety Service Director	5/1/22	5/1/27
GOAL 4: The City of Elyria will protect utilities as part of the mitigation efforts.								
Elyria 4.1	Elyria will work to replace aging and deteriorating power, sewer, and other utility distribution systems.	18	Ongoing	Property Protection	LOC; BRIC; CDBG; Other	Safety Service Director	5/1/22	5/1/27
Elyria 4.2	Elyria will work to develop protective actions to lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	19	Ongoing	Property Protection	LOC	Safety Service Director	5/1/22	5/1/27
Elyria 4.3	Elyria will work with wireless service providers to establish dependable and resilient wireless service within the city to improve the capability to communicate during inclement weather and disasters.	20	Ongoing	Property Protection	LOC; ICC	Safety Service Director	5/1/22	5/1/27
Elyria 4.4	Elyria will work to bury power and utility lines in new neighborhoods, homes, and businesses.	21	Ongoing	Property Protection	LOC; ICC	Safety Service Director	5/1/22	5/1/27
GOAL 5: The City of Elyria will take other actions to promote disaster mitigation and lessen damages due to storms and natural hazards.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Elyria 5.1	Elyria will identify and implement a water supply plan for emergency purposes that supports, supplements, or serves in place of a municipal or county water supply during large fires.	22	Ongoing	Property Protection	CWSRF; CDBG; ICC; Other	Safety Service Director	5/1/22	5/1/27
Elyria 5.2	Elyria will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	23	Ongoing	Property Protection	LOC; Other	Safety Service Director	5/1/22	5/1/27
Elyria 5.3	Elyria will acquire backup generators for public safety facilities and shelters.	24	Ongoing	Property Protection	LOC; HMGP; Other	Safety Service Director	5/1/22	5/1/27
Elyria 5.4	Elyria will update the list of sites to be used as shelters, comfort stations, and service centers during storms, power outages, and other disasters.	25	Ongoing	Property Protection	LOC; Other	Safety Service Director	5/1/22	5/1/27
Elyria 5.5	Elyria will advocate and support the construction of ponds with the capability of being used as an alternative water supply and equip these with dry hydrants.	26	Ongoing	Natural Resource Protection	LOC; BRIC; HMGP; Other	Safety Service Director	5/1/22	5/1/27
Elyria 5.6	Elyria will identify and approve disposal sites for disaster debris including categories of solid waste that include construction materials, wood, combustibles, masonry, concrete, and metal, paper, general garbage and hazardous waste.	27	Ongoing	Property Protection	LOC	Safety Service Director	5/1/22	5/1/27
GOAL 6: The City of Elyria will protect and improve infrastructure to reduce damages to critical systems and other assets.								
Elyria 6.1	Elyria will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	28	New	Structurally Engineered	LOC; HMGP; BRIC; Other	Mayor	5/1/22	5/1/27
Elyria 6.2	Elyria will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	29	New	Property Protection	LOC; HHPD; HMGP; BRIC	Mayor	5/1/22	5/1/27
Elyria 6.3	Elyria will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	30	New	Structurally Engineered	LOC; HHPD; HMGP;	Mayor	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Elyria 6.4	Elyria will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	31	New	Structurally Engineered	LOC; HMGP; BRIC; Other	Mayor	5/1/22	5/1/27
Elyria 6.5	Elyria will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	32	New	Property Protection	LOC; HMGP; BRIC; Other	Mayor	5/1/22	5/1/27
Elyria 6.6	Elyria will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	33	New	Structurally Engineered	LOC; HMGP; BRIC; Other	Mayor	5/1/22	5/1/27
GRAFTON								
GOAL 1: The Village of Grafton will maintain residential and commercial building codes to include a regular inspection program and contractor registration for work within the village.								
Grafton 1.1	Grafton will establish and maintain a Fire Safety inspection Bureau at the fire department to enhance the enforcement and application of building codes in the village.	1	Ongoing	Property Protection	LOC	Village Administrator	5/1/22	5/1/27
Grafton 1.2	Grafton will provide special rescue and technical training to first responders to minimize the loss of life during disasters, and to facilitate the safe conduct of rescue operations during incidents.	2	Ongoing	Property Protection	LOC	Village Administrator	5/1/22	5/1/27
GOAL 2: The Village of Grafton will harden utility service in the village so that life-sustaining services are not interrupted during storms and disasters.								
Grafton 2.1	Grafton will install upgrades and updates to the electrical and water supply systems.	3	Ongoing	Property Protection	LOC; ICC	Village Administrator	5/1/22	5/1/27
Grafton 2.2	Grafton will add a redundant water supply source to decrease dependency during disaster upon a single supply.	4	Ongoing	Property Protection	LOC; ICC;	Village Administrator	5/1/22	5/1/27
Grafton 2.3	Grafton will install a replacement water tower with the purpose of hardening water supply to residents and businesses during disasters and inclement weather conditions.	5	Ongoing	Property Protection	LOC; ICC; CDBG	Village Administrator	5/1/22	5/1/27
Grafton 2.4	Grafton will remove old and deteriorated utility systems equipment and facilities with the purpose of decreasing the likelihood of damage to property caused by these structures during a disaster or severe storm.	6	Ongoing	Property Protection	LOC; ICC; CDBG	Village Administrator	5/1/22	5/1/27

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Grafton 2.5	Grafton will identify and implement proactive maintenance procedures to decrease the incidence of failure during disasters and storms.	7	Ongoing	Property Protection	LOC; ICC	Village Administrator	5/1/22	5/1/27
GOAL 3: The Village of Grafton will improve emergency and crisis communications systems and inter operability.								
Grafton 3.1	Grafton will improve emergency and crisis communications equipment for the purpose of interoperability with Lorain County and other jurisdictions during large scale and extended emergencies and disasters.	8	Ongoing	Public Information	LOC; HSGP	Village Administrator	5/1/22	5/1/27
GOAL 4: The Village of Grafton will reassess, improve, and identify shelters, community gathering rooms, and comfort stations for use during disasters and long-term power								
Grafton 4.1	Grafton will evaluate and plan for appropriate acquisition and installation of safe rooms as funding becomes available for those residents who live in mobile homes, homes built on concrete slabs, or those who live in buildings that lack subsurface shelters.	9	Ongoing	Property Protection	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27
Grafton 4.2	Grafton will support and implement the construction of safe rooms for targeted populations at risk of tornado and wind casualty.	10	Ongoing	Property Protection	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27
GOAL 5: The Village of Grafton will inform residents about disaster preparedness.								
Grafton 5.1	Grafton will conduct a public education campaign to educate the residents about disaster preparedness and response, including natural and transportation disaster risks.	11	Ongoing	Public Information	LOC	Village Administrator	5/1/22	5/1/27
GOAL 6: The Village of Grafton will reduce the impact of flooding.								
Grafton 6.1	The Village of Grafton will protect properties from flooding through acquisition, demolition, and relocation projects to eliminate flood losses where property owners are willing and funds exist to complete such projects.	12	Ongoing	Prevention	LOC; HMGP; FMA; SRL; CDBG; Other	Village Administrator	5/1/22	5/1/27
GOAL 6: Grafton will protect and improve infrastructure to reduce damages to critical systems and other assets.								
Grafton 7.1	Grafton will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	13	New	Structurally Engineered	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Grafton 7.2	Grafton will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	14	New	Property Protection	LOC	Village Administrator	5/1/22	5/1/27
Grafton 7.3	Grafton will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	15	New	Structurally Engineered	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27
Grafton 7.4	Grafton will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	16	New	Structurally Engineered	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27
Grafton 7.5	Grafton will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	17	New	Property Protection	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27
Grafton 7.6	Grafton will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	18	New	Structurally Engineered	LOC; HMGP; Other	Village Administrator	5/1/22	5/1/27
KIPTON								
GOAL 1: The Village of Kipton will improve notification and warning systems for residents of Kipton.								
Kipton 1.1	Kipton will maintain the countywide emergency notification system that utilizes various forms of technology to notify residents of impending danger or inclement weather.	1	Ongoing	Public Information	LOC; HSGP; CDBG	Mayor	5/1/22	5/1/27
GOAL 2: The Village of Kipton will minimize the losses from flooding.								
Kipton 2.1	Kipton will identify repetitive or severe loss structures for acquisition, demolition and relocation for the occupants and by applying for and using funds to complete these projects.	2	Ongoing	Prevention	HMGP; FMA; SRL;	Mayor	5/1/22	5/1/27
Kipton 2.2	The Village of Kipton will support and participate in a countywide storm water assessment and implementation of a countywide plan to manage storm water to minimize flooding across the county.	3	Ongoing	Property Protection	LOC; HMGP; CDBG; Other	Mayor	5/1/22	5/1/27
GOAL 3: The Village of Kipton will support improvement to individual sheltering options during severe storms in the village.								
Kipton 3.1	Kipton will work to establish safe rooms for households that lack basements or other appropriate shelter during severe storms such as tornadoes.	4	Ongoing	Property Protection	HMGP; LOC; Other	Mayor	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
GOAL 4: Kipton will protect and improve infrastructure to reduce damages to critical systems and other assets.								
Kipton 4.1	Kipton will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	5	New	Structurally Engineered	LOC; HMGP; BRIC; CDBG; ICC	Mayor	5/1/22	5/1/27
Kipton 4.2	Kipton will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	6	New	Property Protection	LOC; HHPD; HMGP	Mayor	5/1/22	5/1/27
Kipton 4.3	Kipton will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	7	New	Structurally Engineered	LOC; HHPD; HMGP	Mayor	5/1/22	5/1/27
Kipton 4.4	Kipton will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	8	New	Structurally Engineered	LOC; HMGP	Mayor	5/1/22	5/1/27
Kipton 4.5	Kipton will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	9	New	Property Protection	LOC; HMGP; FMA	Mayor	5/1/22	5/1/27
Kipton 4.6	Kipton will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	10	New	Structurally Engineered	LOC; CWSRF; CDBG	Mayor	5/1/22	5/1/27
LAGRANGE								
GOAL 1: The Village of Lagrange will support and maintain land use planning efforts that lessen the effects of natural disasters on the properties located in the village.								
LaGrange 1.1	Lagrange will maintain its contractor registration process to ensure high quality services are provided after storms have damaged properties.		Ongoing	Property Protection	LOC; ICC	Village Administrator	5/1/22	5/1/27
LaGrange 1.2	Lagrange will maintain residential and commercial building codes, zoning regulations, flood plain regulations, and other standards intended to protect and preserve high quality construction, renovation, and repair.		Ongoing	Property Protection	LOC; ICC	Village Administrator	5/1/22	5/1/27
GOAL 2: The Village of Lagrange will support and maintain warning and notification systems.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
LaGrange 2.1	Lagrange will maintain a notification system that advise residents and workers of dangerous or critical situations, and that communicate weather alerts in a timely fashion.		Ongoing	Public Information	LOC; HSGP	Village Administrator	5/1/22	5/1/27
GOAL 3: The Village of Grafton will improve emergency and crisis communications systems and inter operability.								
LaGrange 3.1	Lagrange will complete and sustain a storm water improvement project funded through user fees charged to property owners under an assessment program.		Ongoing	Property Protection	LOC; HMGP	Village Administrator	5/1/22	5/1/27
LaGrange 3.2	Lagrange will identify publicly owned locations in the village that flood repeatedly during or after heavy precipitation or runoff, and analyze the effects of that flooding on the community.		Ongoing	Property Protection	LOC; FMA; SRL; Other	Village Administrator	5/1/22	5/1/27
LaGrange 3.3	Lagrange will develop corrective actions to alleviate flooding that prevents access to specific properties during times of heavy rain or runoff.		Ongoing	Property Protection	HMGP; LOC; FMA; SRL; Other	Village Administrator	5/1/22	5/1/27
LaGrange 3.4	Lagrange will participate in and implement acquisition, demolition, and relocation projects for properties that have severe or repetitive flood loss and property owners are willing to take action.		Ongoing	Prevention	HMGP; SRL; FMA; LOC; Other	Village Administrator	5/1/22	5/1/27
GOAL 4: The Village of Lagrange will identify service facilities for use by residents during storms and disasters.								
LaGrange 4.1	Lagrange will establish an approved overnight shelter within the village limits to be used during evacuations, extended power outages, and other emergency situations.		Ongoing	Property Protection	LOC	Village Administrator	5/1/22	5/1/27
LaGrange 4.2	Lagrange will establish a community comfort station to be used during daytime emergencies for the purpose of feeding and hydration, communication, supply distribution, and social gathering.		Ongoing	Property Protection	LOC	Village Administrator	5/1/22	5/1/27
GOAL 5: The Village of Lagrange will protect and improve infrastructure to reduce damages to critical facilities and other assets.								
LaGrange 5.1	Lagrange will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.		New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
LaGrange 5.2	Lagrange will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.		New	Property Protection	Local	Mayor	5/1/22	5/1/27
LaGrange 5.3	Lagrange will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.		New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
LaGrange 5.4	Lagrange will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.		New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
LaGrange 5.5	Lagrange will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.		New	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
LaGrange 5.6	Lagrange will maintain, repair, upgrade, and/or replace water treatment and distribution systems.		New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
LORAIN								
GOAL 1: The City of Lorain will improve warning and notification systems that alert residents of impending dangers or inclement weather.								
Lorain 1.1	Lorain will support and participate in a countywide warning and notification system that includes digital notification, social media, and reverse telephone notifications to warn residents about immediate dangers and inclement weather.	1	Ongoing	Public Information	LOC; HSGP; Other	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 1.2	Lorain will assess the need for additional outdoor warning sirens, and will install additional devices in areas where current coverage is minimal or insufficient.	2	Ongoing	Public Information	LOC; HSGP; Other	Director of Public Safety and Service	5/1/22	5/1/27
GOAL 2: The City of Lorain will identify, establish, and utilize protective measures to shelter residents during dangerous weather or other inclement situations.								
Lorain 2.1	Lorain will support the Lorain County EMA and American Red Cross in the identification of, support for and use of shelters during evacuations and extreme weather conditions, power outages, or other disasters.	3	Ongoing	Public Information	LOC	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 2.2	Lorain will work with Lorain County to identify and establish comfort stations and service centers to be used to serve residents quickly and efficiently during disasters.	4	Ongoing	Property Protection	LOC	Director of Public Safety and Service	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
GOAL 3: The City of Lorain will restore natural habitat in areas prone to flooding, or those that have been developed and would best be returned to natural habitat due to flood risk.								
Lorain 3.1	Lorain will work with conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion, and to maintain natural habitats for the purpose of reducing flood and erosion/beachfront erosion during weather incidents.	5	Ongoing	Natural Resource Protection	H2Oho : CRP; GLRI; CRGP; CDBG;	Director of Public Safety and Service	5/1/22	5/1/27
GOAL 4: The City of Lorain will enforce, support, and enhance building codes, zoning regulations, and other land use regulation where disaster losses can be prevented by such								
Lorain 4.1	Lorain will improve and sustain a contractor registration process for work done inside the city with the purpose of preventing inadequate and improper construction practices during disaster response and recovery, and as a way to ensure compliance with current land use and building regulations.	6	Ongoing	Property Protection	LOC; ICC	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 4.2	Lorain will develop a comprehensive land use plan for the city, including sustainment of regulations that lessen the negative effects of disasters.	7	Ongoing	Prevention	LOC; ICC	Director of Public Safety and Service	5/1/22	5/1/27
GOAL 5: The City of Lorain will maintain, improve, and sustain adequate power lines, utility lines, and other infrastructure to prevent extreme losses during inclement weather and disasters.								
Lorain 5.1	Lorain will utilize fees and assessments to property owners to fund the improvements to infrastructure for the purpose of constructing more resilient utilities.	8	Ongoing	Property Protection	LOC; ICC	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 5.2	Lorain will bury utilities in new neighborhoods or commercial developments.	9	Ongoing	Property Protection	LOC; ICC	Director of Public Safety and Service	5/1/22	5/1/27
GOAL 6: The City of Lorain will improve location identification and communication for emergency responders.								
Lorain 6.1	Lorain will improve GIS mapping and addressing in the city to facilitate rapid location and assistance to residents and businesses by public safety and public works during disasters, thus decreasing the loss and casualty occurrences during those incidents.	10	Ongoing	Property Protection	LOC; CDBG; Other	Director of Public Safety and Service	5/1/22	5/1/27
GOAL 7: The City of Lorain will improve services to special populations during disasters to minimize loss of life and injuries.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Lorain 7.1	Lorain will work to identify, analyze, and establish critical services for the children of the city who are economically disadvantaged or considered in need of assistance for safety and security needs.	11	Ongoing	Property Protection	LOC; Other	Director of Public Safety and Service	5/1/22	5/1/27
GOAL 8: The City of Lorain will protect and improve infrastructure to reduce damages to critical systems and other key assets.								
Lorain 8.1	Lorain will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	12	New	Structurally Engineered	Local; HMA; Other	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 8.2	Lorain will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	13	New	Property Protection	Local	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 8.3	Lorain will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	14	New	Structurally Engineered	Local; HMA; Other	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 8.4	Lorain will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	15	New	Structurally Engineered	Local; HMA; Other	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 8.5	Lorain will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	16	New	Property Protection	Local; HMA; Other	Director of Public Safety and Service	5/1/22	5/1/27
Lorain 8.6	Lorain will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	17	New	Structurally Engineered	Local; HMA;	Director of Public Safety and	5/1/22	5/1/27
NORTH RIDGEVILLE								
GOAL 1: The City of North Ridgeville will minimize the negative effects of flooding on its residents and properties.								
N. Ridgeville 11	North Ridgeville will educate and advocate to property owners good regular maintenance practices that result in preventing excessive damages to structures during storms, such as ditch bank maintenance, trimming trees, and clearing excessive vegetation from streams and waterways.	1	Ongoing	Public Information	LOC	Safety Services Director	5/1/22	5/1/27
N Ridgeville 1.2	North Ridgeville will support the construction of retention ponds to hold runoff waters during periods of heavy precipitation.	2	Ongoing	Public Information	LOC	Safety Services Director	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
N Ridgeville 1.3	North Ridgeville will improve storm sewer systems to more adequately manage runoff water for all areas and thus prevent/lessen flooding in residential and/or commercial properties.	3	Ongoing	Property Protection	LOC; CDBG; HMGP; Other	Safety Services Director	5/1/22	5/1/27
N Ridgeville 1.4	North Ridgeville will construct new storm sewers to adequately handle runoff and drainage loads where development, wear and tear, or lack of structures makes flooding likely.	4	Ongoing	Property Protection	LOC; HMGP; BRIC; FMA; CDBG	Safety Services Director	5/1/22	5/1/27
N Ridgeville 1.5	North Ridgeville will reduce the impact of natural hazard by preserving or restoring natural areas and their mitigation functions through erosion and sediment control of waterways.	5	Ongoing	Natural Resource Protection	LOC; CRP; CDBG	Safety Services Director	5/1/22	5/1/27
N Ridgeville 1.6	North Ridgeville will work with other conservancy and soil conservation groups to develop and implement practices to conserve topsoil, prevent erosion, and maintain natural habitats for the purpose of reducing flood and erosion risks.	6	Ongoing	Natural Resource Protection	LOC; ICC; HMGP; CRP;	Safety Services Director	5/1/22	5/1/27
N Ridgeville 1.7	North Ridgeville will utilize acquisition, demolition, and relocation projects for properties that have severe or repetitive losses and property owners are willing to participate.	7	Ongoing	Prevention	HMGP; FMA; SRL; CDBG; Other	Safety Services Director	5/1/22	5/1/27
GOAL 2: The City of North Ridgeville will improve warning and notification systems and will improve general communication with residents during disasters to more effectively recover from disasters.								
N Ridgeville 2.1	North Ridgeville will maintain communication tools such as text messages, phone call systems, and others, perhaps as part of a countywide system, to effectively notify the community of impending danger and/or inclement weather risks.	8	Ongoing	Public Information	LOC	Safety Services Director	5/1/22	5/1/27
GOAL 3: The City of North Ridgeville will conduct preparedness outreach and education programs for residents of the city.								
N Ridgeville 3.1	North Ridgeville will educate the community about evacuation procedures and how to identify shelter locations, comfort stations, and service centers during disasters.	9	Ongoing	Public Information	LOC	Safety Services Director	5/1/22	5/1/27
GOAL 4: The City of North Ridgeville will identify, establish, and utilize protective measures to shelter residents during dangerous weather or other inclement situations.								

