London City Council
20 S. Walnut Street, London, Ohio 43140
January 5, 2026, at 6:30pm
Agenda

Call to Order

Roll Call

Minutes – Approval of December 18, 2025, minutes

Public Hearings

Communications/Announcements

City Council rules 2026/2027, City Committee assignments

Audience Concerns

Committee Reports

City Official Reports

Old Business

3rd Reading

RESOLUTION 189-25 Sponsored by: Shannon Treynor

A RESOLUTION AUTHORIZING THE AUDITOR TO OPEN A BANK ACCOUNT FOR THE TAX DEPARTMENT

RESOLUTION 190-25 **Sponsored by: Andrew Hitt and Lisa Jackman**
A RESOLUTION AUTHORIZING THE SAFETY SERVICE DIRECTOR TO ADVERTISE FOR BIDS FOR SANITATION DEPARTMENT SERVICES

RESOLUTION 191-25 **Sponsored by: Andy Hitt and Lisa Jackman**
A RESOLUTION AUTHORIZING THE SAFETY SERVICE DIRECTOR TO ADVERTISE FOR BIDS FOR TRASH HAULING SERVICES

ORDINANCE 192-25 **Sponsored by: Andy Hitt and Lisa Jackman**
AN ORDINANCE ADJUSTING THE RATE OF SANITATION DEPARTMENT SERVICES

RESOLUTION 193-25 **Sponsored by: Rich Hayes**
A RESOLUTION ADOPTING THE MADISON COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION 5 -YEAR PLAN UPDATE

2nd Reading

RESOLUTION 194-25 **Sponsored by: Greg Eades**
A RESOLUTION INCREASING APPROPRIATIONS. The Police Department is in need of a new cruiser

RESOLUTION 195-25 **Sponsored by: Andrew Hitt**
A RESOLUTION TRANSFERRING APPROPRIATIONS. The Police Department needs to replace the computers in all of the cruisers

Round Table

Adjournment

RESOLUTION 189-25
Sponsored by: Shannon Treynor

A RESOLUTION AUTHORIZING THE AUDITOR TO OPEN A BANK ACCOUNT FOR THE TAX DEPARTMENT

WHEREAS, the Auditor and Municipal Advisors recommend a new bank account for the Tax Department.

NOW THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF LONDON, STATE OF OHIO

SECTION I:

City Council hereby authorizes the City Auditor to open a new bank account for the Tax Department.

SECTION II:

That this Resolution is hereby declared an emergency measure necessary for the immediate preservation of the public peace, health and safety of the City to take effect and be in full force immediately upon its passage.

PASSED:

ATTEST:

_____
Matt Edgington
Clerk of Council

_____
Joshua Peters
President of Council

Submitted to Mayor:_____

APPROVED:

Date of Approval:_____

_____
Patrick Closser, Mayor

_____
Rickelle Davis, Law Director
Approved as to Form

I, Matt Edgington, Clerk of Council for the City of London, Ohio, do hereby certify that the foregoing Ordinance/Resolution No.189-25 was posted on the City of London's website, www.londonohio.gov or at the Madison Messenger a newspaper of general circulation on the _____day of_____, 2025 and on the_____day of_____, 2025

_____
Clerk

#_____

Vote	Abstain	Suspend	Adopt
Andrew Hitt			
Rich Hays			
John Stahl			
Greg Eades			
Shannon Treynor			
Brent McDaniels			
Lisa Jackman			

RESOLUTION 190-25
Sponsored by: Andrew Hitt and Lisa Jackman

A RESOLUTION AUTHORIZING THE SAFETY SERVICE DIRECTOR TO ADVERTISE FOR BIDS FOR SANITATION DEPARTMENT SERVICES

WHEREAS, City Council would like to determine whether to privatize sanitation services; and

WHEREAS, the Safety Service Director must advertise for bids.

NOW THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF LONDON, STATE OF OHIO

SECTION I:

That the Safety Service Director is hereby authorized to advertise for bids.

SECTION II:

That this ordinance shall take effect and be in full force from and after the earliest period allowed by law.

PASSED:

ATTEST:

_____
Matt Edgington
Clerk of Council

_____
Joshua Peters
President of Council

Submitted to Mayor:_____

APPROVED:

Date of Approval:_____

_____
Patrick Closser, Mayor

_____
Rickelle A. Davis, Law Director
Approved as to Form

I, Matt Edgington, Clerk of Council for the City of London, Ohio, do hereby certify that the foregoing Ordinance/Resolution No.190-25 was posted in a newspaper of general circulation on the _____day of_____, 2025 and on the_____day of_____, 2025

_____
Clerk

#_____

Vote	Abstain	Suspend	Adopt
Andrew Hitt			
Rich Hays			
John Stahl			
Greg Eades			
Shannon Treynor			
Brent McDaniels			

RESOLUTION 191-25
Sponsored by: Andy Hitt and Lisa Jackman

A RESOLUTION AUTHORIZING THE SAFETY SERVICE DIRECTOR TO ADVERTISE FOR BIDS FOR TRASH HAULING SERVICES

WHEREAS, the Safety Service Director needs to advertise for bids for trash hauling services; and

WHEREAS, the Safety Service Director must advertise for bids for the lowest and best bidder

NOW THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF LONDON, STATE OF OHIO

SECTION I:

That the Safety Service Director is hereby authorized to advertise for bids.

SECTION II:

That this ordinance shall take effect and be in full force from and after the earliest period allowed by law.

PASSED:

ATTEST:

_____
Matt Edgington
Clerk of Council

_____
Joshua Peters
President of Council

Submitted to Mayor:_____

APPROVED:

Date of Approval:_____

_____
Patrick Closser, Mayor

_____
Rickelle Davis, Law Director
Approved as to Form

I, Matt Edgington, Clerk of Council for the City of London, Ohio, do hereby certify that the foregoing Ordinance/Resolution No.191-25 was posted on the City of London's website, www.londonohio.gov or at the Madison Messenger a newspaper of general circulation on the _____day of_____, 2025 and on the_____day of_____, 2025

_____
Clerk

#_____

Vote	Abstain	Suspend	Adopt
Andrew Hitt			
Rich Hays			
John Stahl			
Greg Eades			
Shannon Treynor			
Brent McDaniels			
Lisa Jackman			

ORDINANCE 192-25
Sponsored by: Andy Hitt and Lisa Jackman

AN ORDINANCE ADJUSTING THE RATE OF SANITATION DEPARTMENT SERVICES

WHEREAS, after reviewing the current cost of the sanitation department trash pick-up services, it has been determined that the rate needs to be increased.

NOW THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF LONDON, STATE OF OHIO

SECTION I:

City Council hereby approves the rate increase. See attached exhibit A

SECTION II:

That this Ordinance shall take effect and be in full force from and after the earliest period allowed by law.

PASSED:

ATTEST:

_____
Matt Edgington
Clerk of Council

_____
Joshua Peters
President of Council

Submitted to Mayor:_____

APPROVED:

Date of Approval:_____

_____
Patrick Closser, Mayor

_____
Jennifer Hitt, Law Director
Approved as to Form

I, Matt Edgington, Clerk of Council for the City of London, Ohio, do hereby certify that the foregoing Ordinance/Resolution No.192-25 was posted on the City of London's website, www.londonohio.gov on the _____day of_____, 2025 and on the_____day of_____, 2025

_____
Clerk

#_____

Vote	Abstain	Suspend	Adopt
Andrew Hitt			
Rich Hays			
John Stahl			
Greg Eades			
Shannon Treynor			
Brent McDaniels			
Lisa Jackman			

	NEW RATES
Monthly Trash Pick-Up Rate	$29.37/month for trash service. New residents moving into the city must pay full price for the cans. Additional cans may be purchased and will be picked up weekly for an additional $4.45/can. Assistance, add $12.00/month.
Assistance Service Fee Exemption	Any resident who is at least 65 years of age or handicapped may apply to waive the $12.00 assistance pickup service fee. Application may be made to the City of London. When filling out the form you will need a photo ID and a copy of your registration for your handicap placard parking pass or verification that you receive SSI disability benefits.
Commercial/ Industrial Rates	$29.37/month for trash service . Businesses moving into the city must pay full price for the cans. Additional cans may be purchased and will be picked up weekly for an additional $4.45/can. $5.70/cubic yard for dumpsters (unchanged)
Special Bulk Pick-Up Rate	Free 1-cubic yard pick-up *or drop off* , 1 x per month -- $14/cubic-yard beyond free pick-up -- ($14 minimum) effective July 1, 2023
Special Drop-Off Rates	$10/cubic yard (unchanged)
Special Dumping Rate	$10/cubic yard for residential
Building Material Drop-Off Rate	$20/cubic yard - DROP OFF ONLY
Appliances	Free to drop off, $14 to pick up if in addition to free pick up
Tire Recycling	$5.00/per tire -- $3.00 additional if the tire has a rim -- DROP OFF ONLY
Annual Increase	Every January 1 beginning 2024 there will be a 3% increase

RESOLUTION 193-25
Sponsored by: Rich Hayes

A RESOLUTION ADOPTING THE MADISON COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION 5 -YEAR PLAN UPDATE

WHEREAS, the Disaster Mitigation Act of 2000, as amended, requires that local governments develop and adopt a hazard mitigation plan as a condition for receiving certain types of Federal disaster assistance and mitigation funding; and

WHEREAS, the Madison County Emergency Management Agency, in coordination with Blue Umbrella Solutions and participating jurisdictions, has prepared the 2025 Madison County Local Hazard Mitigation Plan Update, documenting the planning process, identified hazards, vulnerabilities, and mitigation strategies; and

WHEREAS, the Ohio Emergency Management Agency, acting under authority delegated by FEMA, issues a determination on September 24, 2025 that the Madison County 2025 Local Hazard Mitigation Plan meets the criteria of 44 CFR Part 201.6 and is "Approved Pending Adoption"; and

WHEREAS, adoption of the Plan demonstrates the commitment of Madison County and its jurisdictions to reduce the impacts of hazards, protect life and property, and increase community resilience; and

WHEREAS, jurisdictions that do not adopt the Plan will not be eligible for Federal mitigation funding.

NOW THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF LONDON, STATE OF OHIO

SECTION I:

City Council adopts the Madison County Hazard Mitigation 5-Year Plan Update as an official Plan of London, Ohio;

SECTION II:

City Council directs that this resolution and the adopted plan be transmitted to the Ohio Emergency Management Agency and FEMA Region V to secure final approval;

SECTION III:

The respective City officials identified in the strategy of the Plan are hereby directed to implement the recommended actions assigned to them. These officials will report annually on their activities, accomplishments, and progress to the Madison County Hazard Mitigation Committee under the direction of the City of London Administration.

SECTION IV:

That this ordinance shall take effect and be in full force from and after the earliest period allowed by law.

PASSED:

ATTEST:

_____
Matt Edgington
Clerk of Council

_____
Joshua Peters
President of Council

Submitted to Mayor:_____

APPROVED:

Date of Approval:_____

_____
Patrick Closser, Mayor

_____
Rickelle Davis, Law Director
Approved as to Form

I, Matt Edgington, Clerk of Council for the City of London, Ohio, do hereby certify that the foregoing Ordinance/Resolution No.193-25 was posted on the City of London's website, www.londonohio.gov or at the Madison Messenger a newspaper of general circulation on the _____day of_____, 2025 and on the_____day of_____, 2025

_____
Clerk

#_____

Vote	Abstain	Suspend	Adopt
Andrew Hitt			
Rich Hays			
John Stahl			
Greg Eades			
Shannon Treynor			
Brent McDaniels			
Lisa Jackman			

July 2025

Madison County, Ohio
Local Hazard Mitigation Plan Update

Encompassing:

- **Madison County, Ohio**
- **City of London**
- **Village of Midway**
- **Village of Mt. Sterling**
- **Village of Plain City**
- **Village of South Solon**
- **Village of West Jefferson**
- **Jefferson Local**
- **Jonathan Alder Local**
- **London City Schools**
- **Madison-Plains Local**

Prepared By:
Blue Umbrella Solutions

Table of Contents

SECTION **PAGE**

List of Appendices

List of Commonly Used Acronyms

Acronym	Meaning
EAL	Expected Annual Loss
CRS	Community Rating System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FMA	Flood Mitigation Assistance
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
LHMP	Local Hazard Mitigation Plan
MCEMA	Madison County Emergency Management Agency
MPC	Mitigation Planning Committee
NCEI	National Centers for Environmental Information
NFIP	National Flood Insurance Program
NOAA	National Oceanic and Atmospheric Administration
NRI	National Risk Index
NWS	National Weather Service
Ohio EMA	Ohio Emergency Management Agency
RAPT	Resilience Analysis and Planning Tool
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
WUI	Wildland/Urban Interface

Section 1 – Introduction, Assurances, Incorporation, and Adoption

1.1 Introduction

Hazard mitigation is commonly defined as sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects. Hazard mitigation planning provides communities with a roadmap to aid in the creation and revision of policies and procedures, and the use of available resources, to provide long-term, tangible benefits to the community. A well-designed hazard mitigation plan provides communities with realistic actions that can be taken to reduce potential vulnerability and exposure to identified hazards.

This Local Hazard Mitigation Plan (LHMP) was prepared to provide sustained actions to eliminate or reduce risk to people and property from the effects of natural and man-made hazards. This plan documents Madison County and its participating jurisdictions planning process and identifies applicable hazards, vulnerabilities, and hazard mitigation strategies. This plan will serve to direct available community and regional resources towards creating policies and actions that provide long-term benefits to the community. Local and regional officials can refer to the plan when making decisions regarding regulations and ordinances, granting permits, and in funding capital improvements and other community initiatives.

Specifically, this hazard mitigation plan was developed to:

- Update the 2020 LHMP
- Build for a safer future for all citizens
- Foster cooperation for planning and resiliency
- Identify, prioritize, and mitigate hazards
- Assist with sensible and effective planning and budgeting
- Educate citizens about hazards, mitigation, and preparedness
- Comply with relevant federal requirements

This plan has been designed to be a living document, a document that will evolve to reflect changes, correct any omissions, and constantly strive to ensure the safety of all citizens.

1.2 Assurances

In an effort to reduce natural disaster losses, the United States Congress passed the Disaster Mitigation Act of 2000 (DMA 2000) in order to amend the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act). DMA 2000 amended the Stafford Act by repealing the previous Mitigation Planning section (409) and replacing it with a new Mitigation Planning section (322). Section 322 of the DMA makes the development of a hazard mitigation plan a specific eligibility requirement for any local government applying for Federal mitigation grant funds. This LHMP was prepared to meet the requirements of the DMA 2000, as defined in regulations set forth by the Interim Final Rule (44 Code of Federal Regulations (CFR) Part 201.6).

All adopting jurisdictions certify that they will comply with all applicable Federal statutes and regulations during the periods for which they receive grant funding, in compliance with 44 CFR 13.11(c), and will amend this plan whenever necessary to reflect changes in State or Federal laws and statutes as required in 44 CFR 13.11(d).

This hazard mitigation plan was prepared to comply with all relevant requirements of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988, as amended by the Disaster Mitigation Act of 2000. This plan complies with all the relevant requirements of:

- Code of Federal Regulations (44 CFR) pertaining to hazard mitigation planning
- Federal Emergency Management Agency (FEMA) planning directives and guidelines
- Interim final, and final rules pertaining to hazard mitigation planning and grant funding
- Relevant presidential directives
- Office of Management and Budget circulars
- Any additional and relevant federal government documents, guidelines, and rules.

Additionally, this LHMP has been completed to address all State of Ohio recommendations and requirements concerning hazard mitigation planning and the requirements of FEMA's Local Mitigation Planning Policy Guide, including all revisions that went into effect April 11, 2025.

1.3 Authorities

The LHMP relies on the authorities given to participating jurisdictions by its citizens and encoded in local and state law. This plan is intended to be consistent with all policies and procedures that govern activities related to the mitigation programing and planning. In all cases of primacy, State of Ohio and local laws, statutes, and policies will supersede the provisions of the plan.

1.4 Participating Jurisdictions

In order to have an approved hazard mitigation plan, DMA 2000 and 44 CFR § 201.6 require that each jurisdiction choosing to participate must demonstrate meaningful participation in the planning process. For this plan, meaningful participation benchmarks included:

- Participation in planning meetings when able, or through alternate engagement such as phone calls, emails, or review of materials.
- Provision of local data, maps, and other information to support plan development.
- Identification of jurisdiction-specific mitigation actions.
- Review and comment on draft plan sections.
- Contribution to fostering the public input process.
- Formal adoption of the plan following FEMA approval.

As FEMA's Local Mitigation Plan Review Guide notes, participation is not limited to attendance at meetings, but may be demonstrated through a variety of activities such as reviewing and commenting on drafts, providing local data, identifying actions, and engaging in coordination. Accordingly, each jurisdiction, both those that could attend formal meetings and those that relied on alternate engagement formats, still met FEMA's delineated participation requirements.

Based on the above criteria, the following jurisdictions participated in the planning process, and will adopt the approved hazard mitigation plan:

Table 1: Participating Jurisdiction

Jurisdiction	Meeting Attendance	Alternate Engagement	Data Provision	Mitigation Actions	LHMP Review	Foster Public Input
Madison County	x		x	x	x	x
City of London	x		x	x	x	x
Village of Midway	x		x	x	x	x
Village of Mt. Sterling		x	x	x	x	x
Village of Plain City	x		x	x	x	x
Village of South Solon		x	x	x	x	x
Village of West Jefferson	x		x	x	x	x
Jefferson Local		x	x	x	x	x
Jonathan Alder Local		x	x	x	x	x
London City	x		x	x	x	x
Madison-Plains Local		x	x	x	x	x

1.5 Hazard Mitigation Plan Incorporation and Integration

This hazard mitigation plan is an overarching document that is both comprised of, and contributes to, various county and local codes, plans, reports, and studies. The integration of these can help align community goals, objectives, and prime concerns, avoid lost opportunities, and eliminate duplication of effort

Madison County and participating jurisdictions will continue to actively work on incorporating elements of this hazard mitigation plan into any relevant plan, code or ordinance revision or creation. Whenever possible, Madison County and

participating jurisdiction will use existing plans, policies, procedures, and programs to aid in the implementation of identified hazard mitigation actions.

On a local level, hazard mitigation plans will be integrated into various planning documents and initiatives, as they come up for revision, resubmittal, or amendment, to ensure a comprehensive and coordinated approach to reducing the impact of hazards. Local level plans where hazard mitigation strategies will be integrated include:

- **Codes and Ordinances:** A hazard mitigation plan can be a powerful tool for updating local codes and ordinances by providing data-driven insights and risk assessments that support stronger, more resilient community standards.
- **Comprehensive Plans:** Helps guide long term community development to ensure future resilience against identified hazards.
- **Emergency Operations Plans:** Contributes to detailing specific actions to be taken before, during, and after disasters to reduce vulnerability and enhance community resilience.
- **Land-Use/Zoning Plans:** Helps guide the development and zoning decisions in a way that minimizes vulnerability to hazards. This includes avoiding construction in high-risk areas and encouraging resilient building practices.
- **School District Plans:** A District Master Plan can help guide long term development to ensure future resilience against identified hazards. A school safety and security plan can help enhance the safety and resilience.