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
N Ridgeville 4.1	North Ridgeville will support the Lorain County EMA and American Red Cross in the identification of, support for and use of shelters during evacuations and extreme weather conditions, power outages, or other disasters.	10	Ongoing	Property Protection	LOC	Safety Services Director	5/1/22	5/1/27
N Ridgeville 4.2	North Ridgeville will work with Lorain County to identify and establish comfort stations and service centers to be used to serve residents quickly and efficiently during disasters.	11	Ongoing	Property Protection	LOC	Safety Services Director	5/1/22	5/1/27
GOAL 5: NORTH RIDGEVILLE WILL PROTECT AND IMPROVE INFRASTRUCTURE TO REDUCE DAMAGES TO CRITICAL SYSTEMS.								
N. Ridgeville 5.1	North Ridgeville will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	12	New	Structurally Engineered	Local; HMA; Other	Safety Services Director	5/1/22	5/1/27
N. Ridgeville 5.2	North Ridgeville will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	13	New	Property Protection	Local	Safety Services Director	5/1/22	5/1/27
N. Ridgeville 5.3	North Ridgeville will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	14	New	Structurally Engineered	Local; HMA; Other	Safety Services Director	5/1/22	5/1/27
N. Ridgeville 5.4	North Ridgeville will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	15	New	Structurally Engineered	Local; HMA; Other	Safety Services Director	5/1/22	5/1/27
N. Ridgeville 5.5	North Ridgeville will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	16	New	Property Protection	Local; HMA; Other	Safety Services Director	5/1/22	5/1/27
N. Ridgeville 5.6	North Ridgeville will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	17	New	Structurally Engineered	Local; HMA;	Safety Services Director	5/1/22	5/1/27
OBERLIN								
GOAL 1: The City of Oberlin will reduce the negative effects of flooding on city residents and properties.								
Oberlin 1.1	Oberlin will support progressive storm water management by facilitating widespread development of countywide storm water planning to help prevent downstream flooding.	1	Ongoing	Property Protection	LOC	City Manager	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Oberlin 1.2	Oberlin will strive to install vegetative buffer zones and natural habitat restoration in areas that flood on a repeated basis, especially along Plum Creek, and will work with property owners to facilitate those conservation measures.	2	Ongoing	Natural Resource Protection	CRP; HMGP; FMA; CDBG; LOC	City Manager	5/1/22	5/1/27
Oberlin 1.3	Oberlin will support residential and commercial building code enforcement, floodplain management, and zoning regulations in an attempt to minimize flooding and property loss due to flooding.	3	Ongoing	Property Protection	LOC	City Manager	5/1/22	5/1/27
Oberlin 1.4	Oberlin will use, when funding is available, acquisition, relocation, and demolition projects for structures that incur repeated flooding and/or are located in a high-risk flood zone.	4	Ongoing	Prevention	HMGP; FMA; SRL; Other; LOC	City Manager	5/1/22	5/1/27
GOAL 2: The City of Oberlin will work to harden utilities within the city to foster rapid recovery from disasters.								
Oberlin 2.1	Oberlin will identify and acquire alternate power supplies for all critical facilities within the city to insure the continuation of life-saving services during severe weather, disasters, and long periods of power outages and other storms.	5	Ongoing	Property Protection	LOC; ICC; HMGP; Other	City Manager	5/1/22	5/1/27
GOAL 3: The City of Oberlin will improve sheltering and protective measures available to residents during severe storms.								
Oberlin 3.1	Oberlin will support a countywide program for construction of safe rooms for residents and visitors in wind-resistant shelters.	6	Ongoing	Property Protection	HMGP; LOC; Other	City Manager	5/1/22	5/1/27
GOAL 4: The City of Oberlin will improve emergency communications within the city and with all entities in Lorain County to lessen the loss of life and property during disasters.								
Oberlin 4.1	Oberlin will participate in a countywide interoperable communications system that includes tactical frequencies for public safety as well as city administration and other important service providers.	7	Ongoing	Public Information	LOC; HSGP; Other	City Manager	5/1/22	5/1/27
Oberlin 4.2	Oberlin will support the maintenance of its current notification system, and will consider support of a countywide emergency notification system that includes text messaging, mobile apps, emails, and other digital and social media.	8	Ongoing	Public Information	LOC; HMGP; Other	City Manager	5/1/22	5/1/27
GOAL 5: The City of Oberlin will identify and plan for emergency operations with all populations in order to protect the life and safety residents, visitors, and workers during natural								

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Oberlin 5.1	Oberlin will strive to clarify and coordinate emergency efforts with special populations and groups so that those who reside in multi-family housing are adequately served during emergencies and disasters.	9	Ongoing	Public Information	LOC; EMPG	City Manager	5/1/22	5/1/27
GOAL 6: The City of Oberline will protect and improve infrastrucutre to reduce damages to critical facilities and other assets.								
Oberlin 6.1	Oberlin will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	10	New	Structurally Engineered	Local; HMA; Other	City Manager	5/1/22	5/1/27
Oberlin 6.2	Oberlin will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	11	New	Property Protection	Local	City Manager	5/1/22	5/1/27
Oberlin 6.3	Oberlin will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	12	New	Structurally Engineered	Local; HMA; Other	City Manager	5/1/22	5/1/27
Oberlin 6.4	Oberline will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	13	New	Structurally Engineered	Local; HMA; Other	City Manager	5/1/22	5/1/27
Oberlin 6.5	Oberlin will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	14	New	Property Protection	Local; HMA; Other	City Manager	5/1/22	5/1/27
Oberlin 6.6	Oberlin will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	15	New	Structurally Engineered	Local; HMA; Other	City Manager	5/1/22	5/1/27
ROCHESTER								
GOAL 1: The Village of Rochester will improve rapid warning and notification systems.								
Rochester 1.1	Rochester will maintain the countywide emergency notification system that utilizes various forms of technology to notify residents of impending danger or inclement weather.	1	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
GOAL 2: The Village of Rochester will decrease the impact of flooding on village residents.								

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Rochester 2.1	Rochester will identify repetitive or severe loss structures for acquisition, demolition and relocation for the occupants and will apply for and use grant funds to complete these projects.	2	Ongoing	Prevention	LOC; HMGP; FMA; SRL; CDBG; Other	Mayor	5/1/22	5/1/27
GOAL 3: The Village of Rochester will support countywide flood mitigation studies.								
Rochester 3.1	Rochester will participate in a countywide storm water assessment and implementation of a countywide plan to manage storm water to minimize flooding across the county.	3	Ongoing	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
GOAL 4: ROCHESTER WILL PROTECT AND IMPROVE INFRASTRUCTURE TO REDUCE DAMAGES TO CRITICAL SYSTEMS.								
Rochester 4.1	Rochester will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	4	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Rochester 4.2	Rochester will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	5	New	Property Protection	LOC	Mayor	5/1/22	5/1/27
Rochester 4.3	Rochester will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	6	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Rochester 4.4	Rochester will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	7	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Rochester 4.5	Rochester will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	8	New	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Rochester 4.6	Rochester will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	9	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
SHEFFIELD VILLAGE								
GOAL 1: The Village of Sheffield will advocate and educate officials and residents about the need to develop countywide storm water management planning and regulation.								

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Sheffield Village 1.1	Sheffield will participate in storm water study in Lorain County, and will develop retention ponds, detention structures, and vegetative buffers to lessen flooding in downstream areas.	1	Ongoing	Structurally Engineered Projects	HMGP; BRIC; FMA; LOC; Other	Mayor	5/1/22	5/1/27
Sheffield Village 1.2	Sheffield will establish and support economic development standards that utilize current building codes, zoning standards, and other land use planning regulations that take into consideration the effect of development on storm water and flooding effects.	2	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
GOAL2: The Village of Sheffield will reduce the negative effects of flooding on village residents and properties.								
Sheffield Village 2.1	Sheffield will advocate for the proper maintenance of streams, ditches, and rivers to reduce debris and vegetation that causes water to back up and flood areas inside the city and upstream from the city.	3	Ongoing	Natural Resource Protection	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 2.2	Sheffield will advocate that property owners in floodplains to carry flood insurance as a way to protect and mitigate flood losses.	4	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 2.3	Sheffield support current FEMA floodplain mapping.	5	Ongoing	Prevention	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 2.4	Sheffield will identify, establish, and maintain erosion control measures along streams, ditches and rivers, as well as along the shoreline of Lake Erie.	6	Ongoing	Natural Resource Protection	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 2.5	Sheffield will implement the proper maintenance of storm sewers and water lines to minimize flooding and maximize the ability for the city to manage storm runoff.	7	Ongoing	Property Protection	LOC; CDBG; Other	Mayor	5/1/22	5/1/27
Sheffield Village 2.6	Sheffield will identify and complete projects that acquire, relocate, and demolish repetitive flood loss structures.	8	Ongoing	Prevention	HMGP; FMA; SRL; CDBG; Other	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Sheffield Village 2.7	Sheffield will create retention ponds, vegetative buffer zones, natural habitats, and barriers where flooding waterways cause repeated damages to properties that cannot feasibly be relocated or otherwise protected.	9	Ongoing	Structurally Engineered Projects	HMGP; BRIC; SRL; FMA;	Mayor	5/1/22	5/1/27
GOAL 3: The Village of Sheffield will improve warning and notification for residents.								
Sheffield Village 3.1	Sheffield will maintain warning and notification systems that include digital methods of contact including text messaging, emails, as well as outdoor sirens to warn residents and workers of immediate dangers and inclement weather conditions.	10	Ongoing	Public Information	LOC; HSGP; Other	Mayor	5/1/22	5/1/27
GOAL 4: The Village of Sheffield will improve protective actions available during severe storms.								
Sheffield Village 4.1	Sheffield will support and implement safe room programs for residents who live in congregate housing developments and mobile homes without shelters for tornadoes and other severe wind incidents.	11	Ongoing	Property Protection	HMGP; Other	Mayor	5/1/22	5/1/27
GOAL 5: The Village of Sheffield will harden utility services during storms and disasters.								
Sheffield Village 5.1	Sheffield will collaborate with utility providers to improve and harden utility services by burying utility lines in new and renovated residential areas, and by replacing old worn supply lines in older neighborhoods.	12	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 6: The Village of Sheffield will conduct public outreach and education programs to minimize the loss of life and property during disasters.								
Sheffield Village 6.1	Sheffield will conduct educational programs for children and families regarding flood safety, fire safety and prevention, and weather awareness and safety during storms and disasters.	13	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 6.2	Sheffield will post electronic information for resident and worker safety during and after an earthquake.	14	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 6.3	Sheffield will educate the public about heat and cold emergencies and how to be safe and secure during those times as a way to minimize the emergency needs of the city during temperature extremes, and to minimize how badly safety forces are overwhelmed during those times.	15	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
GOAL 7: The Village of Sheffield will protect and improve infrastructure to reduce damages to critical systems.								
Sheffield Village 7.1	Sheffield will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	16	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Sheffield Village 7.2	Sheffield will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	17	New	Property Protection	LOC	Mayor	5/1/22	5/1/27
Sheffield Village 7.3	Sheffield will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	18	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Village 7.4	Sheffield will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	19	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Village 7.5	Sheffield will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	20	New	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Village 7.6	Sheffield will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	21	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
SHEFFIELD LAKE								
GOAL 1: The City of Sheffield Lake will educate the community about the notification systems that warn them of impending disasters and the actions they should take immediately to protect themselves and their property.								
Sheffield Lake 1.1	Sheffield Lake will utilize communication tools such as text messages, phone call systems, and others, perhaps as part of a countywide system, to effectively notify the community of impending danger and/or inclement weather risks.	1	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Sheffield Lake 1.2	Sheffield Lake will improve the communication systems through enhanced hardware and software and improved procedures between first responders and other critical resources in the event of an emergency or disaster.	2	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Sheffield Lake 1.3	Sheffield Lake will maintain working partnerships with Lorain County Emergency Management and other agencies to develop information dissemination capabilities that might include 2-1-1 and other community agencies, and would enhance the community's ability to communicate with all populations, including those with functional and special needs.	3	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Sheffield Lake 1.4	Sheffield Lake will effectively identify and communicate with special populations within the jurisdiction as it relates to disasters, warning and notification, and response.	4	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Sheffield Lake 1.5	Sheffield Lake will educate the community about evacuation procedures and how to identify shelter locations, comfort stations, and service centers during disasters.	5	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
GOAL 2: The City of Sheffield Lake will improve protective options for residents during severe storms and disasters.								
Sheffield Lake 2.1	Sheffield Lake will establish sites to be used as shelters, comfort stations, and service centers during disasters, and will strive to equip these sites with the features necessary to adequately serve the community during storms, power outages, and other disasters.	6	Ongoing	Property Protection	LOC; Other	Mayor	5/1/22	5/1/27
GOAL 3: The City of Sheffield Lake will identify and implement a water supply plan for emergency purposes that support, supplement, or serve in place of a municipal or county water supply during large fires.								
Sheffield Lake 3.1	Sheffield Lake will construct ponds with the capability of being used as an alternate water supply, and that are equipped with dry hydrants.	7	Ongoing	Natural Resource Protection	LOC; CWSRF; CDBG	Mayor	5/1/22	5/1/27
GOAL 4: The City of Sheffield Lake will conduct public outreach and education for property owners to reduce the effects of disasters.								
Sheffield Lake 4.1	Sheffield Lake will educate about and advocate to property owners good regular maintenance practices that result in preventing excessive damages to structures during storms, such as ditch bank maintenance, trimming trees, and clearing excessive vegetation from streams and waterways.	8	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
GOAL 5: The City of Sheffield Lake will develop projects to lessen the damages to property from flooding.								
Sheffield Lake 5.1	Sheffield Lake will use acquisition and demolition projects to remove repetitive loss structures and prevent further losses.	9	Ongoing	Prevention	HMGP; FMA; SRL; CDBG; Other	Mayor	5/1/22	5/1/27
Sheffield Lake 5.2	Sheffield Lake will construct retention ponds to hold runoff waters during periods of heavy precipitation.	10	Ongoing	Structurally Engineered Projects	BRIC; HMGP; FMA; LOC; Other	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Sheffield Lake 5.3	Sheffield Lake will improve storm sewer systems to more adequately manage runoff water for all areas and thus prevent/lessen flooding in residential and/or commercial properties.	11	Ongoing	Structurally Engineered Projects	BRIC; HMGP; FMA; LOC; Other	Mayor	5/1/22	5/1/27
Sheffield Lake 5.4	Sheffield Lake will identify and develop elevation options for roadways, streets, and other infrastructure that is negatively affected by flooding on a regular basis.	12	Ongoing	Structurally Engineered Projects	BRIC; HMGP; FMA; LOC; Other	Mayor	5/1/22	5/1/27
GOAL 6: The City of Sheffield Lake will work with utility providers to harden utility services and to prevent excessive outages during storms and inclement weather.								
Sheffield Lake 6.1	Sheffield Lake will bury power and utility lines in new neighborhoods, homes, and businesses.	13	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
Sheffield Lake 6.2	Sheffield Lake will replace aging and deteriorating power, water, sewer, and other utility distribution systems.	14	Ongoing	Property Protection	LOC; ICC;	Mayor	5/1/22	5/1/27
Sheffield Lake 6.3	Sheffield Lake will develop protective actions to prevent or lessen the likelihood of damage to water treatment and/or distribution systems during disasters and inclement weather.	15	Ongoing	Property Protection	LOC; ICC; BRIC;	Mayor	5/1/22	5/1/27
Sheffield Lake 6.4	Sheffield Lake will work with wireless service providers to establish dependable and resilient wireless service within the jurisdiction to improve the capability to communicate during inclement weather and disasters.	16	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 7: The City of Sheffield Lake will improve location identification capability to lower response times and increase accuracy in response.								
Sheffield Lake 7.1	Sheffield Lake will improve GIS mapping and addressing within the community so that first responders and service providers can more easily locate and assist victims at particular residences and businesses.	17	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
GOAL 8: The City of Sheffield Lake will improve recovery times by more effectively managing storm clean-up.								
Sheffield Lake 8.1	Sheffield Lake will identify and approve disposal sites for disaster debris, including segregated solid waste such as construction materials, wood and combustible waste, masonry and concrete waste, metal waste, paper and general garbage, and hazardous waste.	18	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
GOAL 9: The City of Sheffield Lake will protect and improve infrastructure to reduce damages to critical systems and key assets.								

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Sheffield Lake 9.1	Sheffield Lake will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	19	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Lake 9.2	Sheffield Lake will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	20	New	Property Protection	LOC	Mayor	5/1/22	5/1/27
Sheffield Lake 9.3	Sheffield Lake will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	21	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Lake 9.4	Sheffield Lake will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	22	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Lake 9.5	Sheffield Lake will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	23	New	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
Sheffield Lake 9.6	Sheffield Lake will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	24	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
SOUTH AMHERST								
GOAL 1: The Village of South Amherst will support effective notification and warning systems.								
S Amherst 1.1	South Amherst will maintain an emergency notification system that utilizes various forms of technology to notify residents of impending danger or inclement weather.	1	Ongoing	Public Information	LOC; HSGP; Other	Mayor	5/1/22	5/1/27
GOAL 2: The Village South Amherst will minimize the losses from flooding.								
S Amherst 2.1	South Amherst will participate in countywide planning to assess and manage storm water to minimize flooding across the county.	2	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
GOAL 3: The Village of South Amherst will participate in a countywide storm water assessment.								
S Amherst 3.1	South Amherst will participate in countywide planning to assess and manage storm water to minimize flooding across the county.	3	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
GOAL 4: The Village of South Amherst will harden utility supplies during disasters.								

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
S Amherst 4.1	South Amherst will require that electrical providers bury utility lines for all new construction.	4	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
S Amherst 4.2	South Amherst will make improvements to the storm sewer system in the village to lessen flooding by facilitating good and rapid drainage capabilities.	5	Ongoing	Property Protection	LOC; ICC	Mayor	5/1/22	5/1/27
S Amherst 4.3	South Amherst will develop a redundant water supply for the village with the purpose of lessening water outages when intake is impeded by extremely cold weather.	6	Ongoing	Natural Resource Protection	LOC; CWSRF; CDBG	Mayor	5/1/22	5/1/27
GOAL 5: The Village of South Amherst will support improvements and clarity to emergency communications components.								
S Amherst 5.1	South Amherst will improve GIS mapping for the village to eliminate confusion when first responders must find specific locations.	7	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
S Amherst 5.2	South Amherst will improve communications interoperability between local first responders as well as between village responders and other adjacent and county departments through hardware and software improvements and enhanced procedures.	8	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
GOAL 6: The Village of South Amherst will improve shelter capacity in the village.								
S Amherst 6.1	South Amherst will facilitate and implement the placement of safe rooms on properties that lack wind-safe shelter.	9	Ongoing	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
GOAL 7: SOUTH AMHERST WILL PROTECT AND IMPROVE INFRASTRUCTURE TO REDUCE DAMAGES TO CRITICAL SYSTEMS.								
S. Amherst 7.1	South Amherst will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	10	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
S. Amherst 7.2	South Amherst will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	11	New	Property Protection	LOC	Mayor	5/1/22	5/1/27
S. Amherst 7.3	South Amherst will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	12	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
S. Amherst 7.4	South Amherst will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	13	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
S. Amherst 7.5	South Amherst will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	14	New	Property Protection	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
S. Amherst 7.6	Maintain, repair, upgrade, and/or replace water treatment and distribution systems.	15	New	Structurally Engineered	LOC; HMGP; Other	Mayor	5/1/22	5/1/27
VERMILION								
GOAL 1: The City of Vermilion will lessen the negative effects of flooding within the city.								
Vermilion 1.1	Vermilion will implement acquisition, demolition and relocation programs for repetitive flood loss properties.	1	Ongoing	Prevention	HMGP; FMA;	Mayor	5/1/22	5/1/27
Vermilion 1.2	Vermilion will educate property owners and advocate for flood insurance coverage for properties in locations where flood damage is likely.	2	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Vermilion 1.3	Vermilion will acquire properties prone to flooding, and to restore the properties to a natural state, as appropriate, through cooperation with park and recreations groups, conservation groups, state agencies, and other appropriate resources.	3	Ongoing	Prevention	HMGP; SRL; FMA; LOC; Other	Mayor	5/1/22	5/1/27
Vermilion 1.4	Vermilion will improve storm sewer systems to more adequately manage runoff water for all areas and thus prevent or lessen flooding in residential and/or commercial properties.	4	Ongoing	Structurally Engineered Projects	HMGP; BRIC; FMA; CRP; CDBG; LOC; Other	Mayor	5/1/22	5/1/27
Vermilion 1.5	Vermilion will use beach nourishment and vegetation to protect recreational areas and beaches from the damage caused by high lake levels and coastal flooding.	5	Ongoing	Natural Resource Protection	H2Ohio, CRP, CRGP,	Mayor	5/1/22	5/1/27

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Vermilion 1.6	Vermilion will use bulkheads, structurally engineered drainage systems, revetments, regrading and terracing, and seawalls to protect infrastructure and critical resources like roads, bridges and utilities from damages caused by coastal flooding, extremely high lake levels and other types of flooding and wind storms.	6	Ongoing	Natural Resource Protection	H2Ohio ; CRP; CRGP, LOC; Other	Mayor	5/1/22	5/1/27
GOAL 2: The City of Vermilion will ensure the availability of potable drinking water for residents during extremely cold periods or extended cold periods.								
Vermilion 2.1	Vermilion will identify, design, and implement improvements to water supply intake systems to lessen the negative effect of ice jams on the water supply.	7	Ongoing	Natural Resource Protection	CWSRF; H2Ohio ; BRIC;	Mayor	5/1/22	5/1/27
Vermilion 2.2	Vermilion will maintain relationships with water providers such as Erie County, Lorain, and Northern Ohio Rural Water to provide a redundant water supply when intake sources are not operational for the city's normal water system.	8	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
GOAL 3: The City of Vermilion will develop and sustain resilient utility services through communication with property owners that advocate and educate them about responsible property ownership.								
Vermilion 3.1	Vermilion will advocate regular and effective tree trimming, debris management, and ditch maintenance for private property owners.	9	Ongoing	Property Protection	LOC	Mayor	5/1/22	5/1/27
Vermilion 3.2	Vermilion will identify funding for and purchase alternate power supplies for critical facilities within the city.	10	Ongoing	Property Protection	HMGP; HSGP; BRIC; Other: LOC	Mayor	5/1/22	5/1/27
Vermilion 3.3	Vermilion will identify funding for and purchase at least one large, portable generator to be used to sustain critical services on site during storms or aftermath.	11	Ongoing	Property Protection	HMGP; LOC; ICC;	Mayor	5/1/22	5/1/27
GOAL 4: The City of Vermilion will maintain public outreach efforts to lessen the effects of natural disasters on the residents of the city.								
Vermilion 4.1	Vermilion will maintain their municipal warning and notification system.	12	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
Vermilion 4.2	Vermilion will distribute educational materials about evacuation, shelters, and comfort stations to the residents for their use and safety during evacuations and severe storms.	13	Ongoing	Public Information	LOC	Mayor	5/1/22	5/1/27
GOAL 5: VERMILION WILL PROTECT AND IMPROVE INFRASTRUCTURE TO REDUCE DAMAGES TO CRITICAL SYSTEMS.								

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Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
Vermilion 5.1	Vermilion will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	14	New	Structurally Engineered	Local; HMA; Other	Mayor	5/1/22	5/1/27
Vermilion 5.2	Vermilion will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	15	New	Property Protection	Local	Mayor	5/1/22	5/1/27
Vermilion 5.3	Vermilion will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	16	New	Structurally Engineered	Local; HMA; Other	Mayor	5/1/22	5/1/27
Vermilion 5.4	Vermilion will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	17	New	Structurally Engineered	Local; HMA; Other	Mayor	5/1/22	5/1/27
Vermilion 5.5	Vermilion will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	18	New	Property Protection	Local; HMA; Other	Mayor	5/1/22	5/1/27
Vermilion 5.6	Vermilion will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	19	New	Structurally Engineered	Local; HMA; Other	Mayor	5/1/22	5/1/27
WELLINGTON								
GOAL 1: The Village of Wellington will improve warning and notification systems								
Wellington 1.1	Wellington will expand the outdoor warning siren system to harden and improve warning and notification capabilities. As the geographic footprint of the community has expanded, and development on the periphery of the village has occurred, the current central siren needs to be improved with the installation of outlying sirens to more effectively inform the public. The current system does not have a verbal warning capability, so that will be considered as a feature in a new system.	1	Ongoing	Public Information	HSGP; CDBG; LOC	Village Manager	5/1/22	5/1/27
Wellington 1.2	Wellington will install additional siren/voice notification nodes at strategic locations to improve warning capabilities.	2	Ongoing	Public Information	HSGP; CDBG; LOC	Village Manager	5/1/22	5/1/27

Section 3: Mitigation Strategies

Mitigation Action	Details	Priority	Status	Action Type	Funding Source	Project Lead	Start Date	End Date
GOAL 2: The Village of Wellington, through its Electric Department, will create a redundant and separate electrical grid interconnection to harden utility services and to prevent excessive outages during storms and inclement weather.								
Wellington 2.1	Wellington will build a new substation that will be a second interconnection to the grid power supply and will be fed by a separate distribution line from the area electrical transmission company. This will provide redundancy at both the local interconnection level and at the distribution level and should significantly harden the utility to storm impacts.	3	Ongoing	Structurally Engineered Projects	LOC; ICC	Village Manager	5/1/22	5/1/27
GOAL 3: The Village of Wellington will protect and improve infrastructure to reduce damages to critical systems and other assets.								
Wellington 3.1	Wellington will maintain, repair, upgrade, and/or replace storm sewers, wastewater management systems, and associated structures, such as curbs and stormwater basins.	4	New	Structurally Engineered	LOC; HMGP; Other	Village Manager	5/1/22	5/1/27
Wellington 3.2	Wellington will ensure that high hazard and classified dams have appropriate emergency plans that identify inundation areas and facilitate emergency actions in the event of a failure.	5	New	Property Protection	LOC	Village Manager	5/1/22	5/1/27
Wellington 3.3	Wellington will maintain, repair, and replace dams and upground reservoirs that are structurally compromised or place the public in danger during a structural failure.	6	New	Structurally Engineered	LOC; HMGP; Other	Village Manager	5/1/22	5/1/27
Wellington 3.4	Wellington will improve and repair roadways, bridges, culverts, and other transportation infrastructure that is damaged by rapid runoff and heavy precipitation.	7	New	Structurally Engineered	LOC; HMGP; Other	Village Manager	5/1/22	5/1/27
Wellington 3.5	Wellington will conduct appropriate studies (hydrology and hydraulics, storm water and sewer, inundation, and others) to determine the root cause of flooding and water management issues and identify vulnerable populations and structures.	8	New	Property Protection	LOC; HMGP; Other	Village Manager	5/1/22	5/1/27
Wellington 3.6	Wellington will maintain, repair, upgrade, and/or replace water treatment and distribution systems.	9	New	Structurally Engineered	LOC; HMGP; Other	Village Manager	5/1/22	5/1/27

4.0 PLAN ADOPTION

As the final step in the mitigation plan process, Lorain County followed the formal process for state review, federal approval, and local adoption. This section describes that process and includes all dates relevant to plan approval, adoption, and expiration.

4.1 STATE REVIEW AND FEDERAL PLAN APPROVAL

After extensive stakeholder and community review, the 2022 Lorain County Hazard Mitigation Plan was submitted to the Ohio Emergency Management Agency for review on June 1, 2022. Approval pending adoption was issued on **DATE**. Upon receipt of this approval, the Lorain County EMA began to pursue adoption by the jurisdictions.

4.2 LOCAL ADOPTION

The plan was formally adopted by all incorporated jurisdictions. As part of the adoption process, adopting jurisdictions were provided sample legislation to assist in the process. A complete list of plan adoptions by jurisdiction is provided in table 4-1. Adoption resolutions from each jurisdiction are also attached to this section.

Table 4-1: Jurisdiction Adoption

Jurisdiction	Date of Adoption
Lorain County	
Amherst, Village of	
Avon, City of	
Avon Lake, City of	
Elyria, City of	
Grafton, Village of	
Kipton, Village of	
LaGrange, Village of	
Lorain, City of	
North Ridgeville, City of	
Oberlin, City of	
Rochester, Village of	
Sheffield, Village of	
Sheffield Lake, City of	
South Amherst, Village of	
Vermilion, City of	
Wellington, Village of	

Following adoption, final plan approval on **DATE**. The approved plan was uploaded into the Ohio EMA’s mitigation plan portal.

4.3 PLAN EXPIRATION

The Lorain County Hazard Mitigation Plan will expire on **XX, XX**, 2027. The process to maintain the plan will be ongoing throughout the five-year period, as explained in section 1.0 The Planning Process.

5.0 APPENDIX A: HAZARD MITIGATION PLANNING

Throughout the planning process, a broad group of stakeholders and community members from across Lorain County participated in the hazard mitigation plan. The table below identifies each individual who participated and the agency or jurisdiction represented.

Participant	Position/Title	Agency/Jurisdiction
James Wilhelm	Fire Chief	Amherst
David Urig	Trustee	Amherst Township
David Swope	Fire Chief	Avon
Tom Carleton	Building Official	Avon Lake
Vincent Molnar	Police Chief	Avon Lake
Joseph Reitz	Public Works Director	Avon Lake
John Rogers	Assistant Fire Chief	Avon Lake
Greg Zilka	Mayor	Avon Lake
Craig Norton	Trustee	Brighton Township
Marsha Brownhelm	Fiscal Officer	Brownhelm Township
Stephen Higgins	Fire Chief	Carlisle Township
Jared Smith	Trustee	Carlisle Township
Ray Anthony	Fire Chief	Columbia Township
Mark Cunningham	Trustee	Columbia Township
Anonymous Participant	Unknown	Columbia Township
Kevin Brubaker	Safety Service Director	Elyria
Dave Rothgery	Operations Manager	Elyria
Deborah Conner	Public Utilities Manager	Elyria
Samuel Jacob	Water Works Superintendent	Elyria
Duane Whitley	Police Chief	Elyria
Tim VanDyke	Trustee	Elyria Township
Glen Thompson	Fire Chief	Grafton
Christie Homer-Miller	Trustee	Grafton Township
Anonymous Participant	Unknown	Henrietta Township
Lyn Ickes	Zoning Commission	Huntington Township
Karol Cornelius	Mayor	Kipton
Christie Homer-Miller	Fiscal Officer	Kipton
Mary Kay Gates	Village Administrator	LaGrange
Rita Canfield	Trustee	LaGrange Township

Participant	Position/Title	Agency/Jurisdiction
James Rader	Chief	LaGrange Township
Shawn Lloyd	Fire Captain	Lorain (City)
Rick Soto	Chief of Staff	Lorain (City)
Tim Carrion		Lorain County
Jessica Fetter	EMA Director	Lorain County
Hope Boros	Emergency Operations Manager	Lorain County
Daniel Gross	Facilities Director	Lorain County
Lyn Ickes	Watershed Specialist	Lorain County
Maggie Hopkins	Business Administrator	Lorain County
Sandy Moraco	Program Administrator	Lorain County JFS
Janine Trottier	Preparedness Coordinator	Lorain County Public Health
Angela Lundberg	HAN Coordinator	Lorain County Public Health
Mark Adams	Health Commissioner	Lorain County Public Health
Lynn Rebman	Preparedness Coordinator	Lorain County Public Health
Lynn Parsh	Office Manager	Lorain County Soil and Water Conservation District
Andy Gulish	Trustee	New Russia Township
John Reese	Chief	North Ridgeville
Jeff Baumann	Public Works Director	Oberlin
Robert Hanmer	Fire Chief	Oberlin
Robert Hillard	City Manager	Oberlin
Ryan Warfield	Police Chief	Oberlin
Eric Flynn	Trustee	Penfield Township
Mark McConnell	Trustee	Pittsfield Township
Forrest Mohrman	Trustee	Pittsfield Township
Duane Eaton	Fire Chief	Rochester
Anonymous Participant	Trustee	Rochester Township
Tim Card	Fire Chief	Sheffield Lake
Jacob DeWitt	Firefighter	Sheffield Lake
Patrick Hastings	Service Director	Sheffield Lake
David Novak	Fire Lieutenant	Sheffield Lake
Joseph Neuhoff	Fiscal Officer	Sheffield Township
Jeff Young	Fire Chief	Sheffield Village
Dave Leshinski	Mayor	South Amherst
Al Schmitz	Fire Chief	South Amherst
Chris Hartung	Police Chief	Vermilion

Participant	Position/Title	Agency/Jurisdiction
Anne Maiden	Administrative Assistant	Vermilion
Chris Stempowski	Fire Chief	Vermilion
Tony Valerius	Service Director	Vermilion
Steve Dupee	Village Manager	Wellington
Mike Wetherbee	Fire Chief	Wellington Fire District (Village and Township)
Mike Bridge	Director of Operations	Lifecare Ambulance
Skip Gentry	Director of Operations	South Lorain Ambulance

6.0 APPENDIX B: HAZARD AND VULNERABILITY DATA

The information in this appendix supplements the analysis of Lorain County hazards and vulnerabilities from Section 2: Hazard Identification and Risk Assessment. A complete list of historical incidents for each hazard and detailed data on the potential for damage in Lorain County from a 100-year flood and earthquake, per HAZUS estimates, are provided.

6.1 HAZARD HISTORY DATA

The National Climactic Data Center has maintained records on weather incidents across the United States since approximately 1950. The sections that follow provide a history of the incidents recorded in Lorain County from 1950 through present day.

6.1.1 Drought and Extreme Heat

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Drought	Lorain (Zone)	08/01/1996	0	0	0	0
Drought	Lorain (Zone)	07/01/1997	0	0	0	0
Drought	Lorain (Zone)	06/01/1999	0	0	0	0
Drought	Lorain (Zone)	07/01/1999	0	0	0	0
Drought	Lorain (Zone)	08/01/1999	0	0	0	0
Drought	Lorain (Zone)	09/01/1999	0	0	0	7M

6.1.2 Flood

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Flash Flood	Lorain County	04/23/1996	0	0	4K	0
Flash Flood	Avon	06/04/1996	0	0	0	0
Flash Flood	Lorain County	06/12/1996	0	0	30K	0
Flash Flood	Avon	06/14/1996	0	0	0	0
Flash Flood	Vermilion	06/18/1996	0	0	10K	0
Flash Flood	Wellington	06/18/1996	0	0	20K	0
Flash Flood	Elyria	06/25/1996	0	0	2K	0
Flash Flood	Columbia Station	09/07/1996	0	0	10K	20K
Flash Flood	Northern Half	09/07/1996	0	0	200K	75K
Flash Flood	Northern Half	09/09/1996	0	0	0	0
Flash Flood	Northern Half	09/09/1996	0	0	75K	0
Flash Flood	Northern Half	09/13/1996	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Flash Flood	Northern Half	09/13/1996	0	0	75K	0
Flash Flood	Northern Half	09/13/1996	0	0	50K	0
Flash Flood	Lorain County	10/18/1996	0	0	0	0
Flash Flood	Lorain County	02/27/1997	0	0	50K	0
Flash Flood	Lorain County	06/01/1997	0	0	80K	40K
Storm Surge/Tide	Lakeshore	06/01/1997	0	0	75K	0
Flash Flood	Lorain County	06/01/1997	0	0	30K	20K
Flash Flood	Lorain City	08/16/1997	0	0	0	0
Flash Flood	Lorain County	09/20/1997	0	0	50K	0
Flash Flood	Lorain County	01/07/1998	0	0	80K	0
Flash Flood	Lorain City	01/09/1998	0	0	0	0
Storm Surge/Tide	Lorain City	03/20/1998	0	0	50K	0
Flash Flood	Lorain County	04/16/1998	0	0	50K	0
Flash Flood	Lorain County	06/30/1998	0	0	15K	0
Flash Flood	Lorain County	06/30/1998	0	0	0	0
Flash Flood	Lorain City	07/21/1998	0	0	10K	0
Flash Flood	Lorain City	10/13/1999	0	0	0	0
Flash Flood	Elyria	07/27/2000	0	0	0	0
Flash Flood	Oberlin	04/19/2002	0	0	0	0
Flood	Lorain (Zone)	05/18/2004	0	0	50K	0
Flash Flood	Lorain County	05/21/2004	0	0	12.4M	0
Flood	Lorain (Zone)	05/21/2004	0	0	500K	0
Flash Flood	Lorain County	05/21/2004	0	0	250K	0
Flash Flood	Lorain County	05/22/2004	0	0	750K	0
Flood	Lorain (Zone)	01/01/2005	0	0	1.1M	0
Flood	Lorain (Zone)	02/08/2005	0	0	75K	0
Flood	Lorain (Zone)	04/03/2005	0	0	100K	0
Flash Flood	Lorain County	07/16/2005	0	2	1.2M	0
Flash Flood	Northern Half	08/08/2005	0	0	25K	0
Flash Flood	Northern Half	08/20/2005	0	0	2M	0
Flood	Lorain (Zone)	08/30/2005	0	0	125K	0
Flash Flood	Lorain City	09/17/2005	0	0	1.1M	0
Flash Flood	Lorain County	06/21/2006	0	0	600K	0
Flood	Lorain County	06/22/2006	1	0	4.5M	5M
Flood	Elyria	01/05/2007	0	0	200K	0
Flash Flood	Vermilion on the Lake	03/02/2007	0	0	50K	0
Flash Flood	Lorain City	08/07/2007	0	0	1.5M	0
Flood	Elyria	08/21/2007	0	0	50K	0
Flash Flood	Semples	06/26/2008	0	0	100K	15K
Flood	Vermilion on the Lake	02/08/2009	0	0	50K	0
Flood	Vermilion on the Lake	02/28/2011	0	0	750K	0
Flood	Henrietta	04/04/2011	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Flash Flood	Lorain Airport	04/25/2011	0	0	50K	0
Flash Flood	Lorain City	05/14/2011	0	0	0	0
Flash Flood	Oberlin	05/25/2011	0	0	0	0
Flash Flood	Pittsfield	05/25/2011	0	0	0	0
Flash Flood	Lorain City	05/26/2011	0	0	0	0
Flash Flood	Elyria	05/26/2011	0	0	0	0
Flood	Elyria	10/30/2012	0	0	1K	0
Flash Flood	Westview	06/25/2013	0	0	100K	0
Flash Flood	LaGrange	07/10/2013	0	0	100K	0
Flash Flood	Sheffield	05/12/2014	0	0	150K	0
Flash Flood	Shawville	05/12/2014	0	0	25M	0
Flash Flood	Sheffield	05/12/2014	0	0	1M	0
Flash Flood	Lorain County	06/24/2014	0	0	120K	0
Flash Flood	Avon Lake	06/23/2015	0	0	4M	0
Flash Flood	Elyria Airport	06/20/2019	0	0	80K	0
Flash Flood	North Eaton	06/28/2019	0	0	15K	0
Flash Flood	North Ridgeville	05/15/2020	0	0	2K	0
Flood	Vermilion on the Lake	05/18/2020	0	0	10K	0