Specifically, the following table details where the previous Madison County LHMP was utilized for jurisdictional plans, and where the current LHMP will be utilized in the future:

Table 2: LHMP Jurisdictional Plan Integration

Jurisdiction	Codes and Ordinances	Comprehensive Plan	Emergency Operation Plan	Land Use / Zoning Plan	School District Plans
Madison County	x	x	x	x	
City of London	x	x	x	x	
Village of Midway	x	x	x	x	
Village of Mt. Sterling	x	x	x	x	
Village of Plain City	x	x	x	x	
Village of South Solon	x	x	x	x	
Village of West Jefferson	x	x	x	x	
Jefferson Local			x		x
Jonathan Alder Local			x		x
London City			x		x
Madison-Plains Local			x		x

Integrating hazard mitigation with FEMA programs and initiatives provides many benefits to Madison County and participating jurisdictions. These benefits include a streamlined planning and funding process for hazard mitigation projects, enhanced community resilience from the leveraging of federal programs to create a holistic approach to resilience, broad based data sharing allowing for an improved understating of community risk, and enhanced funding opportunities where jurisdictions can leverage multiple sources of federal funding to implement hazard mitigation actions. Programs currently being integrated into the LHMP include:

National Flood Insurance Program (NFIP):

- NFIP: A federal program which provides flood insurance for property owners in participating communities, improves floodplain management practices, and develops maps of flood hazard areas.
- Community Rating System (CRS): NFIP's CRS incentivizes communities to go beyond minimum floodplain management standards to reduce flood risk. Communities earn CRS points for implementing flood hazard mitigation activities, which can result in lower flood insurance premiums for residents. Hazard mitigation planning can guide communities in adopting flood-specific measures that qualify for CRS points.

- Building Standards: NFIP policies encourage communities to adopt and enforce building standards to minimize flood damage. By integrating hazard mitigation planning, communities can identify and prioritize infrastructure improvements that meet or exceed NFIP standards, especially in areas vulnerable to flooding.
- Floodplain Management Plans: Developing comprehensive floodplain management plans as part of hazard mitigation planning can support NFIP compliance while addressing risks specific to community needs.

Hazard Mitigation Assistance (HMA) Grants

- Planning Support: The program provides funding for hazard mitigation plans, which can help identify, prioritize, and implement mitigation projects that reduce risk and align with FEMA's overall resilience goals.
- Eligible Project Types: A variety of projects (e.g., retrofitting infrastructure, elevating buildings, property acquisitions) that can align with community-specific hazard mitigation goals. By aligning local hazard mitigation strategies with eligible project types, communities can maximize available funding to address risks.
- Funding Integration with Local Mitigation Projects: Communities can leverage HMA grants to implement local mitigation projects that align with broader hazard mitigation goals. For example, using FMA funds to reduce flood risk in NFIP-insured properties or leveraging funds for innovative infrastructure resilience projects.

Threat and Hazard Identification and Risk Assessment (THIRA)

- Comprehensive Risk Identification: THIRA provides a structured approach for communities to identify and prioritize their risks based on a full spectrum of hazards, including natural and human-caused events. Integrating hazard mitigation planning with THIRA enables communities to address multi-hazard risks with targeted mitigation strategies.
- Capability Targets Alignment: THIRA also helps communities identify capability gaps and set targets for resilience. Hazard mitigation plans can use these targets to outline mitigation actions that align with capability-building priorities, such as improving emergency response infrastructure or fortifying lifeline systems.
- Unified Risk and Capability Assessments: By integrating hazard mitigation planning with the THIRA process, communities can develop a more cohesive picture of their risk and capability needs, allowing for more focused and impactful use of FEMA resources across initiatives.

Integration of hazard mitigation into these various plans ensures that resilience efforts are embedded in the broader fabric of community development. Coordination and collaboration among different sectors and stakeholders are essential for the successful implementation of hazard mitigation strategies on the local level. Plan incorporation and integration is crucial for creating a cohesive and coordinated approach to address various aspects of hazard mitigation. All participating jurisdictions utilize similar internal procedures for plan incorporation and integration. The following represent utilized methods:

- **Cross-Referencing:** Identify and cross-reference relevant sections of different plans and policies. This involves explicitly noting connections between the goals, strategies, and actions outlined in one plan with those in others.
- **Consistency Checks:** Conduct consistency checks to ensure that the language, objectives, and strategies in different plans and policies align with each other.
- **Joint Planning Committees:** Establish joint planning committees or task forces that involve representatives from different departments or agencies responsible for various plans (for example, the MPC). These committees facilitate communication, collaboration, and the coordination of planning efforts across sectors.
- **Collaborative Workshops and Meetings:** Organize collaborative workshops and meetings to bring together stakeholders involved in different planning processes (as seen in the planning meetings for the LHMP). These forums provide an opportunity for stakeholders to share information and discuss common goals.
- **Alignment with State and Regional Plans:** Ensure that local plans align with broader regional and state plans. This involves considering regional and state priorities and incorporating them into local planning efforts to create a harmonized approach to development.

- **Data Sharing and Analysis:** Share relevant data among planning efforts and conduct joint data analysis. This helps in creating a common understanding of the challenges and opportunities, facilitating evidence-based decision-making across different plans.
- **Unified Implementation Strategies:** This involves identifying common actions and initiatives that contribute to the achievement of multiple goals outlined in various plans.

1.6 LHMP Review and Approval

Following Presidential Disaster Declaration DR-4360, a Program Administered by States (PAS) agreement between FEMA and Ohio Emergency Management Agency (Ohio EMA) was signed which delegated to the State the ability to review and issue "Approval Pending Adoption" status for four out of every five local hazard mitigation plans. This was later extended out in consequent Disaster Declarations and, as of June 2023, the State can now review and issue APA for nine out of every ten LHMPs submitted. Under the conditions of this PAS agreement, the State will review LHMPs to ensure compliance with the planning requirements within 45 days of submittal and notify the community when a plan is Approved Pending Adoption. The state will also notify FEMA the status of plan reviews, and will submit the APA letters, files, and other supporting documents.

For quality assurance of the PAS agreement, every tenth plan that the state receives will have to undergo both state and Federal reviews. The plan will then follow the same review, revision, and approval process as it would have outside of the PAS agreement

1.7 Plan Adoption

Upon review and "Approval Pending Adoption" status by Ohio EMA and/or FEMA Region V, adoption resolutions will be signed by all participating jurisdictions using existing adoption protocols. Both approval documentation and jurisdictional adoption resolutions may be found in Appendix A.

Section 2 – Documentation of the Planning Process

2.1 Guiding Principle

The guiding principle for the creation and utilization of this LHMP is as follows:

- Through partnerships among all local jurisdictions, identify and reduce the vulnerability to natural hazards to protect the health, safety, quality of life, environment and economy of the diverse communities within Madison County.

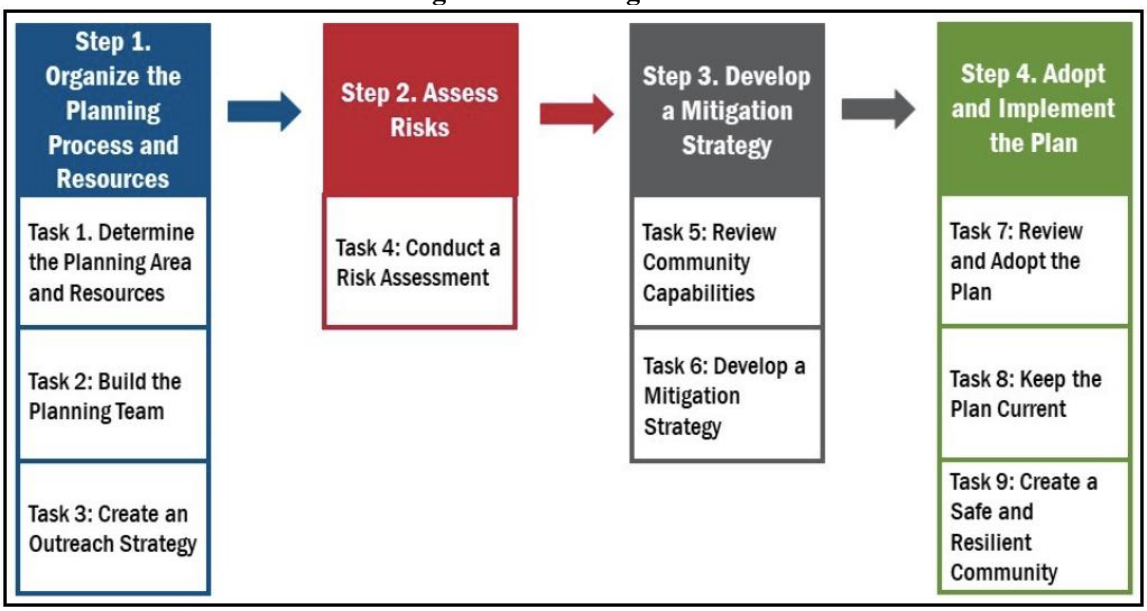
2.2 Planning Process

The process established for this planning effort is based on the Disaster Mitigation Act of 2000 planning and update requirements and the FEMA associated guidance for local hazard mitigation plans (Local Mitigation Planning Policy Guide (FP 206-21-0002), effective April 11, 2025). To accomplish this, the following planning process methodology was followed:

- Inform, invite, and involve other mitigation plan stakeholders throughout the state, including federal agencies, state agencies, regional groups, businesses, non-profits, underserved communities, and local emergency management organizations.
- Creation of a Mitigation Planning Committee (MPC) to codify and guide the planning process.
- Develop the planning and project management process, including methodology, review procedures, details about plan development changes, interagency coordination, planning integration, and the organization and contribution of stakeholders.
- Creation of a multi-pronged outreach strategy to engage stakeholders.
- Conduct a thorough review of all relevant current and historic planning efforts.
- Conduct a review of all related and relevant state and local plans for integration and incorporation.
- Collect data on all related state plans and initiatives, local plans' hazard risk, local plans' mitigation strategies and actions, critical facilities and community lifelines, flood plains, Repetitive Loss/Severe Repetitive Loss properties, hazard events, on-going and completed mitigation actions, and mitigation program changes since the development of the previous plan.
- Complete a risk and vulnerability assessment using data from the FEMA and other federal and state agency resources. Analyses were conducted at the state level, county by county, of state-owned facilities, and county by county drawing on local assessments.
- Develop and update the capability assessment of Madison County and all participating jurisdictions.
- Develop a comprehensive mitigation strategy effectively addressing Madison County's hazards and mitigation program objectives. This included reviewing pre and post disaster policies and programs, identifying objectives and goals, identifying mitigation actions and projects, and assessing mitigation actions and projects.
- Determination and implementation of a plan maintenance cycle, including a timeline for plan upgrades and improvements.

The following figure summarizes these steps:

Figure 1: Planning Process

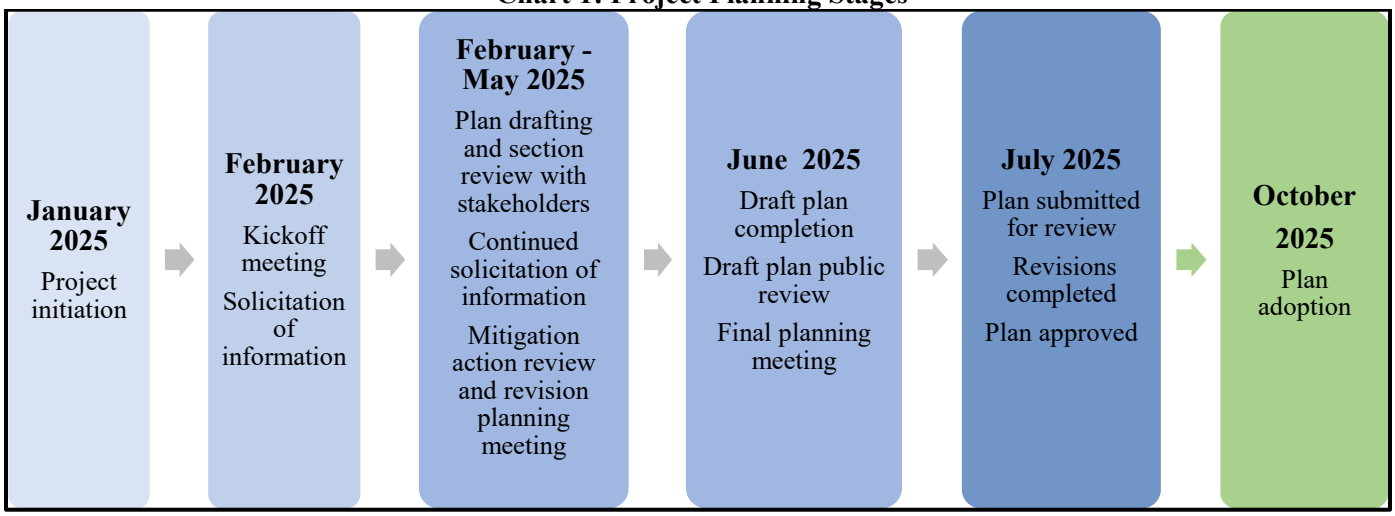


Source: FEMA

2.3 Project Timeline

The Madison County LHMP review and revision process began in June 2024, with the first public meeting held in June 2024. The following chart indicates the planning stages completed as part of this process:

Chart 1: Project Planning Stages



2.4 Plan Organization

This LHMP is both a reference document and an action plan. It has information and resources to educate readers and decision-makers about hazard events and related issues and a comprehensive strategy that participating jurisdictions, stakeholders, and community members can follow to improve resilience. This LHMP is composed of the following sections:

- **Section 1 - Introduction, Assurances, Incorporation, and Adoption:** Details the regulatory framework for plan development, participating jurisdictions, how the plan will be incorporated into other planning mechanisms, and adoption requirements.
- **Section 2 – Planning Process:** Outlines the steps taken to complete this LHMP, the people involved in its creation, strategies to invite public participation, and technical and planning resources utilized in completing this plan.

- **Section 3 - Regional Profile and Development Trends:** Details demographic information, vulnerable populations, critical facility and community lifeline information, agricultural data, and a discussion of climate change parameters.
- **Section 4 – Capability Assessment:** Provides a comprehensive evaluation of existing abilities to effectively mitigate hazards and manage disaster risks. This assessment involves analyzing the community's current resources, policies, programs, and systems to determine how well it can implement mitigation strategies.
- **Section 5 - Hazard Identification and Risk Assessment:** Describes the hazards that can impact the planning area, including extent, previous occurrences, changing conditions, and vulnerabilities.
- **Section 6 - Mitigation Strategy:** Outlines the specific actions, policies, and projects designed to reduce or eliminate the risks and impacts of hazards on a community. These strategies are developed based on the findings from the hazard identification and risk assessment phases and are tailored to address the unique vulnerabilities and capabilities of the community.
- **Section 7 - Plan Maintenance:** Summarizes plan maintenance responsibilities, monitoring and update requirements, and opportunities for continued public involvement.
- **Appendices:** Provides supplementary detailed information and supporting documents. The appendices serve to enhance the main content by offering further clarification, data, and documentation that support the planning process and implementation.

2.5 2025 Plan Update

In undertaking this planning effort, Madison County determined that wide variances in planning format and data do not allow for effective continuous planning. To provide planning continuity every effort was made during this plan update to adhere as closely as possible to elements of the previous LHMP. As such, the level of analysis and detail included in this risk assessment is cumulative, allowing participating jurisdictions to have a robust base to further mold and improve their mitigation strategies over the next five years.

As part of this planning effort, each section of the previous mitigation plan was reviewed based on current and available data. The plan was reviewed against the following elements:

- Compliance with the current regulatory environment
- Completeness of data
- Correctness of data
- Capability differentials
- Current regional environment

Based on the above criteria, each section of the previous LHMP was revised as required. In addition to data revisions, the format and sequencing of the previous plan was updated for ease of use and plan clarity. Key updated elements from the previous LHMP include:

- Integration of the Madison County Comprehensive Plan.
- Expanded definition and discussion of underserved communities and vulnerable populations.
- Updated goals and objectives, including a new goal and objectives.
- Updated critical facilities and community lifelines list.
- Expanded detailing of historic hazard event occurrences.
- Updated mapping using newly available data.
- Updated county and jurisdictional capabilities assessment
- Updated mitigation actions, including progress on previous actions

Participating jurisdictions hazard mitigation priorities have remained consistent for all participating jurisdictions since the last plan update. These priorities include a continued focus on reducing vulnerabilities, enhancing resilience, and addressing risks associated with natural hazards. Stakeholders remain committed to strengthening community

preparedness, protecting critical infrastructure, and minimizing potential losses through collaborative strategies and long-term planning.

2.6 Mitigation Planning Committee

Project initiation began with the selection of a Mitigation Planning Committee (MPC), consisting of the Madison County Emergency Manager and representative staff from both Madison County and participating jurisdictions. From project inception to completion, the MPC was notified at each major plan development milestone through a combination of meetings and electronic communication.

In general, all MPC members were asked to participate in the following ways:

- Attend and participate in meetings
- Help establish project operating procedures and timelines
- Review planning elements and drafts
- Shepherd the plan adoption process

Members of the MPC were also asked to assist with the following:

- **Providing Localized Risk Assessment Data:** Contribute specific data and information about local hazards, vulnerabilities, and risks that are unique to their jurisdiction.
- **Identifying Mitigation Actions:** Help identify and prioritize mitigation actions that are most relevant to their jurisdiction.
- **Coordinating with Stakeholders:** Act as liaisons between the MPC and their respective stakeholders, including vulnerable communities, community members, local businesses, and other governmental agencies. This ensures that the plan reflects the concerns and needs of all relevant parties.
- **Ensuring Compliance and Integration:** Ensure that the mitigation strategies and actions proposed in the LHMP align with existing local plans, ordinances, and regulations. This integration helps to streamline implementation and ensures that the LHMP supports broader community goals.
- **Securing Resources and Funding:** Help identify potential resources, including funding opportunities, that can support the implementation of mitigation actions.
- **Reviewing and Updating the Plan:** After the initial development of the LHMP, MPC members are typically involved in regular reviews of the plan. This includes monitoring progress on mitigation actions, evaluating the effectiveness of strategies, and making necessary adjustments based on new data or changing conditions.
- **Public Engagement and Education:** Play a crucial role in engaging the public and educating community members about the LHMP and its importance.