6.1.3 Severe Thunderstorm

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Lorain County	07/09/1955	0	0	0	0
Thunderstorm Wind	Lorain County	06/23/1956	0	0	0	0
Thunderstorm Wind	Lorain County	04/24/1958	0	0	0	0
Thunderstorm Wind	Lorain County	09/06/1961	0	0	0	0
Hail	Lorain County	05/23/1962	0	0	0	0
Hail	Lorain County	05/23/1962	0	0	0	0
Thunderstorm Wind	Lorain County	09/13/1962	0	0	0	0
Hail	Lorain County	08/11/1964	0	0	0	0
Thunderstorm Wind	Lorain County	05/16/1965	0	0	0	0
Thunderstorm Wind	Lorain County	11/27/1965	0	0	0	0
Thunderstorm Wind	Lorain County	03/23/1966	0	0	0	0
Thunderstorm Wind	Lorain County	06/08/1967	0	0	0	0
Thunderstorm Wind	Lorain County	05/15/1968	0	0	0	0
Thunderstorm Wind	Lorain County	07/18/1968	0	0	0	0
Thunderstorm Wind	Lorain County	07/04/1969	0	0	0	0
Thunderstorm Wind	Lorain County	05/25/1970	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Lorain County	05/25/1970	0	0	0	0
Hail	Lorain County	05/25/1970	0	0	0	0
Hail	Lorain County	06/14/1970	0	0	0	0
Hail	Lorain County	06/05/1973	0	0	0	0
Hail	Lorain County	04/14/1974	0	0	0	0
Thunderstorm Wind	Lorain County	04/14/1974	0	0	0	0
Hail	Lorain County	04/14/1974	0	0	0	0
Thunderstorm Wind	Lorain County	04/14/1974	0	0	0	0
Thunderstorm Wind	Lorain County	05/11/1974	0	0	0	0
Thunderstorm Wind	Lorain County	07/09/1974	0	0	0	0
Hail	Lorain County	07/29/1974	0	0	0	0
Hail	Lorain County	08/13/1974	0	0	0	0
Thunderstorm Wind	Lorain County	03/20/1976	0	0	0	0
Thunderstorm Wind	Lorain County	07/10/1976	0	0	0	0
Thunderstorm Wind	Lorain County	07/14/1976	0	0	0	0
Thunderstorm Wind	Lorain County	07/15/1976	0	0	0	0
Thunderstorm Wind	Lorain County	06/28/1977	0	0	0	0
Thunderstorm Wind	Lorain County	06/30/1977	0	0	0	0
Thunderstorm Wind	Lorain County	07/16/1977	0	0	0	0
Thunderstorm Wind	Lorain County	05/20/1978	0	0	0	0
Thunderstorm Wind	Lorain County	06/12/1978	0	0	0	0
Hail	Lorain County	06/20/1979	0	0	0	0
Thunderstorm Wind	Lorain County	06/20/1979	0	0	0	0
Thunderstorm Wind	Lorain County	08/05/1979	0	0	0	0
Thunderstorm Wind	Lorain County	09/07/1979	0	0	0	0
Hail	Lorain County	04/08/1980	0	0	0	0
Thunderstorm Wind	Lorain County	04/08/1980	0	0	0	0
Thunderstorm Wind	Lorain County	06/07/1980	0	0	0	0
Thunderstorm Wind	Lorain County	06/29/1980	0	0	0	0
Thunderstorm Wind	Lorain County	09/04/1980	0	0	0	0
Thunderstorm Wind	Lorain County	09/13/1980	0	0	0	0
Thunderstorm Wind	Lorain County	09/25/1980	0	0	0	0
Thunderstorm Wind	Lorain County	04/17/1981	0	0	0	0
Hail	Lorain County	04/28/1981	0	0	0	0
Thunderstorm Wind	Lorain County	04/28/1981	0	0	0	0
Thunderstorm Wind	Lorain County	06/22/1981	0	0	0	0
Thunderstorm Wind	Lorain County	08/07/1981	0	0	0	0
Thunderstorm Wind	Lorain County	01/04/1982	0	0	0	0
Thunderstorm Wind	Lorain County	01/04/1982	0	0	0	0
Hail	Lorain County	05/22/1982	0	0	0	0
Thunderstorm Wind	Lorain County	06/15/1982	0	0	0	0
Hail	Lorain County	06/22/1982	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Lorain County	09/02/1982	0	0	0	0
Thunderstorm Wind	Lorain County	05/02/1983	0	0	0	0
Hail	Lorain County	05/02/1983	0	0	0	0
Thunderstorm Wind	Lorain County	05/02/1983	0	0	0	0
Hail	Lorain County	05/02/1983	0	0	0	0
Hail	Lorain County	05/02/1983	0	0	0	0
Hail	Lorain County	05/02/1983	0	0	0	0
Hail	Lorain County	05/02/1983	0	0	0	0
Thunderstorm Wind	Lorain County	07/04/1983	0	0	0	0
Thunderstorm Wind	Lorain County	07/31/1983	0	0	0	0
Thunderstorm Wind	Lorain County	09/06/1983	0	0	0	0
Thunderstorm Wind	Lorain County	06/13/1984	0	0	0	0
Thunderstorm Wind	Lorain County	07/06/1984	0	0	0	0
Hail	Lorain County	03/28/1985	0	0	0	0
Hail	Lorain County	03/28/1985	0	0	0	0
Thunderstorm Wind	Lorain County	03/28/1985	0	0	0	0
Thunderstorm Wind	Lorain County	04/05/1985	0	0	0	0
Thunderstorm Wind	Lorain County	04/05/1985	0	0	0	0
Thunderstorm Wind	Lorain County	04/05/1985	0	0	0	0
Thunderstorm Wind	Lorain County	07/10/1985	0	0	0	0
Thunderstorm Wind	Lorain County	03/10/1986	0	0	0	0
Thunderstorm Wind	Lorain County	06/16/1986	0	0	0	0
Thunderstorm Wind	Lorain County	07/25/1986	0	0	0	0
Thunderstorm Wind	Lorain County	08/26/1986	0	0	0	0
Thunderstorm Wind	Lorain County	09/26/1986	0	0	0	0
Thunderstorm Wind	Lorain County	09/26/1986	0	0	0	0
Thunderstorm Wind	Lorain County	09/27/1986	0	0	0	0
Thunderstorm Wind	Lorain County	05/30/1987	0	0	0	0
Thunderstorm Wind	Lorain County	06/08/1987	0	0	0	0
Thunderstorm Wind	Lorain County	06/29/1987	0	0	0	0
Thunderstorm Wind	Lorain County	06/29/1987	0	0	0	0
Thunderstorm Wind	Lorain County	06/29/1987	0	0	0	0
Thunderstorm Wind	Lorain County	06/29/1987	0	0	0	0
Thunderstorm Wind	Lorain County	08/02/1987	0	0	0	0
Thunderstorm Wind	Lorain County	08/02/1987	0	0	0	0
Thunderstorm Wind	Lorain County	08/02/1987	0	0	0	0
Thunderstorm Wind	Lorain County	05/09/1988	0	0	0	0
Thunderstorm Wind	Lorain County	05/09/1988	0	2	0	0
Hail	Lorain County	05/15/1988	0	0	0	0
Hail	Lorain County	05/15/1988	0	0	0	0
Thunderstorm Wind	Lorain County	05/15/1988	0	0	0	0
Thunderstorm Wind	Lorain County	05/15/1988	0	0	0	0
Thunderstorm Wind	Lorain County	08/14/1988	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Lorain County	08/15/1988	0	0	0	0
Thunderstorm Wind	Lorain County	05/25/1989	0	0	0	0
Thunderstorm Wind	Lorain County	05/31/1989	0	0	0	0
Thunderstorm Wind	Lorain County	06/27/1989	0	0	0	0
Thunderstorm Wind	Lorain County	09/07/1989	0	0	0	0
Thunderstorm Wind	Lorain County	11/27/1989	0	0	0	0
Thunderstorm Wind	Lorain County	06/03/1990	0	0	0	0
Thunderstorm Wind	Lorain County	06/30/1990	0	0	0	0
Thunderstorm Wind	Lorain County	09/06/1990	0	0	0	0
Thunderstorm Wind	Lorain County	09/14/1990	0	0	0	0
Thunderstorm Wind	Lorain County	03/27/1991	0	0	0	0
Thunderstorm Wind	Lorain County	03/27/1991	0	0	0	0
Thunderstorm Wind	Lorain County	05/24/1991	0	0	0	0
Thunderstorm Wind	Lorain County	05/30/1991	0	0	0	0
Thunderstorm Wind	Lorain County	05/31/1991	0	0	0	0
Thunderstorm Wind	Lorain County	06/15/1991	0	0	0	0
Thunderstorm Wind	Lorain County	07/07/1991	0	0	0	0
Hail	Lorain County	08/19/1991	0	0	0	0
Thunderstorm Wind	Lorain County	04/11/1992	0	0	0	0
Thunderstorm Wind	Lorain County	04/16/1992	0	0	0	0
Thunderstorm Wind	Lorain County	05/17/1992	0	0	0	0
Thunderstorm Wind	Lorain County	06/17/1992	0	0	0	0
Thunderstorm Wind	Lorain County	07/14/1992	0	0	0	0
Thunderstorm Wind	Lorain County	07/14/1992	0	1	0	0
Thunderstorm Wind	Lorain County	07/14/1992	0	0	0	0
Thunderstorm Wind	Lorain County	08/10/1992	0	0	0	0
Hail	Lorain County	08/27/1992	0	0	0	0
Thunderstorm Wind	Lorain County	09/09/1992	0	0	0	0
Thunderstorm Wind	Lorain County	09/02/1993	0	0	50K	0
Thunderstorm Wind	Wellington	04/12/1994	0	0	5K	0
Thunderstorm Wind	Huntington	04/27/1994	0	0	5K	0
Thunderstorm Wind	Lorain County	06/20/1994	0	1	50K	0
Hail	Grafton	06/28/1994	0	0	0	0
Thunderstorm Wind	Avon Lake	08/04/1994	0	0	5K	0
Thunderstorm Wind	Wellington	08/04/1994	0	0	5K	0
Thunderstorm Wind	Western Portion	08/13/1994	0	0	5K	0
Thunderstorm Wind	Lorain	09/25/1994	0	0	50K	0
Thunderstorm Wind	Eastern Half	03/20/1995	0	0	15K	0
Thunderstorm Wind	Lorain County	05/28/1995	0	0	5K	0
Thunderstorm Wind	Elyria	07/05/1995	0	0	3K	0
Thunderstorm Wind	Lorain County	07/13/1995	0	0	400K	20K
Hail	Elyria and Oberlin	07/15/1995	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Elyria and Oberlin	07/15/1995	0	0	3K	0
Thunderstorm Wind	Avon Lake	07/16/1995	0	0	0	0
Thunderstorm Wind	Avon and Avon Point	08/13/1995	0	0	110K	0
Thunderstorm Wind	North Ridgeville	09/13/1995	0	0	0	0
Thunderstorm Wind	Lorain County	04/12/1996	0	0	300K	0
Hail	Amherst	04/20/1996	0	0	0	0
Hail	Vermilion	06/03/1996	0	0	0	0
Hail	Avon	06/04/1996	0	0	0	0
Lightning	Sheffield Township	06/12/1996	0	1	0	0
Hail	County Airport	06/12/1996	0	0	0	0
Hail	South of Airport	06/12/1996	0	0	0	0
Thunderstorm Wind	Avon	06/13/1996	0	0	0	0
Lightning	Grafton	06/18/1996	0	1	0	0
Thunderstorm Wind	New Russia Township	06/24/1996	0	0	0	0
Lightning	Lorain County	06/24/1996	0	0	30K	0
Thunderstorm Wind	Lorain County	10/30/1996	0	0	200K	0
Thunderstorm Wind	Lorain City	11/07/1996	0	0	0	0
Thunderstorm Wind	Northern Portion	12/01/1996	0	0	2K	0
Hail	Wellington	05/18/1997	0	0	0	0
Hail	Amherst	08/04/1997	0	0	0	0
Hail	Oberlin	08/16/1997	0	0	0	0
Hail	Sheffield Lake	05/31/1998	0	0	0	0
Hail	Amherst	05/31/1998	0	0	0	0
Hail	Elyria	05/31/1998	0	0	0	0
Hail	Avon	05/31/1998	0	0	0	0
Lightning	Eaton Estates	05/31/1998	0	0	15K	0
Hail	Vermilion on the Lake	05/31/1998	0	0	0	0
Hail	Lorain City	05/31/1998	0	0	0	0
Hail	Lorain County	05/31/1998	0	0	0	0
Hail	Sheffield Lake	05/31/1998	0	0	0	0
Hail	Oberlin	06/30/1998	0	0	0	0
Thunderstorm Wind	Amherst	06/30/1998	0	0	0	0
Thunderstorm Wind	Lorain City	07/21/1998	0	0	50K	0
Hail	North Ridgeville	07/21/1998	0	0	0	0
Lightning	Camden	07/21/1998	0	0	600K	0
Thunderstorm Wind	Lorain County	11/10/1998	0	0	30K	0
Thunderstorm Wind	Oberlin	07/06/1999	0	0	15K	0
Lightning	Elyria	07/06/1999	0	1	0	0
Thunderstorm Wind	Lorain City	07/06/1999	0	0	15K	0
Thunderstorm Wind	Avon	07/09/1999	0	0	15K	0
Thunderstorm Wind	Elyria	07/28/1999	0	0	0	0
Lightning	Elyria	07/28/1999	0	0	225K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Hail	Lorain City	07/31/1999	0	0	0	0
Thunderstorm Wind	Lorain City	07/31/1999	0	0	0	0
Hail	Amherst	10/13/1999	0	0	0	0
Hail	Lorain Airport	10/13/1999	0	0	0	0
Thunderstorm Wind	Lorain Airport	04/20/2000	0	0	25K	0
Lightning	Lorain County	05/18/2000	0	0	20K	0
Hail	Avon Lake	05/31/2000	0	0	0	0
Hail	Grafton	06/29/2000	0	0	0	0
Hail	Penfield	07/28/2000	0	0	0	0
Hail	LaGrange	07/28/2000	0	0	0	0
Hail	Penfield	07/28/2000	0	0	0	0
Thunderstorm Wind	Oberlin	08/06/2000	0	0	0	0
Thunderstorm Wind	Lorain City	10/04/2000	0	0	300K	0
Hail	Eaton Estates	06/02/2001	0	0	0	0
Thunderstorm Wind	Elyria	08/09/2001	0	0	0	0
Hail	Vermilion on the Lake	04/19/2002	0	0	5K	0
Hail	Henrietta	04/19/2002	0	0	5K	0
Hail	Penfield	04/19/2002	0	0	5K	0
Hail	Lorain City	05/30/2002	0	0	5K	0
Hail	Kipton	06/04/2002	0	0	5K	0
Hail	Vermilion on the Lake	06/14/2002	0	0	2K	0
Thunderstorm Wind	Elyria	07/28/2002	0	0	40K	0
Hail	LaGrange	09/14/2002	0	0	5K	0
Hail	LaGrange	09/14/2002	0	0	25K	0
Hail	Amherst	11/10/2002	0	0	5K	0
Thunderstorm Wind	Vermilion on the Lake	11/10/2002	0	0	25K	0
Thunderstorm Wind	LaGrange	04/04/2003	0	0	2K	0
Thunderstorm Wind	Avon Lake	04/20/2003	0	0	3K	0
Hail	Elyria	05/10/2003	0	0	0	0
Thunderstorm Wind	Avon Lake	06/26/2003	0	0	5K	0
Thunderstorm Wind	Oberlin	07/04/2003	0	0	25K	0
Thunderstorm Wind	Elyria	07/04/2003	0	0	15K	0
Hail	Elyria	07/04/2003	0	0	2K	0
Thunderstorm Wind	Amherst	07/04/2003	0	0	10K	0
Thunderstorm Wind	Eaton Estates	07/04/2003	0	0	50K	0
Thunderstorm Wind	Lorain City	07/07/2003	0	0	10K	0
Hail	LaGrange	07/07/2003	0	0	0	0
Thunderstorm Wind	Amherst	07/07/2003	0	0	30K	0
Thunderstorm Wind	Lorain County	07/08/2003	0	0	250K	0
Thunderstorm Wind	Lorain County	07/08/2003	0	0	50K	0
Thunderstorm Wind	Lorain City	07/10/2003	0	0	2K	0
Thunderstorm Wind	Sheffield Lake	07/10/2003	0	0	2K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Lorain County	07/27/2003	0	0	15K	0
Hail	Penfield	08/16/2003	0	0	0	0
Thunderstorm Wind	Oberlin	08/22/2003	0	0	25K	0
Hail	Avon Lake	08/26/2003	0	0	0	0
Thunderstorm Wind	Amherst	09/27/2003	0	0	2K	0
Hail	Wellington	05/07/2004	0	0	0	0
Hail	Brighton	05/17/2004	0	0	5K	0
Thunderstorm Wind	Oberlin	05/17/2004	0	0	35K	0
Thunderstorm Wind	Kipton	05/17/2004	0	0	2K	0
Thunderstorm Wind	Elyria	05/17/2004	0	0	35K	0
Hail	Elyria	05/17/2004	0	0	0	0
Thunderstorm Wind	North Ridgeville	05/17/2004	0	0	0	0
Hail	Grafton	05/17/2004	0	0	0	0
Hail	Eaton Estates	05/17/2004	0	0	0	0
Thunderstorm Wind	Oberlin	05/17/2003	0	0	15K	0
Hail	Avon Lake	05/17/2004	0	0	0	0
Hail	Eaton Estates	05/18/2004	0	0	0	0
Thunderstorm Wind	Penfield	05/18/2004	0	0	2K	0
Thunderstorm Wind	Oberlin	05/21/2004	0	0	2K	0
Thunderstorm Wind	LaGrange	05/21/2004	0	0	2K	0
Thunderstorm Wind	Lorain County	05/21/2004	0	0	150K	0
Hail	Elyria	05/21/2004	0	0	0	0
Hail	Avon Lake	05/22/2004	0	0	0	0
Thunderstorm Wind	Vermilion on the Lake	06/01/2004	0	0	10K	0
Thunderstorm Wind	Elyria	06/13/2004	0	0	10K	0
Thunderstorm Wind	Lorain County	06/14/2004	0	0	90K	0
Thunderstorm Wind	LaGrange	06/17/2004	0	0	3K	0
Thunderstorm Wind	North Ridgeville	06/17/2004	0	0	2K	0
Hail	Wellington	08/18/2004	0	0	0	0
Thunderstorm Wind	Wellington	08/28/2004	0	0	5K	0
Thunderstorm Wind	LaGrange	08/28/2004	0	0	3K	0
Hail	Grafton	04/20/2005	0	0	0	0
Thunderstorm Wind	Lorain County	05/13/2005	0	0	15K	0
Hail	Huntington	05/28/2005	0	0	0	0
Hail	Oberlin	06/09/2005	0	0	20K	0
Hail	Elyria	06/10/2005	0	0	30K	0
Hail	Oberlin	06/14/2005	0	0	5K	0
Thunderstorm Wind	Avon	06/30/2005	0	0	10K	0
Thunderstorm Wind	Elyria	07/13/2005	0	0	35K	0
Thunderstorm Wind	Grafton	07/18/2005	0	0	2K	0
Thunderstorm Wind	Avon Lake	07/26/2005	0	0	5K	0
Thunderstorm Wind	Lorain City	07/26/2005	0	0	10K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Grafton	07/26/2005	0	0	2K	0
Thunderstorm Wind	LaGrange	07/26/2005	0	0	2K	0
Thunderstorm Wind	Amherst	07/26/2005	0	0	2K	0
Thunderstorm Wind	Amherst	07/26/2005	0	0	2K	0
Thunderstorm Wind	Avon	07/26/2005	0	0	15K	0
Lightning	Wellington	07/26/2005	0	0	5K	0
Hail	Lorain City	08/20/2005	0	0	2K	0
Thunderstorm Wind	Sheffield	08/20/2005	0	0	2K	0
Lightning	Elyria	09/22/2005	0	0	110K	0
Thunderstorm Wind	Lorain Airport	11/06/2005	0	0	0	0
Thunderstorm Wind	Elyria Airport	11/06/2005	0	0	1K	0
Hail	Elyria	04/07/2006	0	0	0	0
Hail	Oberlin	04/12/2006	0	0	0	0
Hail	Oberlin	04/12/2006	0	0	0	0
Hail	Grafton	05/18/2006	0	0	0	0
Thunderstorm Wind	Amherst	05/25/2006	0	0	30K	0
Thunderstorm Wind	Lorain City	06/19/2006	0	0	3K	0
Hail	Elyria	06/19/2006	0	0	0	0
Hail	North Ridgeville	06/19/2006	0	0	0	0
Severe Storm	Vermilion on the Lake	06/21/2006	0	0	0	0
Hail	Grafton	06/22/2006	0	0	0	0
Thunderstorm Wind	Wellington	06/22/2006	0	0	1K	0
Thunderstorm Wind	Avon Lake	06/28/2006	0	1	8K	0
Thunderstorm Wind	Wellington	07/02/2006	0	0	10K	0
Thunderstorm Wind	Vermilion on the Lake	07/04/2006	0	0	25K	0
Thunderstorm Wind	Oberlin	07/10/2006	0	0	3K	0
Hail	Wellington	07/10/2006	0	0	0	0
Thunderstorm Wind	Grafton	10/28/2006	0	0	3K	0
Hail	Rochester	05/01/2007	0	0	0	0
Hail	Grafton	05/25/2007	0	0	0	0
Thunderstorm Wind	Oberlin	06/01/2007	0	0	5K	0
Thunderstorm Wind	Wellington	06/01/2007	0	0	35K	0
Thunderstorm Wind	Wellington	06/08/2007	0	0	15K	0
Hail	Wellington	06/08/2007	0	0	0	0
Thunderstorm Wind	LaGrange	07/27/2007	0	0	0	0
Hail	LaGrange	07/27/2007	0	0	0	0
Thunderstorm Wind	Lorain City	01/09/2008	0	0	5K	0
Thunderstorm Wind	Elyria	01/09/2008	0	0	0	0
Thunderstorm Wind	Lorain City	01/09/2008	0	0	25K	0
Thunderstorm Wind	Elyria	01/09/2008	0	0	0	0
Thunderstorm Wind	Grafton	01/30/2008	0	0	15K	0
Thunderstorm Wind	Amherst	04/11/2008	0	0	250K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Hail	North Ridgeville	05/02/2008	0	0	0	0
Thunderstorm Wind	Lorain City	06/09/2008	0	0	10K	0
Thunderstorm Wind	Oberlin	06/10/2008	0	0	1K	0
Thunderstorm Wind	LaGrange Airport	06/13/2008	0	0	0	0
Thunderstorm Wind	Wellington	06/21/2008	0	0	3K	0
Hail	Wellington	06/21/2008	0	0	0	0
Hail	North Ridgeville	06/21/2008	0	0	0	0
Hail	North Ridgeville	06/21/2008	0	0	0	0
Hail	North Ridgeville	06/21/2008	0	0	0	0
Thunderstorm Wind	LaGrange Airport	06/21/2008	0	0	0	0
Thunderstorm Wind	Wellington	06/21/2008	0	0	3K	0
Thunderstorm Wind	Wellington	06/21/2008	0	0	0	0
Hail	Vermilion on the Lake	06/22/2008	0	0	0	0
Thunderstorm Wind	Wellington	06/26/2008	0	0	3K	0
Thunderstorm Wind	Amherst	06/26/2008	0	0	30K	0
Thunderstorm Wind	Elyria	06/26/2008	0	0	20K	0
Thunderstorm Wind	Elyria	06/26/2008	0	0	5K	0
Thunderstorm Wind	Amherst	06/26/2008	0	0	25K	0
Thunderstorm Wind	Elyria	07/08/2008	0	0	0	0
Thunderstorm Wind	Elyria	07/08/2008	0	0	0	0
Thunderstorm Wind	Sheffield Lake	07/08/2008	0	0	8K	0
Thunderstorm Wind	Wellington	07/22/2008	0	0	8K	0
Hail	LaGrange	07/22/2008	0	0	0	0
Thunderstorm Wind	Penfield	07/22/2008	0	0	5K	0
Thunderstorm Wind	LaGrange Airport	07/22/2008	0	0	10K	0
Thunderstorm Wind	Sheffield	08/09/2008	0	0	4K	0
Thunderstorm Wind	Avon	08/09/2008	0	0	4K	0
Thunderstorm Wind	Elyria Airport	12/28/2008	0	0	0	0
Hail	Elyria	05/28/2009	0	0	0	0
Thunderstorm Wind	Elyria	05/28/2009	0	0	60K	0
Hail	Elyria	05/28/2009	0	0	0	0
Thunderstorm Wind	North Eaton	06/25/2009	0	0	2K	0
Thunderstorm Wind	Lorain City	08/20/2009	0	0	3K	0
Hail	Avon	08/20/2009	0	0	0	0
Thunderstorm Wind	Wellington	08/20/2009	0	0	8K	0
Hail	Vermilion on the Lake	08/28/2009	0	0	0	0
Hail	Amherst	08/28/2009	0	0	0	0
Hail	Amherst	08/28/2009	0	0	0	0
Hail	Amherst	08/28/2009	0	0	25K	0
Hail	Elyria Airport	08/28/2009	0	0	0	0
Hail	Clearview	08/28/2009	0	0	0	0
Hail	Eaton Estates	08/28/2009	0	0	0	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Hail	Avon Lake	05/07/2010	0	0	0	0
Hail	Amherst	05/07/2010	0	0	0	0
Hail	Lorain City	05/07/2010	0	0	0	0
Hail	Avon Lake	05/07/2010	0	0	5K	0
Hail	Avon Lake	05/07/2010	0	0	0	0
Thunderstorm Wind	Pittsfield	05/14/2010	0	0	15K	0
Hail	Amherst	05/14/2010	0	0	0	0
Hail	North Ridgeville	05/14/2010	0	0	0	0
Thunderstorm Wind	Elyria	06/06/2010	0	0	1K	0
Thunderstorm Wind	Kipton	06/23/2010	0	0	3K	0
Thunderstorm Wind	LaGrange	06/23/2010	0	0	15K	0
Thunderstorm Wind	Lorain Airport	06/23/2010	0	0	0	0
Thunderstorm Wind	LaGrange Airport	06/27/2010	0	0	0	0
Thunderstorm Wind	North Ridgeville	06/27/2010	0	0	5K	0
Thunderstorm Wind	Penfield	07/21/2010	0	0	25K	0
Thunderstorm Wind	Penfield	07/21/2010	0	0	2K	0
Thunderstorm Wind	Penfield	07/21/2010	0	0	10K	0
Thunderstorm Wind	Penfield	07/21/2010	0	0	0	0
Thunderstorm Wind	Avon Lake	09/16/2010	0	0	2K	0
Thunderstorm Wind	Oberlin Airport	10/26/2010	0	0	30K	0
Thunderstorm Wind	Lorain	10/26/2010	0	0	5K	0
Hail	Avon	04/04/2011	0	0	1K	0
Hail	Vermilion on the Lake	04/16/2011	0	0	10K	0
Hail	Oberlin	04/16/2011	0	0	5K	0
Hail	LaGrange Airport	04/19/2011	0	0	0	0
Hail	Grafton	04/20/2011	0	0	0	0
Hail	Sheffield Lake	05/10/2011	0	0	10K	0
Thunderstorm Wind	Amherst	05/23/2011	0	0	0	0
Hail	Vermilion on the Lake	05/23/2011	0	0	300K	0
Thunderstorm Wind	North Ridgeville	05/23/2011	0	0	30K	0
Thunderstorm Wind	Elyria	05/23/2011	0	0	1K	0
Thunderstorm Wind	North Ridgeville	05/23/2011	0	0	1K	0
Hail	Vermilion on the Lake	05/25/2011	0	0	0	0
Hail	Elyria	05/25/2011	0	0	0	0
Hail	Elyria	05/25/2011	0	0	0	0
Hail	Sheffield	05/25/2011	0	0	0	0
Hail	Elyria	05/25/2011	0	0	0	0
Hail	North Ridgeville	05/25/2011	0	0	0	0
Hail	North Ridgeville	05/25/2011	0	0	0	0
Thunderstorm Wind	Sheffield	05/29/2011	0	0	10K	0
Thunderstorm Wind	North Ridgeville	05/29/2011	0	0	125K	0
Hail	Lorain City	06/07/2011	0	0	100K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Hail	Elyria	06/07/2011	0	0	0	0
Hail	Elyria	06/07/2011	0	0	100K	0
Hail	Amherst	06/07/2011	0	0	5K	0
Thunderstorm Wind	Amherst	06/07/2011	0	0	40K	0
Hail	Wellington	06/07/2011	0	0	0	0
Thunderstorm Wind	Lorain City	07/02/2011	0	0	2K	0
Thunderstorm Wind	Lorain City	07/22/2011	0	0	10K	0
Hail	Lorain City	07/23/2011	0	0	0	0
Thunderstorm Wind	Lorain City	07/23/2011	0	0	2K	0
Hail	Vermilion on the Lake	08/01/2011	0	0	0	0
Hail	Lorain City	08/24/2011	0	0	0	0
Thunderstorm Wind	Oberlin	08/24/2011	0	0	15K	0
Thunderstorm Wind	East Carlisle	08/24/2011	0	0	150K	0
Thunderstorm Wind	Fields	08/24/2011	0	0	0	0
Hail	Huntington	03/15/2012	0	0	0	0
Thunderstorm Wind	North Ridgeville	05/25/2012	0	0	50K	0
Hail	North Ridgeville	05/25/2012	0	0	0	0
Thunderstorm Wind	Vermilion on the Lake	06/18/2012	0	0	100K	0
Thunderstorm Wind	Wellington	06/18/2012	0	0	1K	0
Thunderstorm Wind	Amherst	06/18/2012	0	0	10K	0
Thunderstorm Wind	Oberlin	07/01/2012	0	0	15K	0
Thunderstorm Wind	Sheffield Lake	07/03/2012	0	0	0	0
Thunderstorm Wind	Oberlin	07/03/2012	0	0	5K	0
Hail	Litchfield	07/03/2012	0	0	0	0
Hail	Sheffield Lake	07/05/2012	0	0	0	0
Thunderstorm Wind	Elyria	07/05/2012	0	0	15K	0
Thunderstorm Wind	Sheffield	07/26/2012	0	0	0	0
Hail	Henrietta	04/08/2013	0	0	1K	0
Hail	East Carlisle	04/08/2013	0	0	2K	0
Thunderstorm Wind	Wellington	05/31/2013	0	0	3K	0
Hail	Rochester	06/12/2013	0	0	50K	50K
Thunderstorm Wind	Elyria	06/13/2013	0	0	100K	0
Thunderstorm Wind	South Amherst	06/13/2013	0	0	1K	0
Thunderstorm Wind	Vermilion on the Lake	06/25/2013	0	0	18K	0
Thunderstorm Wind	Sheffield Lake	06/25/2013	0	0	110K	0
Thunderstorm Wind	North Ridgeville	06/25/2013	0	0	15K	0
Thunderstorm Wind	Elyria	06/25/2013	0	0	6K	0
Thunderstorm Wind	Elyria	07/10/2013	0	0	25K	0
Hail	Grafton	07/23/2013	0	0	10K	0
Thunderstorm Wind	Amherst	11/01/2013	0	0	8K	0
Thunderstorm Wind	South Amherst	11/17/2013	0	0	40K	0
Thunderstorm Wind	Avon	11/17/2013	0	0	3K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	South Amherst	11/17/2013	0	0	10K	0
Hail	Vermilion on the Lake	05/12/2004	0	0	0	0
Hail	Lorain City	05/12/2014	0	0	0	0
Thunderstorm Wind	Eaton Estates	05/12/2014	0	0	40K	0
Hail	Penfield	05/12/2014	0	0	0	0
Hail	LaGrange	05/12/2014	0	0	0	0
Hail	Clearview	05/12/2014	0	0	0	0
Thunderstorm Wind	North Eaton	05/27/2014	0	0	5K	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	0	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	0	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	15K	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	150K	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	2K	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	3K	0
Thunderstorm Wind	Lorain County	06/18/2014	0	0	12K	0
Thunderstorm Wind	Grafton Airport	07/08/2014	0	0	2K	0
Thunderstorm Wind	Wellington	12/24/2014	0	0	1K	0
Thunderstorm Wind	Wellington	12/24/2014	0	0	4K	0
Thunderstorm Wind	Amherst	05/27/2015	0	0	5K	0
Thunderstorm Wind	Clearview	05/30/2015	0	0	12K	0
Hail	LaGrange	05/30/2015	0	0	100K	0
Thunderstorm Wind	Avon Lake	06/23/2015	0	0	60K	0
Thunderstorm Wind	Avon Lake	06/23/2015	0	0	70K	0
Thunderstorm Wind	East Carlisle	06/05/2016	0	0	4K	0
Thunderstorm Wind	Elyria	06/05/2015	0	0	1K	0
Thunderstorm Wind	Vermilion on the Lake	07/13/2016	0	0	8K	0
Thunderstorm Wind	Lorain	07/18/2016	0	0	10K	0
Thunderstorm Wind	Henrietta	08/26/2016	0	0	3K	0
Thunderstorm Wind	Oberlin	08/26/2016	0	0	15K	0
Thunderstorm Wind	Avon	09/10/2016	0	0	5K	0
Thunderstorm Wind	Elyria	03/01/2017	0	0	75K	0
Thunderstorm Wind	Avon	04/19/2017	0	0	150K	0
Thunderstorm Wind	Grafton	05/29/2017	0	0	5K	0
Thunderstorm Wind	Avon Lake	06/19/2017	0	0	1K	0
Thunderstorm Wind	Elyria	07/07/2017	0	0	1K	0
Hail	Huntington	07/16/2017	0	0	0	0
Thunderstorm Wind	Oberlin	08/04/2017	0	0	2K	0
Thunderstorm Wind	Brighton	11/05/2017	0	0	200K	100K
Thunderstorm Wind	Kipton	11/05/2017	0	0	0	0
Thunderstorm Wind	Kipton	11/05/2017	0	0	0	0
Thunderstorm Wind	LaGrange	11/05/2017	0	0	350K	0
Thunderstorm Wind	Lorain	05/04/2018	0	0	1K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Thunderstorm Wind	Lorain	07/26/2018	0	0	10K	0
Thunderstorm Wind	Lorain	08/06/2018	0	0	75K	0
Thunderstorm Wind	Henrietta	08/06/2018	0	0	7K	0
Thunderstorm Wind	Lorain Co. Reg. Airport	08/29/2018	0	0	0	0
Hail	Elyria	01/08/2019	0	0	0	0
Hail	Elyria	01/08/2019	0	0	0	0
Hail	LaGrange	01/08/2019	0	0	0	0
Thunderstorm Wind	Brownhelm Station	05/23/2019	0	0	0	0
Thunderstorm Wind	Avon Lake	05/23/2019	0	0	5K	0
Thunderstorm Wind	Avon	05/28/2019	0	0	0	0
Thunderstorm Wind	Avon	05/28/2019	0	0	0	0
Thunderstorm Wind	Avon Bosworth Airport	05/28/2019	0	0	0	0
Thunderstorm Wind	South Amherst	05/30/2019	0	0	0	0
Thunderstorm Wind	Elyria	05/30/2019	0	0	5K	0
Thunderstorm Wind	Elyria	06/01/2019	0	0	10K	0
Thunderstorm Wind	Wellington	07/02/2019	0	0	0	0
Thunderstorm Wind	Camden	07/02/2019	0	0	0	0
Thunderstorm Wind	Huntington	08/06/2019	0	0	0	0
Thunderstorm Wind	Westview	08/18/2019	0	0	0	0
Thunderstorm Wind	Lorain	09/13/2019	0	0	0	0
Thunderstorm Wind	Avon Bosworth Airport	09/13/2019	0	0	0	0
Thunderstorm Wind	Elyria	09/13/2019	0	0	0	0
Thunderstorm Wind	Avon Bosworth Airport	09/13/2019	0	0	0	0
Hail	LaGrange	03/28/2020	0	0	0	0
Hail	Grafton	03/28/2020	0	0	0	0
Hail	Avon	04/07/2020	0	0	0	0
Thunderstorm Wind	Elyria	04/07/2020	0	0	0	0
Thunderstorm Wind	Rochester	06/10/2020	0	0	10K	0
Thunderstorm Wind	Avon Lake	06/10/2020	0	0	40K	0
Thunderstorm Wind	Elyria	06/10/2020	0	0	35K	0
Thunderstorm Wind	Kipton	07/10/2020	0	0	0	0
Thunderstorm Wind	South Amherst	07/10/2020	0	0	0	0
Thunderstorm Wind	Lorain	07/10/2020	0	0	0	0
Thunderstorm Wind	LaGrange	07/19/2020	0	0	0	0
Thunderstorm Wind	East Carlisle	07/19/2020	0	0	0	0
Thunderstorm Wind	Westview	07/19/2020	0	0	0	0
Thunderstorm Wind	Lakeshore	10/23/2020	0	0	0	0
Thunderstorm Wind	Brownhelm Station	11/15/2020	0	0	0	0
Thunderstorm Wind	Amherst	11/15/2020	0	0	0	0
Thunderstorm Wind	Wellington	11/15/2020	0	0	0	0
Thunderstorm Wind	North Ridgeville	11/15/2020	0	0	0	0

6.1.4 Tornado/Windstorm

Hazard	Location	Date	Fujita Scale	Deaths	Injuries	Property Damage	Crop Damage
Tornado	Lorain County	06/08/1953	F4	1	47	0	0
Tornado	Lorain County	07/20/1956	F1	0	0	2.5K	0
Tornado	Lorain County	06/20/1958	F1	0	3	25K	0
Tornado	Lorain County	04/19/1963	F0	0	0	25K	0
Tornado	Lorain County	07/01/1963		0	0	2.5K	0
Tornado	Lorain County	04/11/1965	F4	17	100	25M	0
Tornado	Lorain County	09/18/1970		0	2	25K	0
Tornado	Lorain County	10/13/1971	F1	0	1	25K	0
Tornado	Lorain County	07/23/1972	F1	0	0	25K	0
Tornado	Lorain County	07/23/1972	F1	0	0	25K	0
Tornado	Lorain County	08/01/1972	F1	0	0	250K	0
Tornado	Lorain County	08/20/1973	F0	0	0	0.25K	0
Tornado	Lorain County	07/13/1975	F2	0	0	250K	0
Tornado	Lorain County	08/26/1975	F0	0	0	2.5K	0
Tornado	Lorain County	08/26/1986	F2	0	2	2.5M	0
Tornado	Lorain County	06/18/1992	F0	0	0	0	0
Tornado	Lorain County	06/18/1992	F0	0	0	0	0
Tornado	Lorain County	07/12/1992	F1	0	0	2.5M	0
Tornado	Lorain County	07/12/1992	F0	0	2	2.5M	0
Tornado	Lorain County	07/12/1992	F2	0	3	2.5M	0
Tornado	Wellington	06/28/1994	F1	0	0	500K	0
High Wind	Lorain County	01/27/1996		0	0	0	0
High Wind	Lorain County	02/10/1996		0	0	3K	0
High Wind	Lorain County	03/25/1996		0	0	10K	0
High Wind	Lorain County	04/25/1996		0	0	0	0
High Wind	Lorain County	09/07/1996		0	0	5K	20K
High Wind	Lorain County	10/30/1996		0	0	75K	75K
High Wind	Lorain County	02/21/1997		0	0	0	0
High Wind	Lorain County	02/27/1997		0	0	5K	0
High Wind	Lorain County	05/01/1997		0	0	5K	0
Tornado	Lorain	08/04/1997	F0	0	0	0	0
High Wind	Lorain (Zone)	09/29/1997		0	0	5K	0
High Wind	Lorain County	03/14/1998		0	0	20K	0
High Wind	Lorain (Zone)	03/28/1998		0	0	15K	0
Tornado	Eaton Estates	04/09/1998	F0	0	0	0	0
High Wind	Lorain (Zone)	11/10/1998		0	0	40K	0
High Wind	Lorain (Zone)	05/06/1999		0	0	20K	0
Tornado	Rochester	07/09/1999	F0	0	0	30K	0
High Wind	Lorain (Zone)	12/11/2000		0	0	200K	0
High Wind	Lorain (Zone)	02/09/2001		0	0	15K	0

Hazard	Location	Date	Fujita Scale	Deaths	Injuries	Property Damage	Crop Damage
High Wind	Lorain (Zone)	02/25/2001		0	0	5K	0
High Wind	Lorain (Zone)	04/12/2001		0	0	50K	0
High Wind	Lorain (Zone)	10/16/2001		0	0	40K	0
High Wind	Lorain (Zone)	10/25/2001		0	0	20K	0
High Wind	Lorain (Zone)	02/01/2002		0	0	20K	0
High Wind	Lorain County	03/09/2002		1	0	250K	0
High Wind	Lorain County	02/12/2003		0	0	75K	0
Tornado	Kipton	08/03/2003	F0	0	0	15K	50K
Tornado	Amherst	08/03/2003	F0	0	0	10K	0
High Wind	Lorain County	11/12/2003		0	0	75K	0
High Wind	Lorain County	03/05/2004		0	1	250K	0
High Wind	Lorain County	12/01/2004		0	0	25K	0
High Wind	Lorain County	12/07/2004		0	0	25K	0
High Wind	Lorain County	11/06/2005		0	0	30K	0
High Wind	Lorain County	02/17/2006		0	0	85K	0
High Wind	Lorain County	10/28/2006		0	0	100K	0
High Wind	Lorain County	12/01/2006		0	0	0	0
Tornado	Elyria	03/14/2007	EFO	0	0	400K	0
High Wind	Lorain County	12/23/2007		0	0	8K	0
High Wind	Lorain County	01/09/2008		0	0	0	0
High Wind	Lorain County	01/30/2008		0	0	0	0
High Wind	Lorain County	01/30/2008		0	0	0	0
High Wind	Lorain County	01/30/2008		0	0	0	0
High Wind	Lorain County	09/14/2008		1	1	15M	500K
High Wind	Lorain County	12/24/2008		0	0	75K	0
High Wind	Lorain County	02/11/2009		0	0	750K	0
High Wind	Lorain County	12/09/2009		0	0	450K	0
High Wind	Lorain County	05/08/2010		0	0	15K	0
High Wind	Lorain County	04/28/2011		0	0	60K	0
High Wind	Lorain County	04/28/2011		0	0	0	0
High Wind	Lorain County	04/28/2011		0	0	0	0
High Wind	Lorain County	04/28/2011		0	0	0	0
High Wind	Lorain County	04/28/2011		0	0	200K	0
High Wind	Lorain County	01/17/2012		0	0	0	0
High Wind	Lorain County	01/17/2012		0	0	50K	0
High Wind	Lorain County	02/24/2012		0	0	25K	0
High Wind	Lorain County	03/02/2012		0	0	0	0
High Wind	Lorain County	10/29/2012		0	0	15K	0
High Wind	Lorain County	10/29/2012		0	0	10K	0
High Wind	Lorain County	10/29/2012		0	0	50K	0
High Wind	Lorain County	10/29/2012		0	0	2.5M	0
High Wind	Lorain County	11/17/2013		0	0	0	0

Hazard	Location	Date	Fujita Scale	Deaths	Injuries	Property Damage	Crop Damage
High Wind	Lorain County	11/17/2013		0	0	75K	0
High Wind	Lorain County	04/14/2014		0	0	10K	0
High Wind	Lorain (Zone)	04/14/2014		0	0	10K	0
Tornado	Shawville	05/12/2014	EF0	0	0	75K	0
Tornado	Belden	07/08/2014	EF1	0	0	8K	0
High Wind	Lorain (Zone)	11/24/2014		0	0	200K	0
High Wind	Lorain (Zone)	11/24/2014		0	0	0	0
High Wind	Lorain (Zone)	11/24/2014		0	0	0	0
High Wind	Lorain (Zone)	11/24/2014		0	0	0	0
High Wind	Lorain (Zone)	11/24/2014		0	0	0	0
High Wind	Lorain (Zone)	11/12/2015		0	0	35K	0
High Wind	Lorain (Zone)	01/10/2017		0	0	125K	0
High Wind	Lorain (Zone)	01/10/2017		0	0	0	0
High Wind	Lorain (Zone)	02/24/2019		0	0	200K	0
High Wind	Lorain (Zone)	11/27/2019		0	0	0	0
High Wind	Lorain (Zone)	12/30/2019		0	0	65K	0
Tornado	Belden	04/04/2020	EF1	0	0	30K	0
High Wind	Lorain (Zone)	11/15/2020		0	0	0	0

6.1.5 Winter Storm

Winter storm, ice storm, blizzard, extreme cold/wind chill, lake effect snow

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Winter Storm	Lorain County	01/02/1999	0	0	70K	0
Winter Storm	Lorain County	01/08/1999	0	0	2K	0
Winter Storm	Lorain County	01/13/1999	0	0	2K	0
Winter Storm	Lorain County	03/11/2000	0	0	25K	0
Winter Storm	Lorain County	12/13/2000	0	0	75K	0
Winter Storm	Lorain County	03/24/2002	0	0	50K	0
Winter Storm	Lorain County	03/26/2002	0	0	100K	0
Winter Storm	Lorain County	12/22/2004	0	0	4.7M	0
Ice Storm	Lorain County	01/05/2005	0	0	4.8M	0
Winter Storm	Lorain County	01/22/2005	0	0	250K	0
Winter Storm	Lorain County	04/23/2005	0	0	300K	0
Winter Storm	Lorain County	02/08/2006	0	0	100K	0
Winter Storm	Lorain County	02/13/2007	0	0	60K	0
Winter Storm	Lorain County	12/15/2007	0	0	350K	0
Winter Storm	Lorain County	02/25/2008	0	0	200K	0