By fulfilling these roles, MPC members help ensure that the LHMP is well-rounded, locally relevant, and effectively implemented across the entire planning area. Their involvement is key to the plan's success in reducing risks and enhancing community resilience to hazards. The following table represents members of the MPC:

Table 3: MPC Members

Jurisdiction	Name	Title
Madison County	Deb Sims	Emergency Manager
City of London	Todd Eades	Fire Chief
Village of Midway	Peg Brown	Mayor
Village of Mt. Sterling	Andrew Drake	Mayor
Village of Plain City	Jody Carney	Mayor
Village of South Solon	Joseph Haney	Mayor
Village of West Jefferson	Brandon Smith	Chief of Police
Jefferson Local	Dr. Jessica Mamais	Superintendent
Jonathan Alder Local	James Miller, Ed.D.	Superintendent

Table 3: MPC Members

Jurisdiction	Name	Title
London City Schools	Dr. Lou Kramer	Superintendent
Madison-Plains Local	Chad Eisler	Superintendent

2.7 LHMP Stakeholders

Madison County acknowledges that effective hazard mitigation planning should involve a diverse group of stakeholders, including government agencies, private sector entities, private non-profit organizations, quasi-governmental authorities, and special districts. The coordination and cooperation of these stakeholders assists with all aspects of plan development, including:

- Data collection
- Hazard and risk analysis
- Capability assessment
- Mitigation action review, revision, and development
- Plan implementation

Public Comment: *Thank you for including us in the planning process.*

These stakeholders were contacted directly by MCEMA via phone and email during the entirety of the planning process concerning plan progress and meeting information (including remote meeting login information and in person meeting address and time when applicable), and included:

- Local and regional agencies involved in hazard mitigation activities (Haz Mit)
- Agencies that have the authority to regulate development (Dev).
- National Flood Insurance Program coordinators.
- Neighboring communities (Neighbor).
- Representatives of business, academia, and other private organizations (BAP).
- Non-profit and community-based organizations who work to provide support to socially vulnerable and underserved communities (NP).

The following table represents the above defined stakeholders who attended scheduled planning meetings and provided both input and feedback on the LHMP:

Table 4: LHMP Stakeholders

Jurisdiction	Stakeholder Type	Meeting Attendance
Advanced Drainage Systems	BAP	Yes
Armaly Brands	BAP	Yes
Buckeye Community School	BAP	Yes
Buckeye Propane	BAP	Yes
Buckeye Propane	BAP	Yes
Central Ohio Concrete Cutting	BAP	Yes
Central Township Joint Fire District	Haz Mit	Yes
Clark County EMA	Neighbor	Yes
Conduit Pipe Products	BAP	Yes
Creamer Metal Products	BAP	Yes
Forrest Trucking Company	BAP	Yes
Fyda Freightliner	BAP	Yes
Fyda Freightliner	BAP	Yes
Grace Energy Services	BAP	Yes
Jefferson Industries Corp	BAP	Yes
Jefferson Township Fire Department	Haz Mit	Yes
KA Sims Construction	BAP	Yes

Table 4: LHMP Stakeholders

Jurisdiction	Stakeholder Type	Meeting Attendance
Krazy Glue Co.	BAP	Yes
London Fire Department	Haz Mit	Yes
London Parks and Recreation	Haz Mit	Yes
London Police	Haz Mit	Yes
Madison County Board of Directors	Haz Mit	Yes
Madison County Building Department	Dev	Yes
Madison County Chamber of Commerce	BAP	Yes
Madison County Commissioners	Haz Mit, Dev	Yes
Madison County EMA	Haz Mit	Yes
Madison County EMD	Haz Mit	Yes
Madison County Engineer	Haz Mit, Dev	Yes
Madison County Fairgrounds	Haz Mit	Yes
Madison County Family and Children First Council	NP	Yes
Madison County Public Health	Haz Mit	Yes
Madison County Sheriff's Office	Haz Mit	Yes
Madison County Soil and Water	Haz Mit, Dev	Yes
Matco Services	BAP	Yes
Nesco Resource	BAP	Yes
Nissen Chemitec America	BAP	Yes
OSU Extension Office	BAP	Yes
Plain City Police	Haz Mit	Yes
Pleasant Valley Joint Fire District	Haz Mit	Yes
Remedy Staffing Solutions	BAP	Yes
Royal Cabinets	BAP	Yes
Stephens Pipe and Steel	BAP	Yes
Stokes Township Fire Department	Haz Mit	Yes
Torrid	BAP	Yes
Vander Haggs	BAP	Yes
West Jefferson Police	Haz Mit	Yes

Emphasis was placed on inviting and engaging local level departments with potential mitigation roles (Section 4.2) and local building departments (Section 4.3) who played a critical role in creating and reviewing this LHMP. Their expertise was used to help identify local vulnerabilities and develop building-related mitigation measures. Additionally, jurisdictional NFIP coordinators played a key role in mitigation planning at the community level (Section 4.8). These coordinators were actively engaged and for their expertise on flood risk, mitigation strategies, and NFIP compliance. Outreach to these stakeholders was also carried out through MPC members to ensure compliance with planning requirements.

While the following list of stakeholders were unable to attend planning meetings, their input and provided data were integral in the development of this LHMP:

- Madison County Participating Jurisdiction Building Departments
- Madison County Townships (except as noted above)
- Ohio Department of Agriculture
- Ohio Department of Health
- Ohio Department of Natural Resources
- Ohio Department of Transportation
- Ohio EMA
- Ohio Environmental Protection Agency
- FEMA

- National Oceanic and Atmospheric Administration (NOAA)
- National Weather Service (NWS)
- United States Army Corps of Engineers
- United States Department of Agriculture (USDA)
- United States Geological Survey (USGS)
- United States Census Bureau

Additionally, MCEMA kept adjacent county emergency managers up to date concerning the completion of this LHMP. MCEMA recognizes that many of the hazards that could impact Madison County do not respect jurisdictional boundaries, and often affect multiple counties. Coordination is essential for effective response and long-term risk reduction, and through collaboration with neighboring counties, emergency managers can:

- Identify shared risks and develop regional strategies.
- Coordinate resources and response plans.
- Avoid duplication of efforts and ensure consistency across borders.
- Strengthen mutual aid agreements and communication channels.
- Build a more resilient region.

The following table details the Emergency Managers contacted during the planning process:

Table 5: Adjacent County Emergency Managers

County	Name	Title
Champaign	Bill Frey	Emergency Manager
Clark	Michelle Clements-Pitstick	Emergency Manager
Fayette	Melissa Havens	Emergency Manager
Franklin	Jeffrey Young	Emergency Manager
Greene	Ethan Raby	Emergency Manager
Pickaway	Tiffany Nash	Emergency Manager

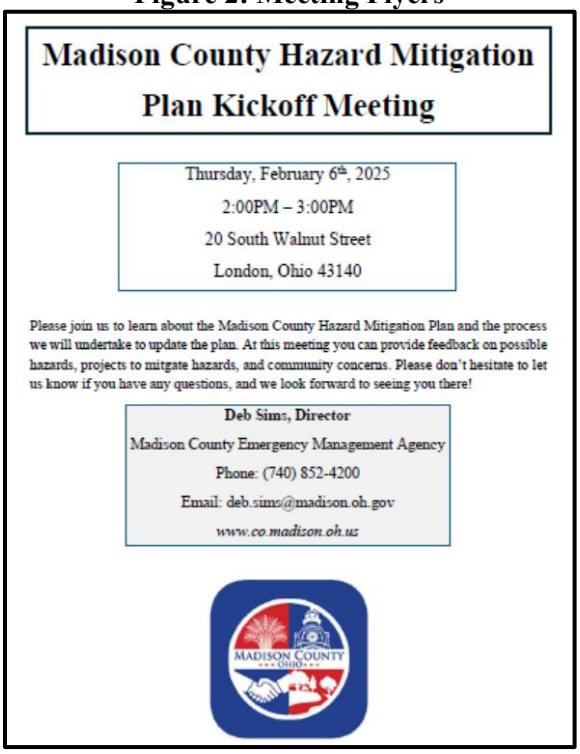
2.8 Community Outreach

All participating jurisdictions undertook a joint strategy to notify and include the public in the LHMP process. Members of the community (the public) were provided with numerous opportunities to contribute and comment on the creation and adoption of the plan. For participating jurisdictions, the public was defined as any person with an interest in the resilience and welfare of Madison County. These opportunities included:

- MCEMA webpage and Facebook updates concerning all hazard mitigation activities, survey links, and meeting information.
- Flyers to post to advertised meeting locations and details.
- Online and paper surveys.
- Comment period, along with an online survey, upon completion of draft plan .

All open public meetings were held at easily accessible community locations. As many participating jurisdictions and citizens have limited communications capabilities, meeting notices were placed in high visibility locations, and our MPC was asked to conduct a word-of-mouth campaign concerning the planning process to include as many participants as possible.

Figure 2: Meeting Flyers



Madison County Hazard Mitigation Plan Kickoff Meeting

Thursday, February 6th, 2025
2:00PM – 3:00PM
20 South Walnut Street
London, Ohio 43140

Please join us to learn about the Madison County Hazard Mitigation Plan and the process we will undertake to update the plan. At this meeting you can provide feedback on possible hazards, projects to mitgate hazards, and community concerns. Please don't hesitate to let us know if you have any questions, and we look forward to seeing you there!

Deb Sims, Director
Madison County Emergency Management Agency
Phone: (740) 852-4200
Email: deb.sims@madison.oh.gov
www.co.madison.oh.us

Along with public meetings, and to help generate community interest and participation, a parallel online outreach strategy was undertaken. Because Madison County encompasses many rural communities, an online strategy was enacted. This allowed remote and underserved communities to participate fully in the process without having to travel long distances. Information concerning the hazard mitigation planning process, along with links to public surveys, links to meeting presentations, and recorded copies of meetings were provided through the MCEMA website.