Hazard	Location	Date	Deaths	Injuries	Property Damage	Crop Damage
Winter Storm	Lorain County	03/04/2008	0	0	500K	0
Winter Storm	Lorain County	03/07/2008	0	0	1.5M	0
Winter Storm	Lorain County	12/19/2008	0	0	40K	0
Winter Storm	Lorain County	01/09/2009	0	0	175K	0
Extreme Cold/Wind Chill	Lorain County	01/15/2009	0	0	0	0
Winter Storm	Lorain County	01/27/2009	0	0	350K	0
Lake Effect Snow	Lorain County	02/03/2009	0	0	200K	0
Winter Storm	Lorain County	02/05/2010	0	0	350K	0
Winter Storm	Lorain County	02/01/2011	0	0	350K	0
Winter Storm	Lorain County	02/20/2011	0	0	400K	0
Winter Storm	Lorain County	03/10/2011	0	0	200K	0
Extreme Cold/Wind Chill	Lorain County	04/29/2012	0	0	150K	0
Winter Storm	Lorain County	02/16/2013	0	0	75K	0
Extreme Cold/Wind Chill	Lorain County	01/06/2014	0	0	0	0
Extreme Cold/Wind Chill	Lorain County	01/28/2014	0	0	0	0
Winter Storm	Lorain County	02/04/2014	0	0	200K	0
Winter Storm	Lorain County	02/17/2014	0	0	300K	0
Winter Storm	Lorain County	03/12/2014	0	0	250K	0
Lake Effect Snow	Lorain County	11/20/2014	0	0	75K	0
Winter Storm	Lorain County	02/01/2015	0	0	350K	0
Extreme Cold/Wind Chill	Lorain County	02/15/2015	0	0	0	0
Extreme Cold/Wind Chill	Lorain County	02/20/2015	0	0	0	0
Lake Effect Snow	Lorain County	12/15/2016	0	0	150K	0
Winter Storm	Lorain County	12/17/2016	0	0	100K	0
Winter Storm	Lorain County	01/19/2019	0	0	100K	0
Extreme Cold/Wind Chill	Lorain County	01/30/2019	1	0	0	0
Lake Effect Snow	Lorain County	11/11/2019	0	0	5K	0
Winter Storm	Lorain County	12/01/2020	0	0	120K	0
Winter Storm	Lorain County	12/24/2020	0	0	50K	0

6.2 HAZUS LOSS ESTIMATES

HAZUS is a nationally accepted methodology that utilizes U.S. Census and local geographic information systems (GIS) data to estimate losses for earthquakes, hurricanes, and floods. Because floods and earthquakes are identified as risks for Lorain County, HAZUS was used to generate and evaluate the county's vulnerability to these incidents. Estimates from HAZUS were generated using 2010 U.S. Census Bureau data, which calculated Lorain County's population as 301,356. Current building counts and critical facility numbers may be slightly different than this information which is based upon the 2010 census.



Hazus-MH: Flood Global Risk Report

Region Name: Lorain

Flood Scenario: 100

Print Date: Tuesday, March 20, 2018

Disclaimer:

This version of Hazus utilizes 2010 Census Data.

Totals only reflect data for those census tracts/blocks included in the user's study region.

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific Flood. These results can be improved by using enhanced inventory data and flood hazard information.



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General Description of the Region

Hazus is a regional multi-hazard loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The flood loss estimates provided in this report were based on a region that included 1 county(ies) from the following state(s):

- Ohio

Note:

Appendix A contains a complete listing of the counties contained in the region .

The geographical size of the region is approximately 495 square miles and contains 6,327 census blocks. The region contains over 116 thousand households and has a total population of 301,356 people (2010 Census Bureau data). The distribution of population by State and County for the study region is provided in Appendix B .

There are an estimated 118,962 buildings in the region with a total building replacement value (excluding contents) of 39,739 million dollars. Approximately 92.10% of the buildings (and 70.65% of the building value) are associated with residential housing.



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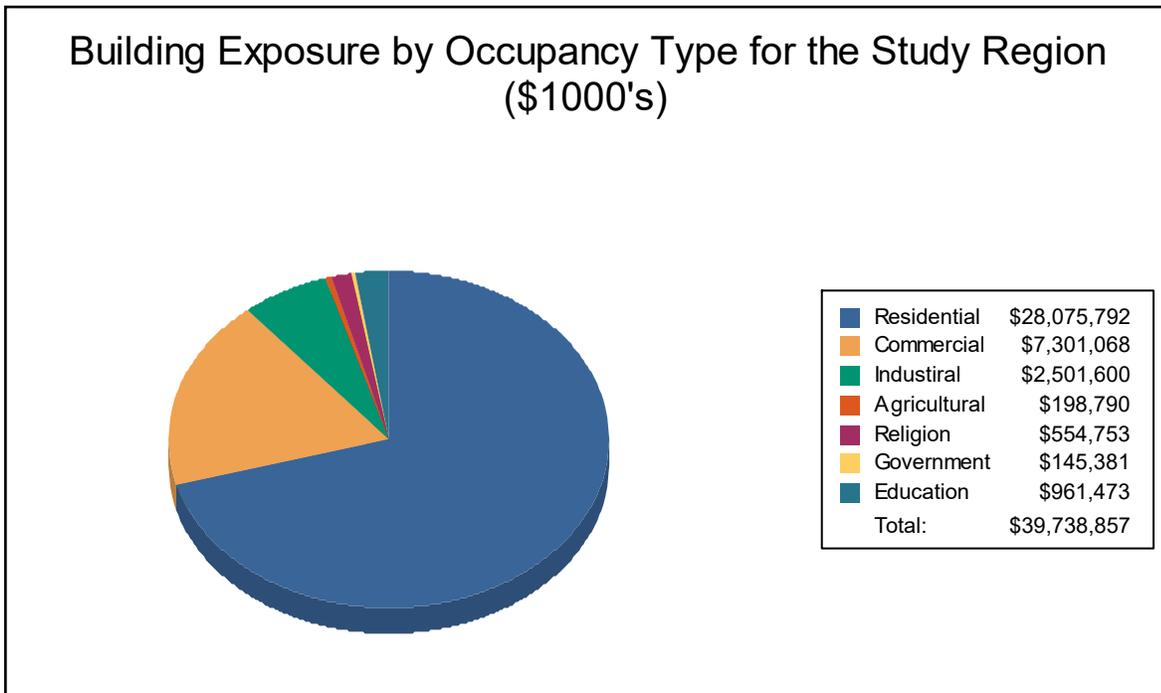
Building Inventory

General Building Stock

Hazus estimates that there are 118,962 buildings in the region which have an aggregate total replacement value of 39,739 million dollars. Table 1 and Table 2 present the relative distribution of the value with respect to the general occupancies by Study Region and Scenario respectively. Appendix B provides a general distribution of the building value by State and County.

Table 1
Building Exposure by Occupancy Type for the Study Region

Occupancy	Exposure (\$1000)	Percent of Total
Residential	28,075,792	70.7%
Commercial	7,301,068	18.4%
Industrial	2,501,600	6.3%
Agricultural	198,790	0.5%
Religion	554,753	1.4%
Government	145,381	0.4%
Education	961,473	2.4%
Total	39,738,857	100%



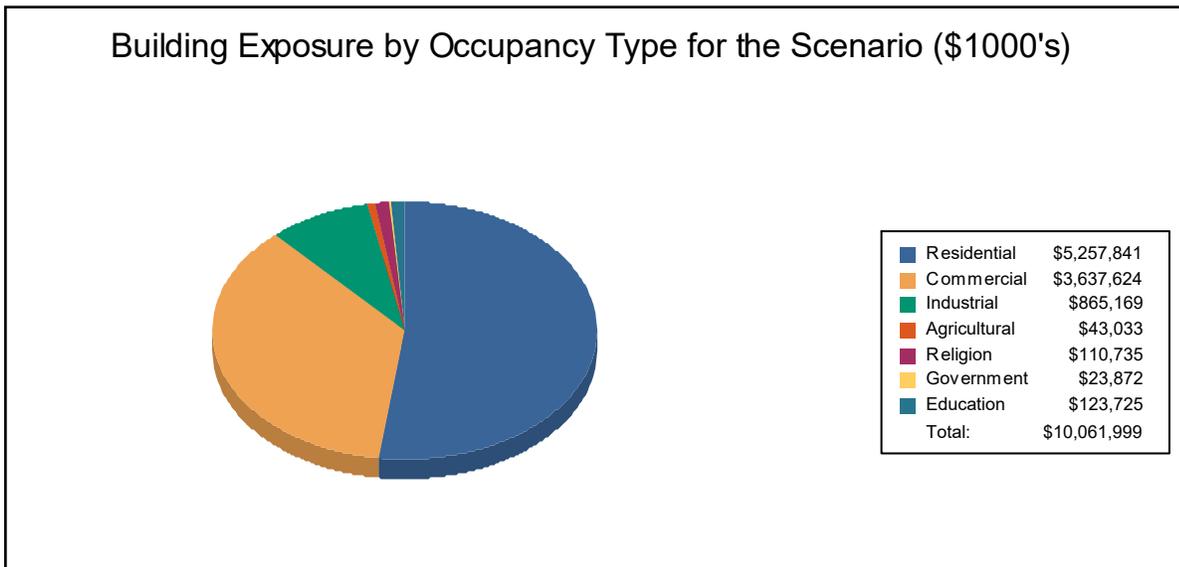
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Table 2
Building Exposure by Occupancy Type for the Scenario

Occupancy	Exposure (\$1000)	Percent of Total
Residential	5,257,841	52.3%
Commercial	3,637,624	36.2%
Industrial	865,169	8.6%
Agricultural	43,033	0.4%
Religion	110,735	1.1%
Government	23,872	0.2%
Education	123,725	1.2%
Total	10,061,999	100%



Essential Facility Inventory

For essential facilities, there are 4 hospitals in the region with a total bed capacity of 698 beds. There are 130 schools, 21 fire stations, 19 police stations and no emergency operation centers.



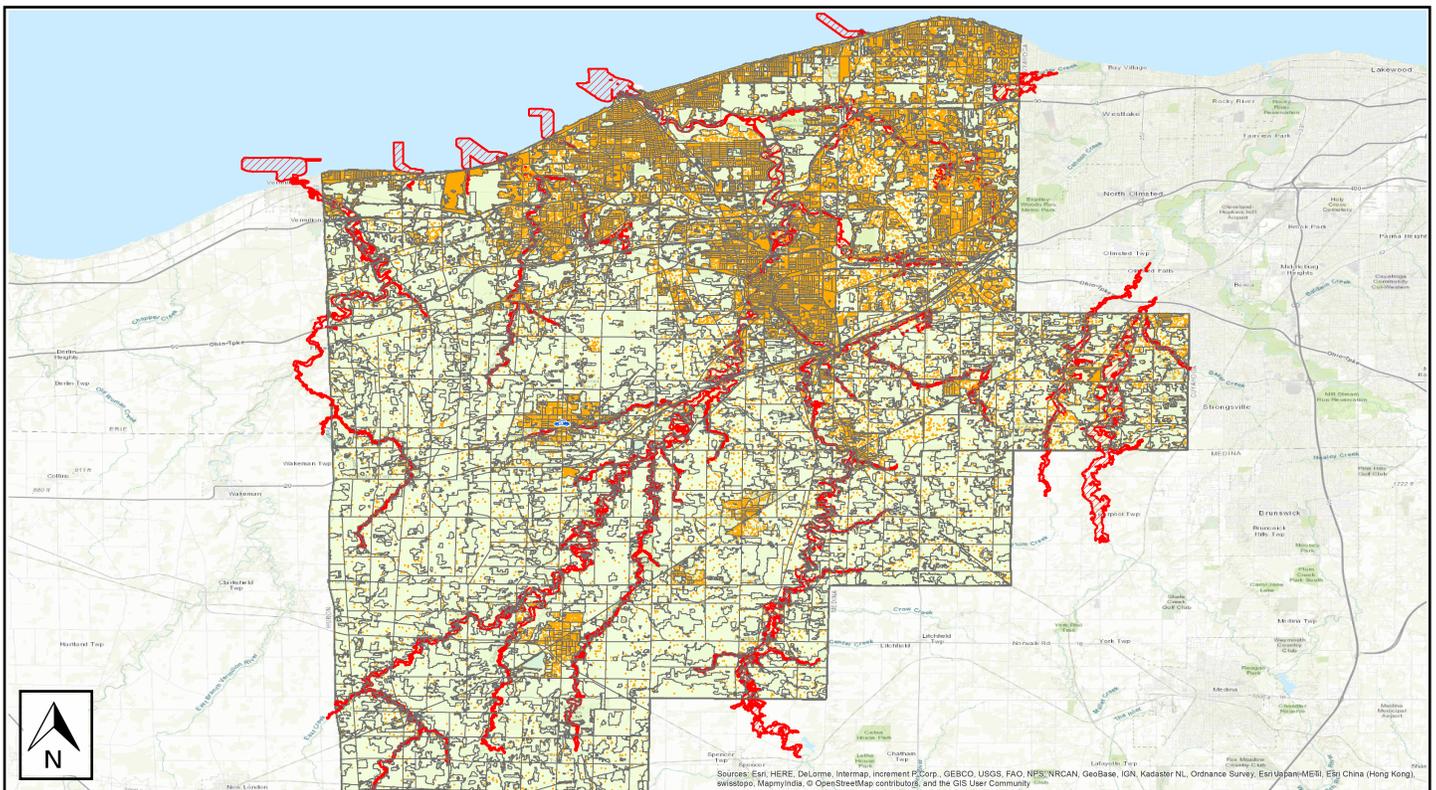
Flood Scenario Parameters

Hazus used the following set of information to define the flood parameters for the flood loss estimate provided in this report.

Study Region Name:	Lorain
Scenario Name:	100
Return Period Analyzed:	100
Analysis Options Analyzed:	No What-Ifs

Study Region Overview Map

Illustrating scenario flood extent, as well as exposed essential facilities and total exposure



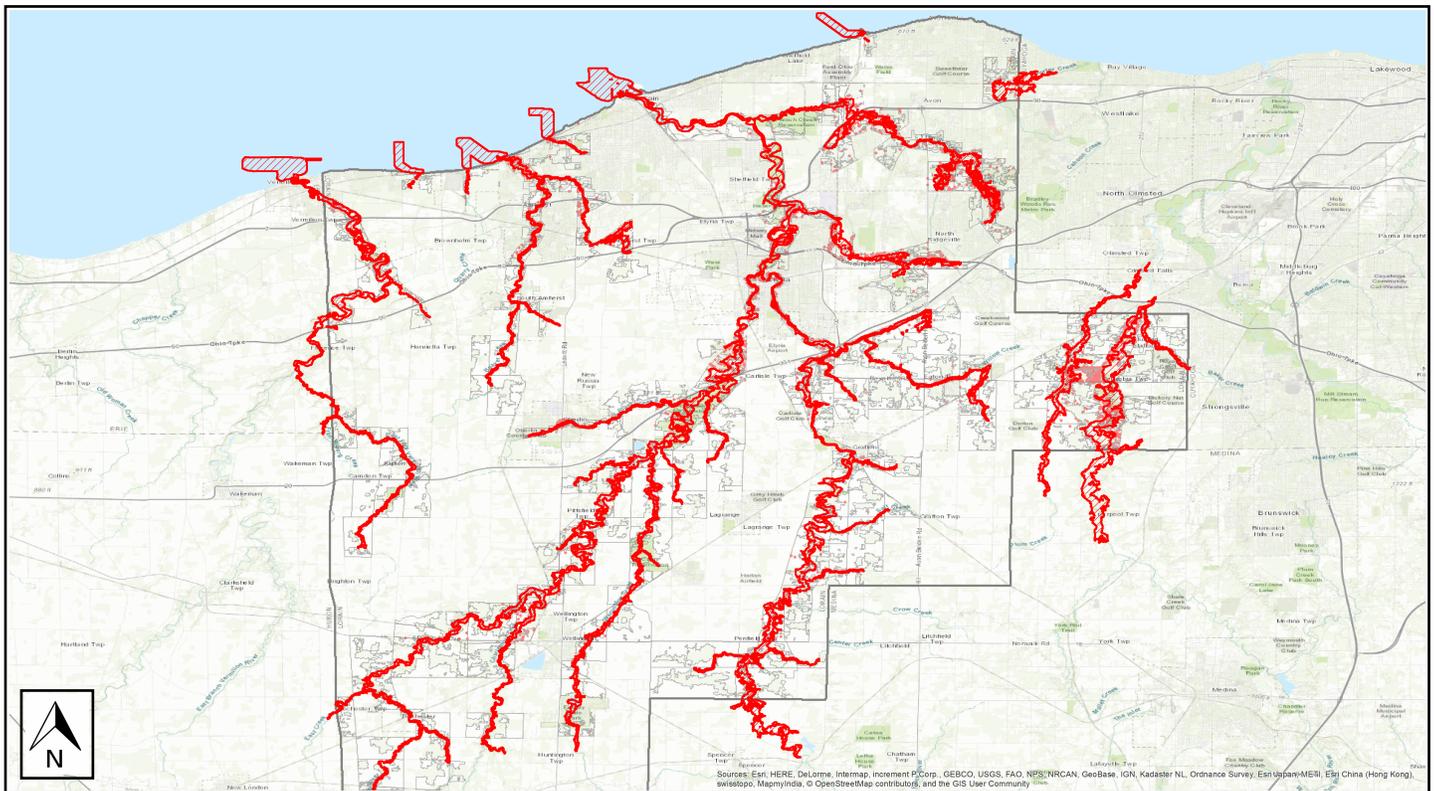


Building Damage

General Building Stock Damage

Hazus estimates that about 307 buildings will be at least moderately damaged. This is over 71% of the total number of buildings in the scenario. There are an estimated 8 buildings that will be completely destroyed. The definition of the 'damage states' is provided in the Hazus Flood Technical Manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 summarizes the expected damage by general building type.

Total Economic Loss (1 dot = \$300K) Overview Map



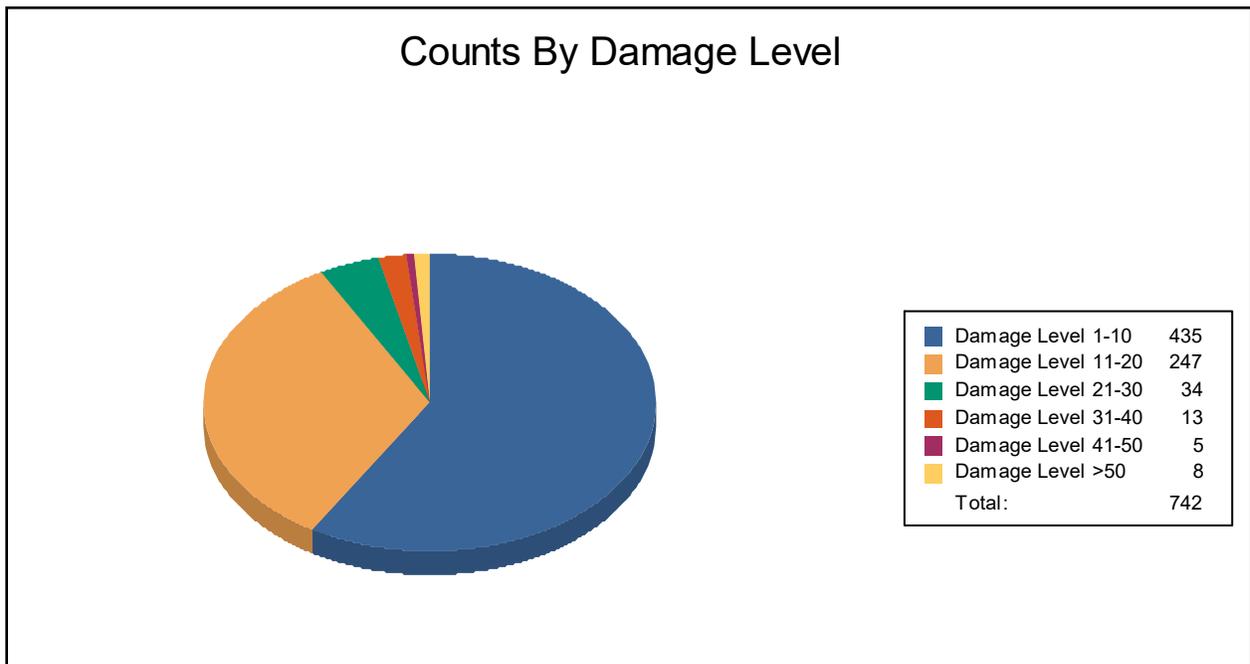
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Table 3: Expected Building Damage by Occupancy

Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	22	50	21	48	0	0	0	0	0	0	1	2
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	413	59	226	32	34	5	13	2	5	1	7	1
Total	435		247		34		13		5		8	



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Table 4: Expected Building Damage by Building Type

Building Type	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)										
Concrete	1	33	2	67	0	0	0	0	0	0	0	0
ManufHousing	0	0	0	0	0	0	0	0	0	0	0	0
Masonry	77	66	36	31	3	3	1	1	0	0	0	0
Steel	5	45	6	55	0	0	0	0	0	0	0	0
Wood	347	57	203	34	31	5	12	2	5	1	7	1



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Essential Facility Damage

Before the flood analyzed in this scenario, the region had 698 hospital beds available for use. On the day of the scenario flood event, the model estimates that 698 hospital beds are available in the region.