Figure 3: MCEMA Webpage Featuring Hazard Mitigation Updates

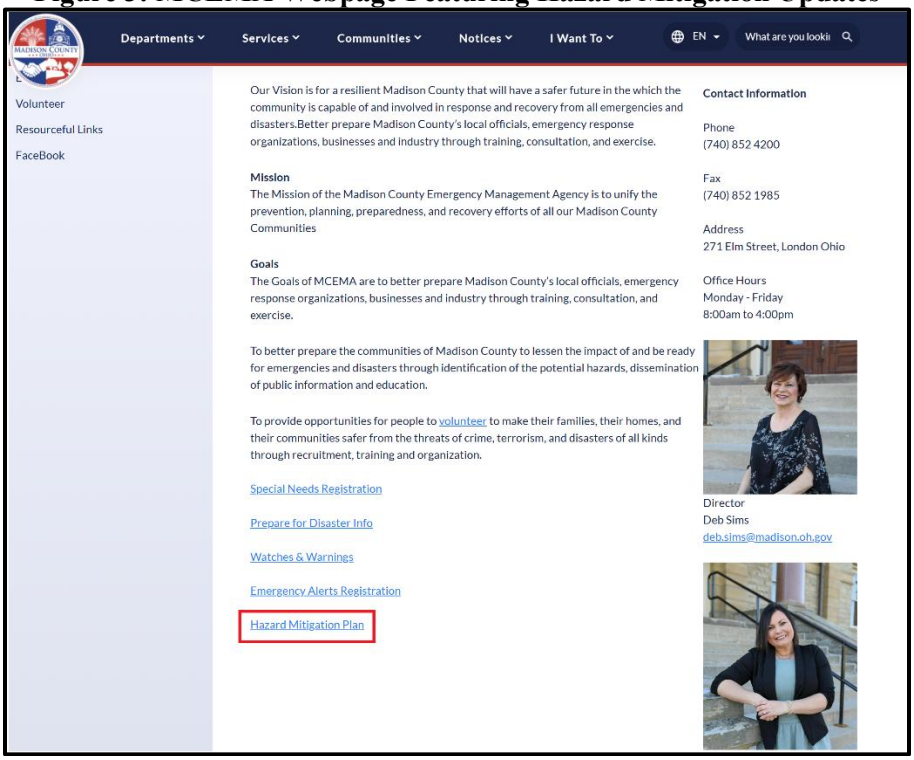
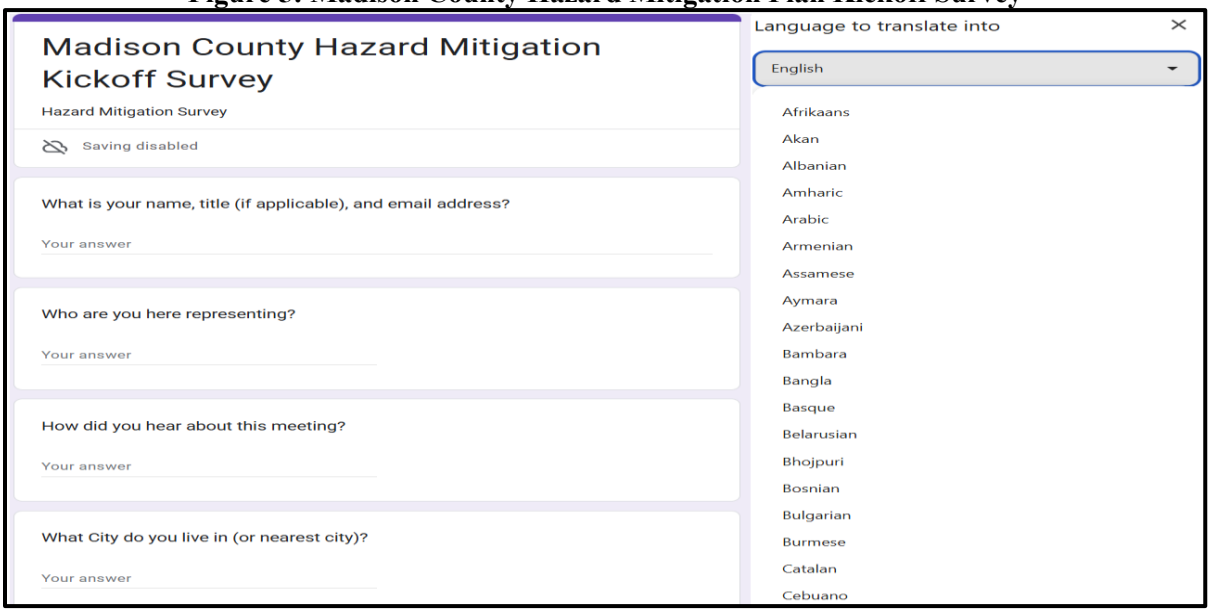


Figure 4: Madison County Emergency Management Facebook Page

Additionally, throughout the planning process numerous public surveys were released to allow community members to provide feedback and input on the LHMP update using a series of guided questions and open comment fields. The surveys used Google's auto translate feature to provide a host of languages to complete the forms.

Figure 5: Madison County Hazard Mitigation Plan Kickoff Survey



Input from the general public provided the MPC with a clearer understanding of local concerns, helped confirm identified hazards, helped shape proposed mitigation actions, and provided elected officials with a guide and tool to set local, regional, and ordinances and regulations. This public outreach effort was also an opportunity for adjacent jurisdictions and entities to be involved in the planning process. Additionally, as citizens were made more aware of potential hazards and the local process to mitigate against their impacts, it was believed that they would take a stronger role in making their homes, neighborhoods, schools, and businesses safer from the potential effects of natural hazards. Comments and feedback from the surveys are both incorporated in this LHMP and are included in Appendix B.

2.9 Planning Meetings

Public Comment: *I like that we are having open public meetings.*

Numerous in-person meetings were conducted for the 2025 LHMP update. All of the meetings were held in a publicly accessible location and advertised as open to the public. These meeting were conducted to discuss the mitigation planning process as well as gain public support and input for the plan update. The following is a brief synopsis of those meetings, and sign in sheets for meeting are presented in Appendix C:

- **LHMP Update Kick-Off and Public Information Meeting – February 6, 2025, March 10, 2025, and March 14, 2025:** Madison County hosted multiple in person kick-off meetings for the MPC, stakeholders, and the public. These meetings presented the general structure and timeline for the LHMP process, discussed jurisdictional participation requirements, presented data concerning changing demographics, reviewed and discussed identified hazards, and presented next steps. Attendees were invited to voice any concerns, ask questions, and provide input on the planning process. Additionally, MPC members were tasked with collecting champion contact information from participating jurisdictions, informed of their planning roles and responsibilities, and advised of future data collection requirements and participation requirements.
- **LHMP Capability Review, and Mitigation Strategy Review Meeting – May 12, 2025:** Madison County held an in person (with a virtual option) meeting for the MPC. Attendees reviewed and revised the hazards list and vulnerability assessment. MPC members also reviewed the mitigation strategy and previously identified and proposed mitigation actions to ensure they were in-line with the current planning environment.
- **LHMP Update Final Review Meeting – July 18, 2025:** Madison County hosted a public final plan review meeting for the MPC, stakeholders, and the public. At the meeting attendees were invited to voice any final concerns, ask questions, and provide input on the mitigation plan update. Additionally, members of the public were invited to review a draft copy of the LHMP update posted to jurisdictional and county websites for two weeks prior to the final meeting, and prior to its submission to FEMA Region VI.

In addition to these standalone LHMP meetings, LHMP presentations were delivered as part of the following meetings:

- Madison County Safety Council, organized by the Madison County Chamber of Commerce
- Chief's Association (fire, EMS, and law enforcement)
- Madison County Family and Children First
- Madison County Trustee Association

Some of our participating jurisdictions were unable to attend in-person meetings due to myriad reasons including staff size, staff duties, travel restrictions, or funding restrictions (including the Village of Mt. Sterling and South Solon, and Jefferson Local, Jonathan Alder Local, and Madison Plains Local school districts). When a jurisdiction could not attend a formal meeting, they were contacted via phone or email by MCEMA and provided with the meeting slides for review and discussion. Additionally, formal meetings were supplemented with informal discussions, check-in calls, and frequent email communications.

2.10 Planning Document Resources

The hazard mitigation plan is an overarching document that is both comprised of, and contributes to, various other jurisdictional plans. In creating this plan, all the planning documents identified below were consulted and reviewed, often extensively. In turn, when each of these other plans is updated, they will be measured against the contents of the hazard mitigation plan.

Below is a list of the various planning efforts, sole or jointly administered programs, and documents reviewed and included in this hazard mitigation plan. While each plan can stand alone, their review and functional understanding was pivotal in the development of this plan and further strengthens and improves a jurisdiction's resilience to disasters.

- **2019 Madison County Hazard Mitigation Plan:** The previous LHMP has been reviewed and is incorporated throughout this plan per FEMA requirements.
- **2024 State of Ohio State Hazard Mitigation Plan:** Completed by the Ohio EMA, this plan was utilized to provide the framework for hazard mitigation. This plan set a baseline for standards and practices for hazard mitigation planning and was used as a resource for information and data.
- **2022 Madison County Comprehensive Plan:** Provides long-term framework for future growth and development. All specific plans, subdivisions, public works projects, and zoning decisions must be consistent with the general plan. These plans provided background information on the county, information on risk and vulnerabilities, and a review of existing policies related to hazards and mitigation.