Table 5: Expected Damage to Essential Facilities

Classification	# Facilities			
	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	0	0	0	0
Fire Stations	21	0	0	0
Hospitals	4	0	0	0
Police Stations	19	1	0	1
Schools	130	0	0	0

If this report displays all zeros or is blank, two possibilities can explain this.

- (1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.
- (2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.



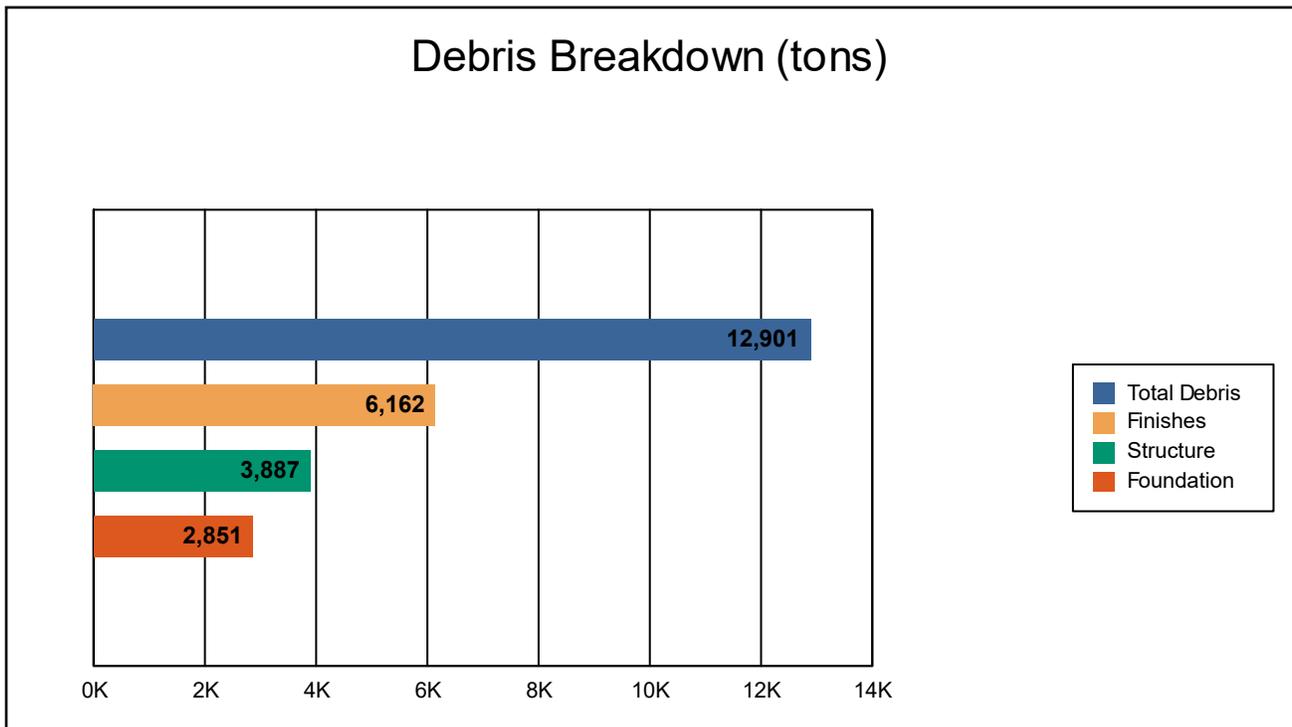
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Induced Flood Damage

Debris Generation

Hazus estimates the amount of debris that will be generated by the flood. The model breaks debris into three general categories: 1) Finishes (dry wall, insulation, etc.), 2) Structural (wood, brick, etc.) and 3) Foundations (concrete slab, concrete block, rebar, etc.). This distinction is made because of the different types of material handling equipment required to handle the debris.



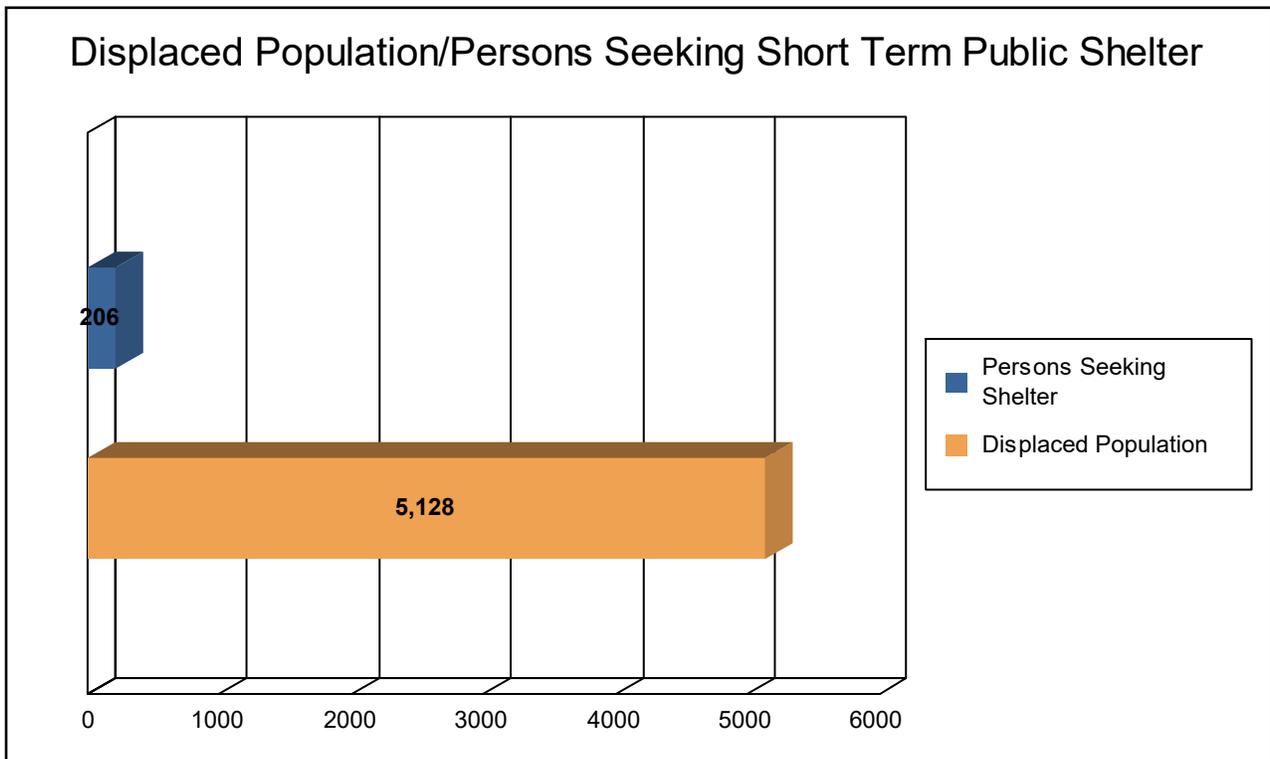
The model estimates that a total of 12,901 tons of debris will be generated. Of the total amount, Finishes comprises 48% of the total, Structure comprises 30% of the total, and Foundation comprises 22%. If the debris tonnage is converted into an estimated number of truckloads, it will require 517 truckloads (@25 tons/truck) to remove the debris generated by the flood.



Social Impact

Shelter Requirements

Hazus estimates the number of households that are expected to be displaced from their homes due to the flood and the associated potential evacuation. Hazus also estimates those displaced people that will require accommodations in temporary public shelters. The model estimates 1,709 households (or 5,128 of people) will be displaced due to the flood. Displacement includes households evacuated from within or very near to the inundated area. Of these, 206 people (out of a total population of 301,356) will seek temporary shelter in public shelters.



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Economic Loss

The total economic loss estimated for the flood is 826.63 million dollars, which represents 8.22 % of the total replacement value of the scenario buildings.

Building-Related Losses

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 flood. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the flood.

The total building-related losses were 324.90 million dollars. 61% of the estimated losses were related to the business interruption of the region. The residential occupancies made up 17.63% of the total loss. Table 6 below provides a summary of the losses associated with the building damage.



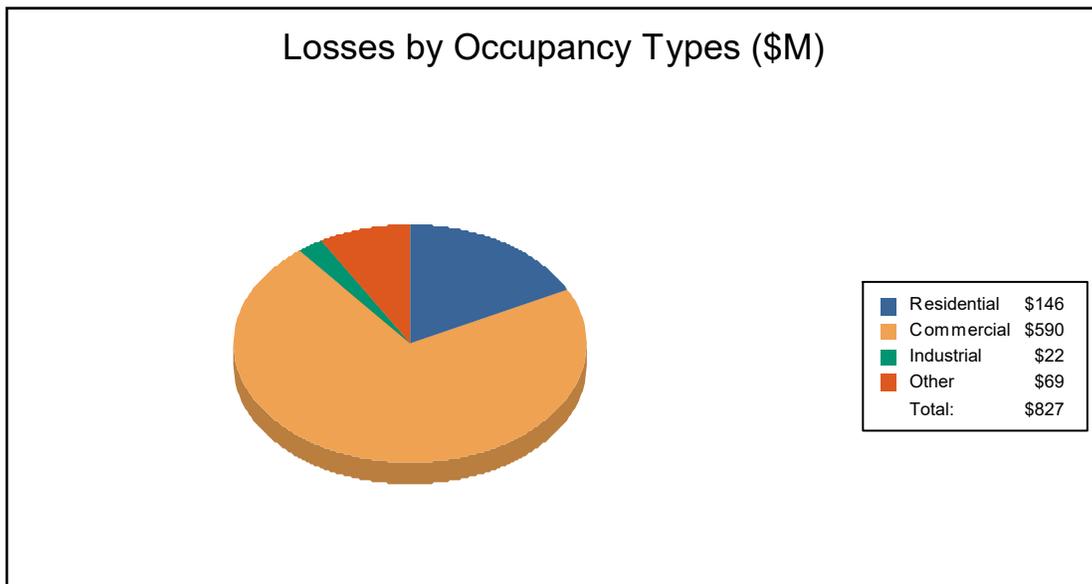
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Table 6: Building-Related Economic Loss Estimates
(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<u>Building Loss</u>						
	Building	69.26	64.36	5.57	3.09	142.28
	Content	33.20	119.45	12.97	13.88	179.49
	Inventory	0.00	0.78	2.14	0.22	3.13
	Subtotal	102.45	184.59	20.67	17.18	324.90
<u>Business Interruption</u>						
	Income	1.48	211.87	0.30	8.89	222.53
	Relocation	27.78	51.58	0.39	4.34	84.09
	Rental Income	10.52	38.87	0.08	0.31	49.78
	Wage	3.48	103.51	0.52	37.81	145.33
	Subtotal	43.26	405.84	1.29	51.35	501.73
ALL	Total	145.71	590.43	21.97	68.53	826.63





Appendix A: County Listing for the Region

Ohio

- Lorain



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Appendix B: Regional Population and Building Value Data

	Population	Building Value (thousands of dollars)		
		Residential	Non-Residential	Total
Ohio				
Lorain	301,356	28,075,792	11,663,065	39,738,857
Total	301,356	28,075,792	11,663,065	39,738,857
Total Study Region	301,356	28,075,792	11,663,065	39,738,857



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Hazus-MH: Earthquake Global Risk Report

Region Name: Lorain

Earthquake Scenario: Elyria, 5 mag, 5 km depth

Print Date: February 21, 2018

Disclaimer:

*This version of Hazus utilizes 2010 Census Data.
Totals only reflect data for those census tracts/blocks included in the user's study region.*

The estimates of social and economic impacts contained in this report were produced using Hazus loss estimation methodology software which is based on current scientific and engineering knowledge. There are uncertainties inherent in any loss estimation technique. Therefore, there may be significant differences between the modeled results contained in this report and the actual social and economic losses following a specific earthquake. These results can be improved by using enhanced inventory, geotechnical, and observed ground motion data.

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General Description of the Region

Hazus-MH is a regional earthquake loss estimation model that was developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences. The primary purpose of Hazus is to provide a methodology and software application to develop multi-hazard losses at a regional scale. These loss estimates would be used primarily by local, state and regional officials to plan and stimulate efforts to reduce risks from multi-hazards and to prepare for emergency response and recovery.

The earthquake loss estimates provided in this report was based on a region that includes 1 county(ies) from the following state(s):

Ohio

Note:

Appendix A contains a complete listing of the counties contained in the region.

The geographical size of the region is 494.77 square miles and contains 73 census tracts. There are over 116 thousand households in the region which has a total population of 301,356 people (2010 Census Bureau data). The distribution of population by Total Region and County is provided in Appendix B.

There are an estimated 118 thousand buildings in the region with a total building replacement value (excluding contents) of 39,738 (millions of dollars). Approximately 92.00 % of the buildings (and 71.00% of the building value) are associated with residential housing.

The replacement value of the transportation and utility lifeline systems is estimated to be 3,124 and 2,679 (millions of dollars) , respectively.



Building and Lifeline Inventory

Building Inventory

Hazus estimates that there are 118 thousand buildings in the region which have an aggregate total replacement value of 39,738 (millions of dollars) . Appendix B provides a general distribution of the building value by Total Region and County.

In terms of building construction types found in the region, wood frame construction makes up 70% of the building inventory. The remaining percentage is distributed between the other general building types.

Critical Facility Inventory

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 4 hospitals in the region with a total bed capacity of 698 beds. There are 130 schools, 21 fire stations, 19 police stations and 0 emergency operation facilities. With respect to high potential loss facilities (HPL), there are no dams identified within the inventory. The inventory also includes 254 hazardous material sites, no military installations and no nuclear power plants.

Transportation and Utility Lifeline Inventory

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 lifeline inventory data are provided in Tables 1 and 2.

The total value of the lifeline inventory is over 5,803.00 (millions of dollars). This inventory includes over 216.86 miles of highways, 354 bridges, 9,436.76 miles of pipes.

Table 1: Transportation System Lifeline Inventory

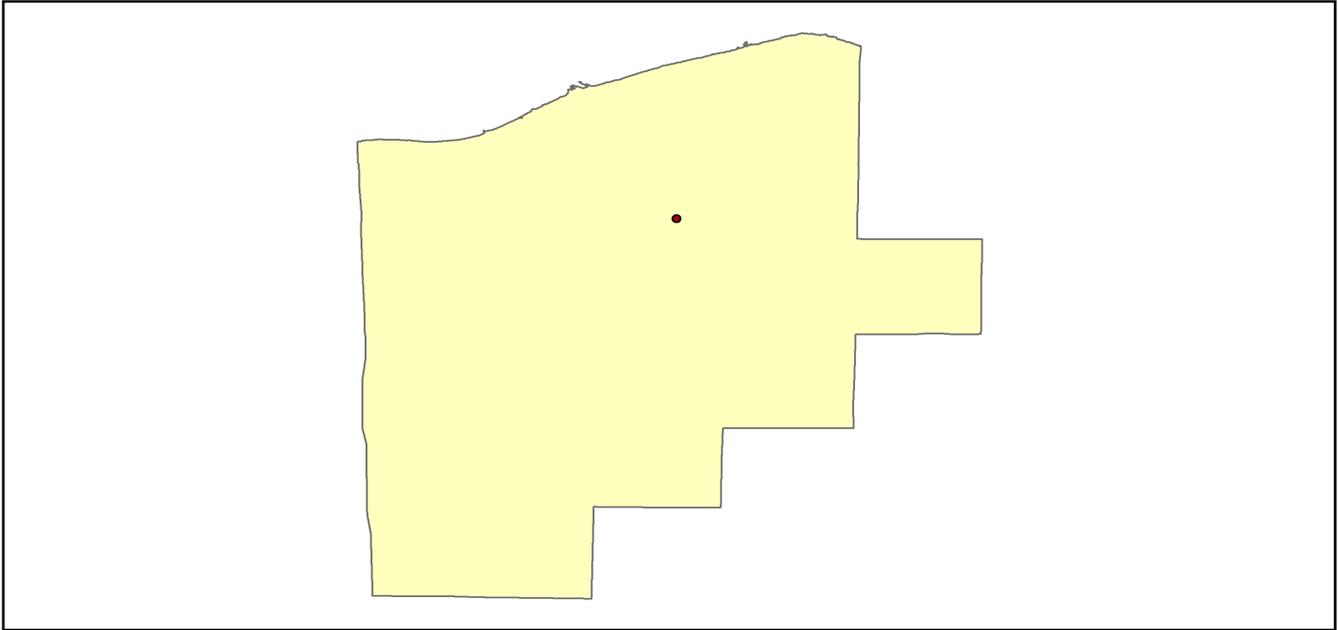
System	Component	# Locations/ # Segments	Replacement value (millions of dollars)
Highway	Bridges	354	341.3731
	Segments	127	2210.7245
	Tunnels	0	0.0000
	Subtotal		2552.0976
Railways	Bridges	7	0.6079
	Facilities	4	10.6520
	Segments	183	220.7103
	Tunnels	0	0.0000
	Subtotal		231.9702
Light Rail	Bridges	0	0.0000
	Facilities	0	0.0000
	Segments	0	0.0000
	Tunnels	0	0.0000
	Subtotal		0.0000
Bus	Facilities	3	3.4335
	Subtotal		3.4335
Ferry	Facilities	0	0.0000
	Subtotal		0.0000
Port	Facilities	9	17.9730
	Subtotal		17.9730
Airport	Facilities	5	53.2550
	Runways	7	265.7480
	Subtotal		319.0030
		Total	3,124.50

Table 2: Utility System Lifeline Inventory

System	Component	# Locations / Segments	Replacement value (millions of dollars)
Potable Water	Distribution Lines	NA	151.8795
	Facilities	2	69.9300
	Pipelines	0	0.0000
	Subtotal		221.8095
Waste Water	Distribution Lines	NA	91.1277
	Facilities	28	1958.0400
	Pipelines	0	0.0000
	Subtotal		2049.1677
Natural Gas	Distribution Lines	NA	60.7518
	Facilities	0	0.0000
	Pipelines	0	0.0000
	Subtotal		60.7518
Oil Systems	Facilities	1	0.1050
	Pipelines	0	0.0000
	Subtotal		0.1050
Electrical Power	Facilities	3	346.5000
	Subtotal		346.5000
Communication	Facilities	7	0.7350
	Subtotal		0.7350
Total			2,679.10

Earthquake Scenario

Hazus uses the following set of information to define the earthquake parameters used for the earthquake loss estimate provided in this report.



Scenario Name	Elyria, 5 mag, 5 km depth
Type of Earthquake	Arbitrary
Fault Name	NA
Historical Epicenter ID #	NA
Probabilistic Return Period	NA
Longitude of Epicenter	-82.11
Latitude of Epicenter	41.37
Earthquake Magnitude	5.00
Depth (km)	5.00
Rupture Length (Km)	NA
Rupture Orientation (degrees)	NA
Attenuation Function	Central & East US (CEUS 2008)

Direct Earthquake Damage

Building Damage

Hazus estimates that about 22,506 buildings will be at least moderately damaged. This is over 19.00 % of the buildings in the region. There are an estimated 1,420 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

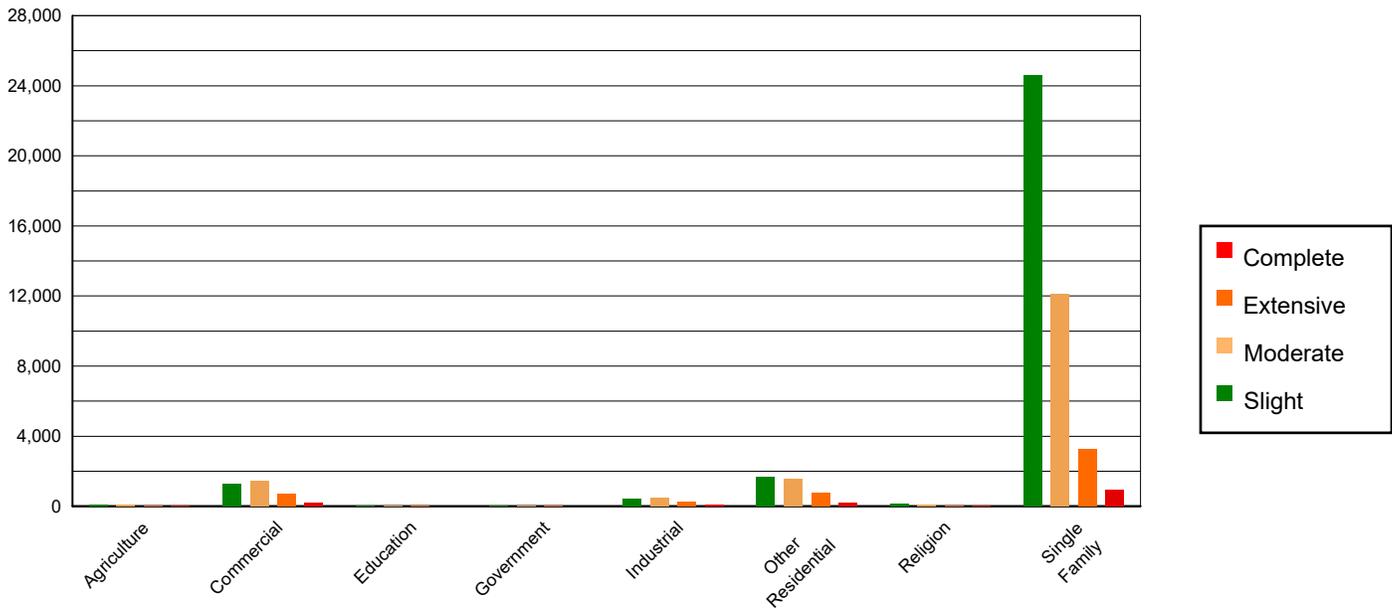


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	201.37	0.30	82.26	0.29	98.48	0.62	51.85	1.00	13.05	0.92
Commercial	2319.72	3.40	1261.30	4.46	1428.10	8.97	685.54	13.27	192.34	13.54
Education	99.44	0.15	52.33	0.19	60.92	0.38	26.44	0.51	7.87	0.55
Government	72.57	0.11	28.81	0.10	33.49	0.21	13.23	0.26	3.90	0.27
Industrial	827.32	1.21	406.91	1.44	507.73	3.19	264.62	5.12	68.42	4.82
Other Residential	3268.88	4.79	1689.89	5.98	1581.26	9.93	778.80	15.08	188.17	13.25
Religion	274.09	0.40	125.67	0.44	117.57	0.74	59.32	1.15	17.35	1.22
Single Family	61135.47	89.64	24609.14	87.09	12093.81	75.96	3285.15	63.60	929.44	65.43
Total	68,199		28,256		15,921		5,165		1,421	

Table 4: Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	54292.07	79.61	20515.78	72.61	7405.62	46.51	901.49	17.45	62.88	4.43
Steel	993.60	1.46	460.92	1.63	826.72	5.19	539.22	10.44	150.41	10.59
Concrete	316.72	0.46	137.59	0.49	170.46	1.07	82.46	1.60	15.87	1.12
Precast	303.55	0.45	109.71	0.39	181.03	1.14	124.17	2.40	21.45	1.51
RM	140.32	0.21	41.65	0.15	70.35	0.44	45.41	0.88	5.23	0.37
URM	11558.94	16.95	6443.52	22.80	6291.10	39.51	2875.30	55.67	1025.44	72.19
MH	593.66	0.87	547.12	1.94	976.08	6.13	596.89	11.56	139.25	9.80
Total	68,199		28,256		15,921		5,165		1,421	

*Note:

- RM Reinforced Masonry
- URM Unreinforced Masonry
- MH Manufactured Housing

Essential Facility Damage

Before the earthquake, the region had 698 hospital beds available for use. On the day of the earthquake, the model estimates that only 219 hospital beds (31.00%) are available for use by patients already in the hospital and those injured by the earthquake. After one week, 46.00% of the beds will be back in service. By 30 days, 74.00% will be operational.

Table 5: Expected Damage to Essential Facilities

Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	4	2	0	0
Schools	130	28	0	20
EOCs	0	0	0	0
PoliceStations	19	3	0	6
FireStations	21	3	0	6

Transportation Lifeline Damage

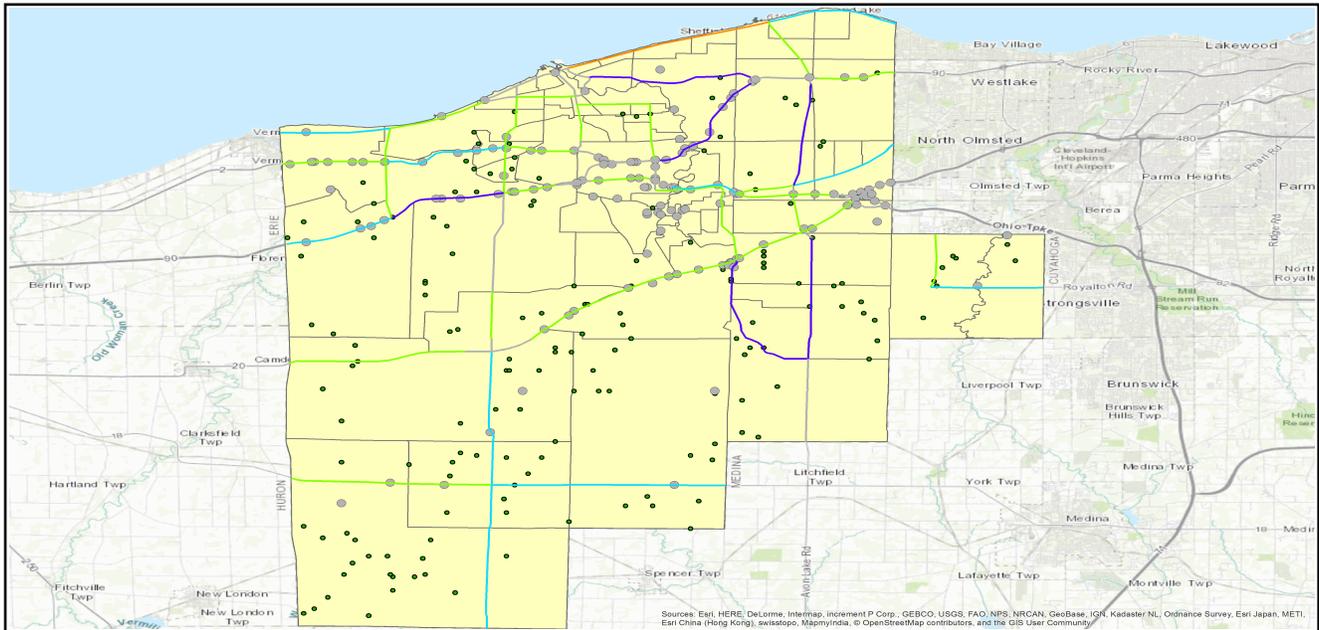


Table 6: Expected Damage to the Transportation Systems

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	127	0	0	127	127
	Bridges	354	7	0	351	354
	Tunnels	0	0	0	0	0
Railways	Segments	183	0	0	183	183
	Bridges	7	0	0	7	7
	Tunnels	0	0	0	0	0
	Facilities	4	3	0	4	4
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	3	3	0	3	3
Ferry	Facilities	0	0	0	0	0
Port	Facilities	9	1	0	9	9
Airport	Facilities	5	2	0	5	5
	Runways	7	0	0	7	7

Table 6 provides damage estimates for the transportation system.

Note: Roadway segments, railroad tracks and light rail tracks are assumed to be damaged by ground failure only. If ground failure maps are not provided, damage estimates to these components will not be computed.

Tables 7-9 provide information on the damage to the utility lifeline systems. Table 7 provides damage to the utility system facilities. Table 8 provides estimates on the number of leaks and breaks by the pipelines of the utility systems. For electric power and potable water, Hazus performs a simplified system performance analysis. Table 9 provides a summary of the system performance information.

Table 7 : 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	2	2	0	0	2
Waste Water	28	17	0	3	28
Natural Gas	0	0	0	0	0
Oil Systems	1	1	0	0	1
Electrical Power	3	2	0	0	3
Communication	7	3	0	7	7

Table 8 : Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	4,719	698	175
Waste Water	2,831	351	88
Natural Gas	1,887	120	30
Oil	0	0	0

Table 9: Expected Potable Water and Electric Power System Performance

	Total # of Households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	116,274	3,265	991	0	0	0
Electric Power		65,396	38,569	13,602	2,116	84

Induced Earthquake Damage

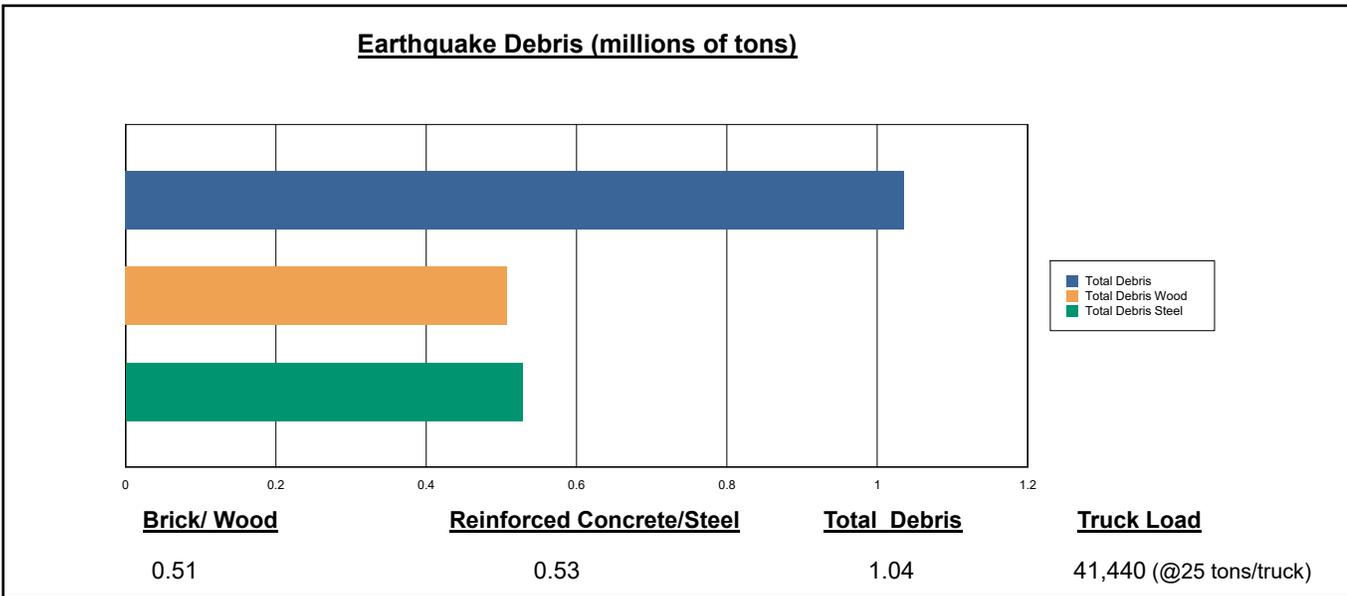
Fire Following Earthquake

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 will be generated by the earthquake. The model breaks the debris into two general categories: a) Brick/Wood and b) Reinforced Concrete/Steel. This distinction is made because of the different types of material handling equipment required to handle the debris.

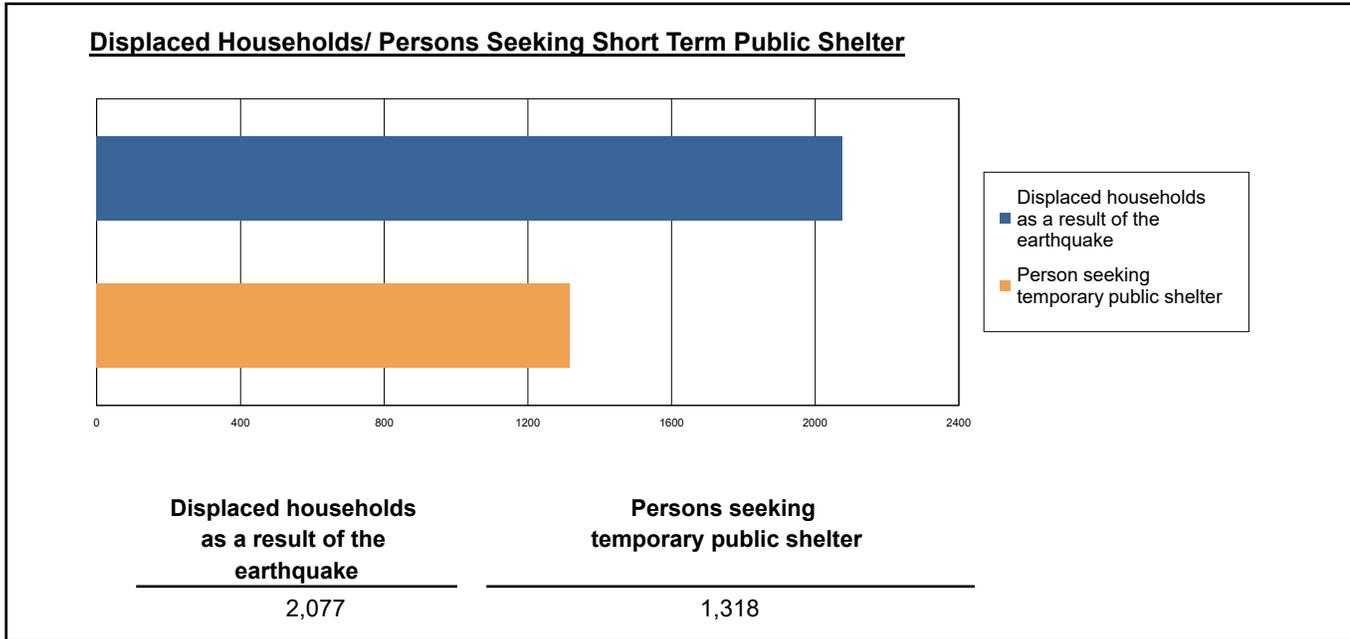
The model estimates that a total of 1,036,000 tons of debris will be generated. Of the total amount, Brick/Wood comprises 49.00% of the total, with the remainder being Reinforced Concrete/Steel. If the debris tonnage is converted to an estimated number of truckloads, it will require 41,440 truckloads (@25 tons/truck) to remove the debris generated by the earthquake.



Social Impact

Shelter Requirement

Hazus estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 2,077 households to be displaced due to the earthquake. Of these, 1,318 people (out of a total population of 301,356) 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 10 provides a summary of the casualties estimated for this earthquake

Table 10: Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2 AM	Commercial	9.58	2.20	0.28	0.55
	Commuting	0.02	0.03	0.05	0.01
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	20.73	4.75	0.59	1.15
	Other-Residential	139.86	30.19	3.65	7.06
	Single Family	550.32	121.62	16.19	31.72
	Total	721	159	21	40
2 PM	Commercial	563.68	129.60	16.65	32.20
	Commuting	0.20	0.25	0.44	0.08
	Educational	273.54	66.00	9.42	18.26
	Hotels	0.00	0.00	0.00	0.00
	Industrial	152.77	35.15	4.42	8.48
	Other-Residential	31.31	6.94	0.88	1.64
	Single Family	120.72	27.57	3.84	7.18
	Total	1,142	266	36	68
5 PM	Commercial	404.78	93.58	12.17	23.21
	Commuting	3.85	4.77	8.49	1.62
	Educational	23.98	5.72	0.81	1.57
	Hotels	0.00	0.00	0.00	0.00
	Industrial	95.48	21.97	2.76	5.30
	Other-Residential	54.52	12.08	1.53	2.86
	Single Family	220.78	50.37	7.01	13.12
	Total	803	188	33	48



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Economic Loss

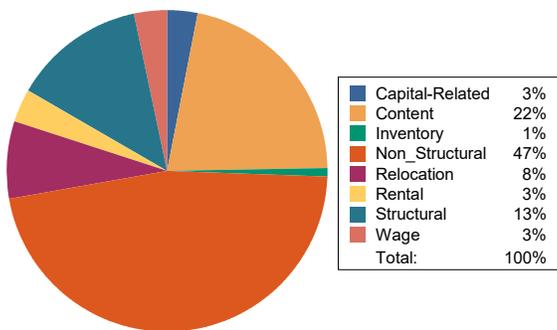
The total economic loss estimated for the earthquake is 4,309.39 (millions of dollars), which includes building and lifeline related losses based on the region's available inventory. The following three sections provide more detailed information about these losses.

Building-Related Losses

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. Business interruption losses also include the temporary living expenses for those people displaced from their homes because of the earthquake.

The total building-related losses were 3,840.25 (millions of dollars); 17 % 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 53 % of the total loss. Table 11 below provides a summary of the losses associated with the building damage.

Earthquake Losses by Loss Type (\$ millions)



Earthquake Losses by Occupancy Type (\$ millions)

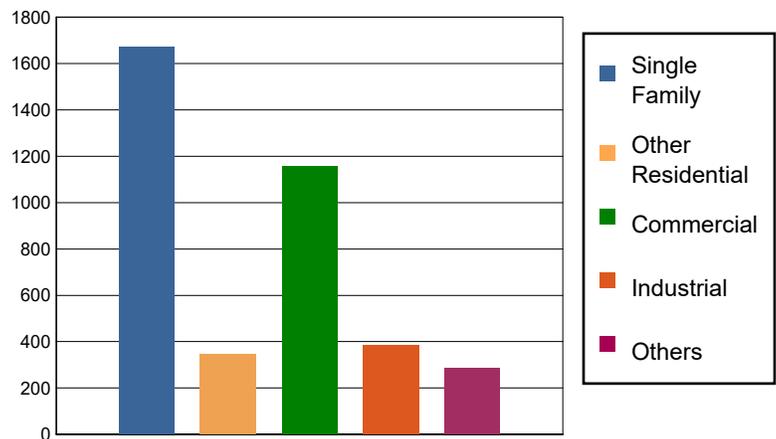


Table 11: Building-Related Economic Loss Estimates

(Millions of dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses							
	Wage	0.0000	5.0068	107.6127	10.5552	8.2721	131.4468
	Capital-Related	0.0000	2.1353	101.8078	6.6647	2.7964	113.4042
	Rental	37.8250	19.7513	62.3608	3.3082	3.7842	127.0295
	Relocation	131.9694	14.9318	95.5221	13.6728	39.1244	295.2205
	Subtotal	169.7944	41.8252	367.3034	34.2009	53.9771	667.1010
Capital Stock Losses							
	Structural	229.8102	35.9209	151.9429	53.5068	42.5256	513.7064
	Non_Structural	904.1128	203.5481	405.6431	158.2328	118.1301	1,789.6669
	Content	368.1979	64.3322	225.0168	113.0671	70.1861	840.8001
	Inventory	0.0000	0.0000	5.0013	23.0509	0.9248	28.9770
	Subtotal	1502.1209	303.8012	787.6041	347.8576	231.7666	3173.1504
	Total	1671.92	345.63	1154.91	382.06	285.74	3840.25

Transportation and Utility Lifeline Losses

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. Tables 12 & 13 provide a detailed breakdown in the expected lifeline losses.

Table 12: Transportation System Economic Losses
(Millions of dollars)

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Segments	2210.7245	0.0000	0.00
	Bridges	341.3731	10.1403	2.97
	Tunnels	0.0000	0.0000	0.00
	Subtotal	2552.0976	10.1403	
Railways	Segments	220.7103	0.0000	0.00
	Bridges	0.6079	0.0022	0.36
	Tunnels	0.0000	0.0000	0.00
	Facilities	10.6520	3.9339	36.93
	Subtotal	231.9702	3.9361	
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	3.4335	1.3465	39.22
	Subtotal	3.4335	1.3465	
Ferry	Facilities	0.0000	0.0000	0.00
	Subtotal	0.0000	0.0000	
Port	Facilities	17.9730	5.2872	29.42
	Subtotal	17.9730	5.2872	
Airport	Facilities	53.2550	13.5010	25.35
	Runways	265.7480	0.0000	0.00
	Subtotal	319.0030	13.5010	
Total		3,124.48	34.21	

Table 13: 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	69.9300	13.1152	18.75
	Distribution Lines	151.8795	3.1427	2.07
	Subtotal	221.8095	16.2579	
Waste Water	Pipelines	0.0000	0.0000	0.00
	Facilities	1958.0400	367.8213	18.79
	Distribution Lines	91.1277	1.5787	1.73
	Subtotal	2049.1677	369.4000	
Natural Gas	Pipelines	0.0000	0.0000	0.00
	Facilities	0.0000	0.0000	0.00
	Distribution Lines	60.7518	0.5408	0.89
	Subtotal	60.7518	0.5408	
Oil Systems	Pipelines	0.0000	0.0000	0.00
	Facilities	0.1050	0.0180	17.14
	Subtotal	0.1050	0.0180	
Electrical Power	Facilities	346.5000	48.5805	14.02
	Subtotal	346.5000	48.5805	
Communication	Facilities	0.7350	0.1293	17.59
	Subtotal	0.7350	0.1293	
	Total	2,679.07	434.93	



FEMA

Appendix A: County Listing for the Region

Lorain, OH

Appendix B: Regional Population and Building Value Data

State	County Name	Population	Building Value (millions of dollars)		
			Residential	Non-Residential	Total
Ohio	Lorain	301,356	28,075	11,663	39,738
Total Region		301,356	28,075	11,663	39,738