- **Participating Jurisdiction Comprehensive Plans:** Provides long-term framework for future growth and development. These plans provided background information on the jurisdictions, information on risk and vulnerabilities, and a review of existing policies related to hazards and mitigation.
- **2024 Madison County Economic Development Strategic Plan:** Created in collaboration with local governments, this plan was created to address future economic growth and development in the county.
- **2024 Madison County Emergency Operations Plans:** This plan is used to develop procedures for the protection of personnel, equipment, and critical records to help determine existing established policies that ensure the continuity of government and essential services during and after disasters.
- **Planning and Zoning Documents and Ordinances:** Tools used by local governments to regulate land use and development within their jurisdictions. These ordinances are essential for implementing a community's land development plan and ensuring orderly growth and development. These documents were reviewed, assessed, and cataloged to compile each participating jurisdiction's capabilities.

2.11 Technical Resources

A variety of technical resources during plan development. These technical resources were instrumental in completing an accurate vulnerability and risk assessment, and include:

- **FEMA Digital Flood Insurance Rate Maps**: FEMA's National Flood Hazard Layer data was instrumental in mapping floodplain locations and estimating potential flood impacts and loss estimates.
- **FEMA National Risk Index (NRI):** An online mapping application that identifies communities most at risk to natural hazards. The mapping service visualizes natural hazard risk metrics and includes data about expected annual losses from natural hazards, social vulnerability, and community resilience. The NRI's interactive web maps are at the county and Census tract level and made available via GIS services for custom analyses.
- **FEMA Resilience Analysis and Planning Tool (RAPT):** FEMA and Argonne National Laboratory created RAPT to support state, local, tribal, territorial analysis in identifying focus areas for building resilience, response, and recovery capabilities. RAPT is a geographic information system web map tool with clickable layers of community resilience indicators, infrastructure locations, and hazard data.
- **Homeland Infrastructure Foundation-Level Data:** A program managed by the DHS that provides authoritative geospatial data for users involved in emergency management and critical infrastructure protection. The primary goal is to support emergency preparedness missions by offering reliable geospatial information.
- **National Oceanic and Atmospheric Administration (NOAA)/National Centers for Environmental Information (NCEI):** Provided weather data and historical events occurrence data.
- **U.S. Army Corps of Engineers (USACE):** Provided dam and flood control data.
- **U.S. Department of Agriculture (USDA):** Provided drought and agricultural data.
- **U.S. Geological Survey:** Provided geologic hazard occurrence and probability data.
- **National Weather Service (NWS):** Provided meteorological and storm event occurrence and probability data.
- **U.S. Drought Monitor:** Provided drought occurrence and intensity data.
- **Ohio Department of Natural Resources:** Provided data about Madison County's geology and seismology.
- **FEMA Map Service Center:** The official public source for flood hazard information produced in support of the National Flood Insurance Program (NFIP).
- **United States Census Bureau:** Data concerning populations, socially vulnerable populations, and housing.
- **Ohio EMA:** LHMP planning guidance and technical support.

Section 3 – Regional Profile and Development Trends

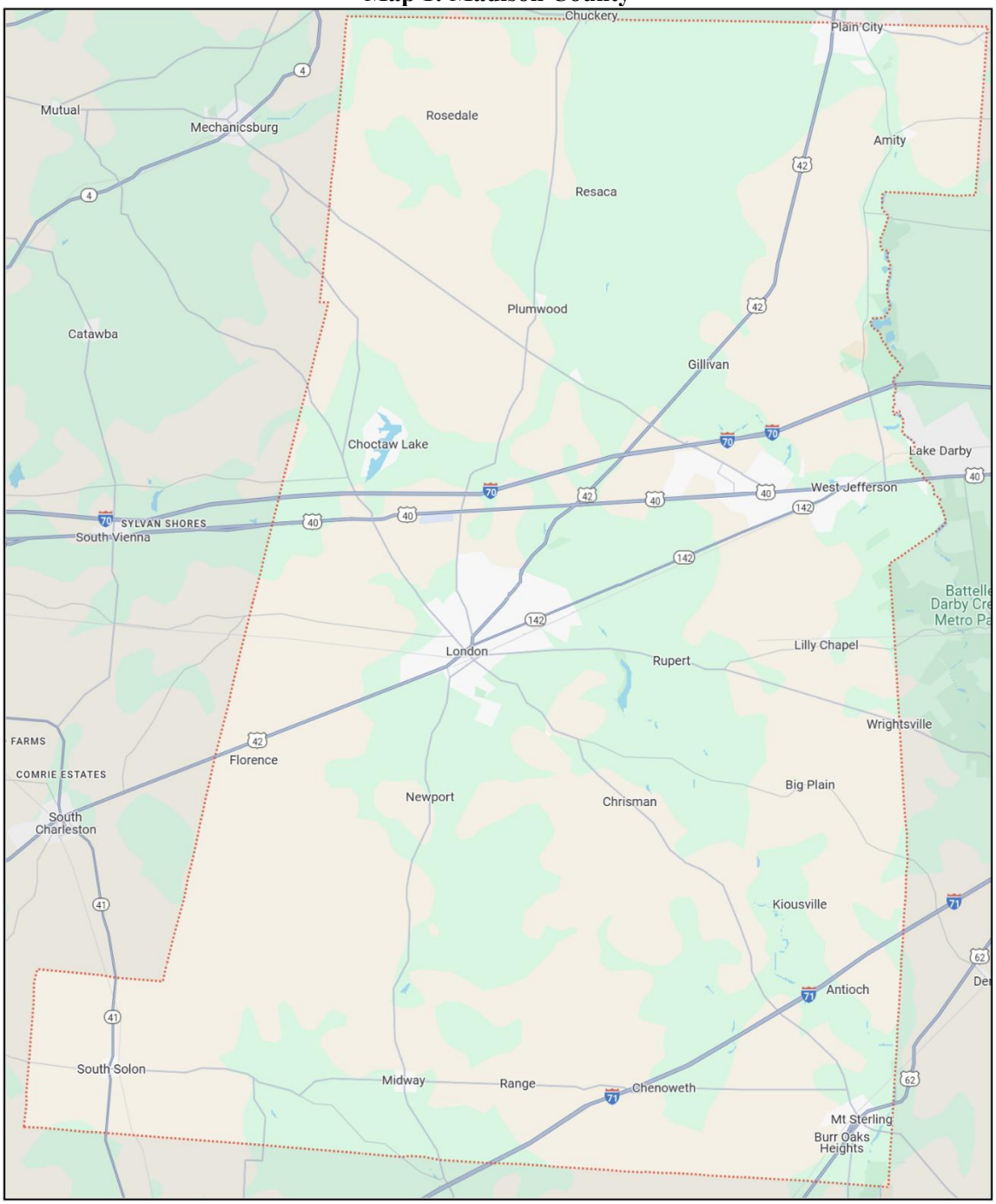
3.1 Introduction

Data concerning development trends and conditions is of great importance in determining regional and local risk and vulnerability to identified hazards, especially in locations which are susceptible to identified hazards. In general, any increase in population or development in hazard susceptible areas tends to increase both the risk and the vulnerability to that hazard. As such, the information presented in this chapter details relevant population and building statistics for Madison County. This data will then be used to determine and refine potential hazard vulnerability in succeeding sections.

3.2 Jurisdictional Maps

The following map details the locations of Madison County and participating jurisdictions:

Map 1: Madison County



3.3 Population Data

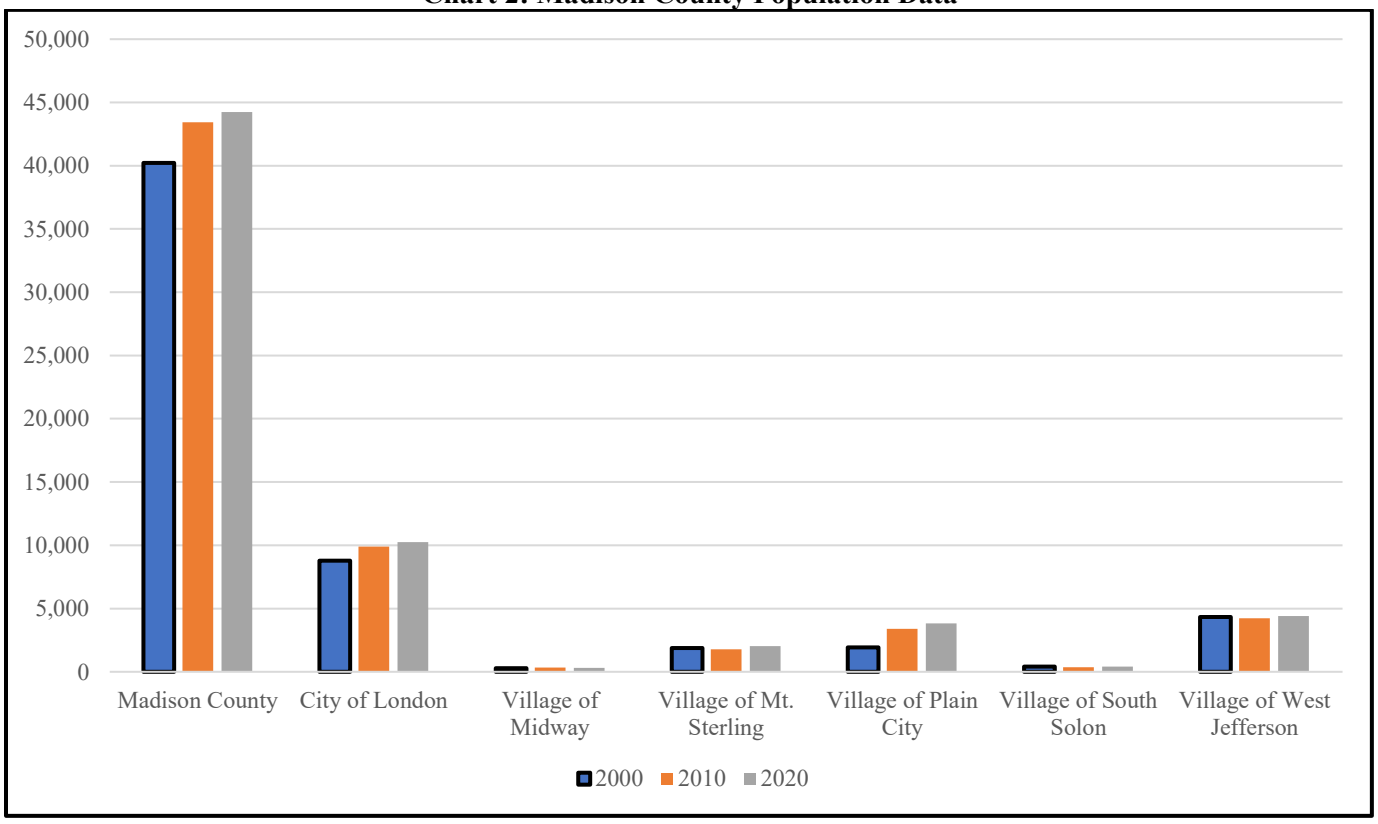
The following table, and associated charts, present population data for Madison County and participating jurisdictions:

Table 6: Madison County Population Data

Jurisdiction	Population			Percentage Population Change 2000-2020	Total Land Area (Sq. Mi.)	Population Density
	2000	2010	2020			
Madison County	40,213	43,435	44,248	10.0%	466.0	95
City of London	8,771	9,904	10,241	16.8%	8.4	1,219
Village of Midway	274	322	300	9.5%	0.3	1,154
Village of Mt. Sterling	1,865	1,782	2,023	8.5%	1.7	1,204
Village of Plain City	1,937	3,397	3,831	97.8%	2.4	1,596
Village of South Solon	405	355	418	3.2%	0.2	1,817
Village of West Jefferson	4,331	4,222	4,413	1.9%	4.9	906
Township of Canaan	2,453	2,567	2,638	7.5%	35.0	75
Township of Darby	2,801	829	4,495	60.5%	21.3	211
Township of Deer Creek	981	933	781	-20.4%	31.0	25
Township of Fairfield	1,371	1,437	1,538	12.2%	31.6	49
Township of Jefferson	6,935	2,918	7,401	6.7%	42.1	176
Township of Monroe	1,834	1,719	1,746	-4.8%	23.0	76
Township of Oak Run	530	528	534	0.8%	28.0	19
Township of Paint	546	556	865	58.4%	36.7	24
Township of Pike	645	580	463	-28.2%	26.0	18
Township of Pleasant	3,282	1,261	3,131	-4.6%	31.3	100
Township of Range	1,016	657	934	-8.1%	48.2	19
Township of Somerford	6,964	2,898	2,968	-57.4%	29.8	100
Township of Stokes	732	324	726	-0.8%	34.8	21
Township of Union	1,457	6,246	5,787	297.2%	39.0	148

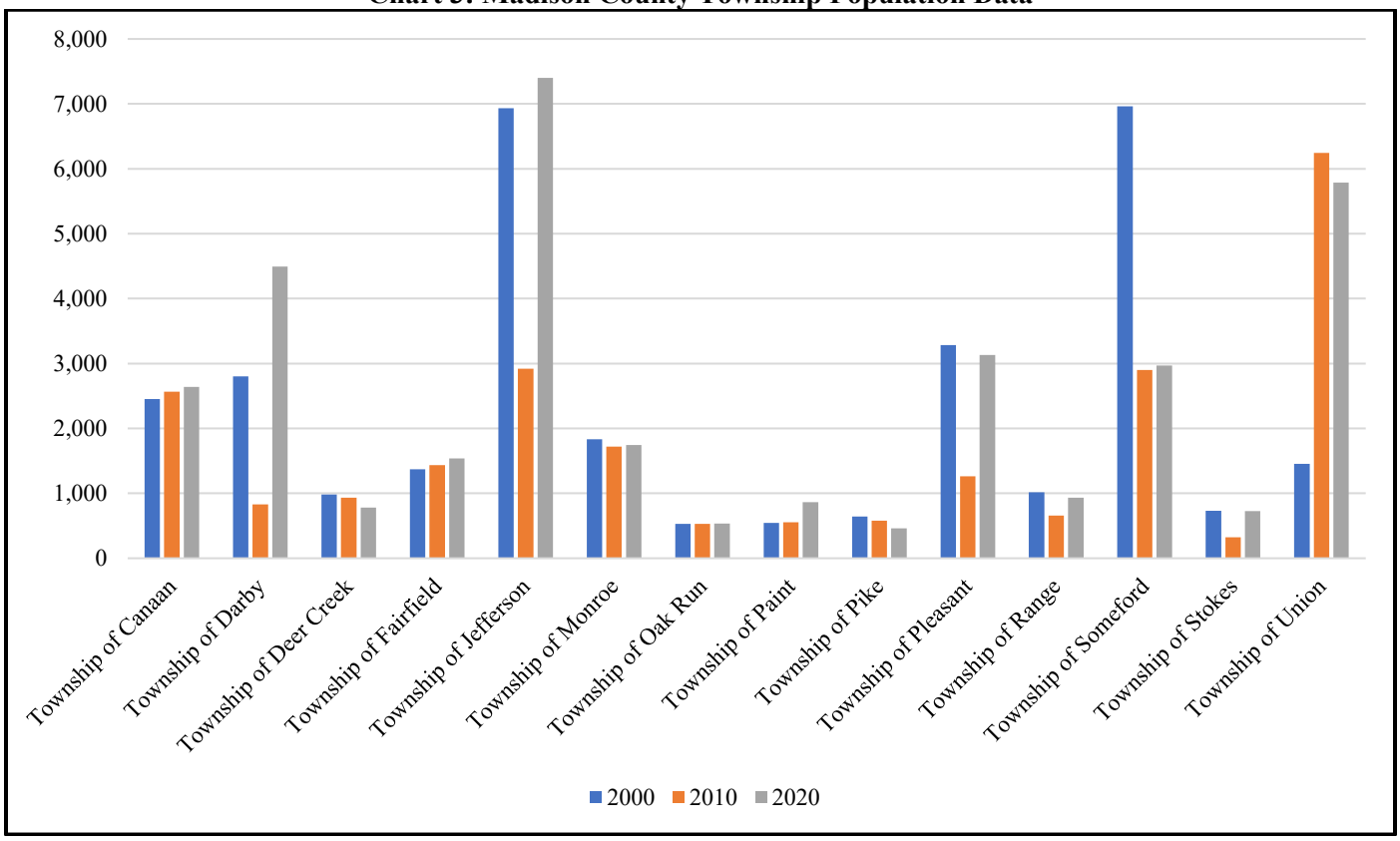
Source: US Census Bureau

Chart 2: Madison County Population Data



Source: US Census Bureau

Chart 3: Madison County Township Population Data



Source: US Census Bureau

3.4 Socially Vulnerable and At-Risk Populations

As a subset of the population data, Madison County has socially vulnerable and at-risk populations, populations that may have difficulty with medical issues, poverty, extremes in age, and communications due to language barriers. Several principles may be considered when discussing potentially at-risk populations, including:

- Not all people who are considered at risk are at risk
- Outward appearance does not necessarily mark a person as at risk
- The hazard event will, in many cases, affect at risk population in differing ways

The National Response Framework defines at risk populations as "populations whose members may have additional needs before, during, and after an incident in functional areas, including but not limited to: maintaining independence, communication, transportation, supervision, and medical care."

Public Comment: *I want to stress how important it is to consider the elderly in our community.*

Identifying socially vulnerable populations is a cornerstone of effective hazard mitigation planning because it helps ensure that all community members are protected. Socially vulnerable groups often face heightened challenges in preparing for, responding to, and recovering from disasters. By recognizing these populations, future mitigation efforts can design targeted interventions, such as accessible evacuation routes, culturally appropriate communication strategies, and prioritized resource distribution, to reduce risks and improve outcomes.

The following tables presents information on potential at risk populations within Madison County and participating jurisdictions using 2020 census data:

Table 7: Madison County Vulnerable Population Data

Jurisdiction	Population 5 and Under	Population 65+	Speaking Language Other Than English	Living Below Poverty Level	Disability, Under the Age of 65
Madison County	2,255	6,831	1,770	4,159	6,486
City of London	702	1,728	225	1,260	1,809
Village of Midway	16	47	16	53	48
Village of Mt. Sterling	141	263	61	384	430
Village of Plain City	330	771	134	345	699
Village of South Solon	9	41	37	38	43
Village of West Jefferson	244	873	132	265	596
Township of Canaan	98	273	372	179	316
Township of Darby	474	951	378	360	528
Township of Deer Creek	32	172	6	76	115
Township of Fairfield	40	239	9	55	187
Township of Jefferson	350	1,393	237	481	981
Township of Monroe	156	170	61	354	272
Township of Oak Run	8	89	0	0	126
Township of Paint	22	150	7	64	111
Township of Pike	11	46	0	19	47
Township of Pleasant	151	491	94	423	537
Township of Range	71	207	71	135	223
Township of Somerford	96	571	30	229	278
Township of Stokes	28	103	38	57	61
Township of Union	16	248	260	17	1,074

Source: US Census Bureau
-: No data

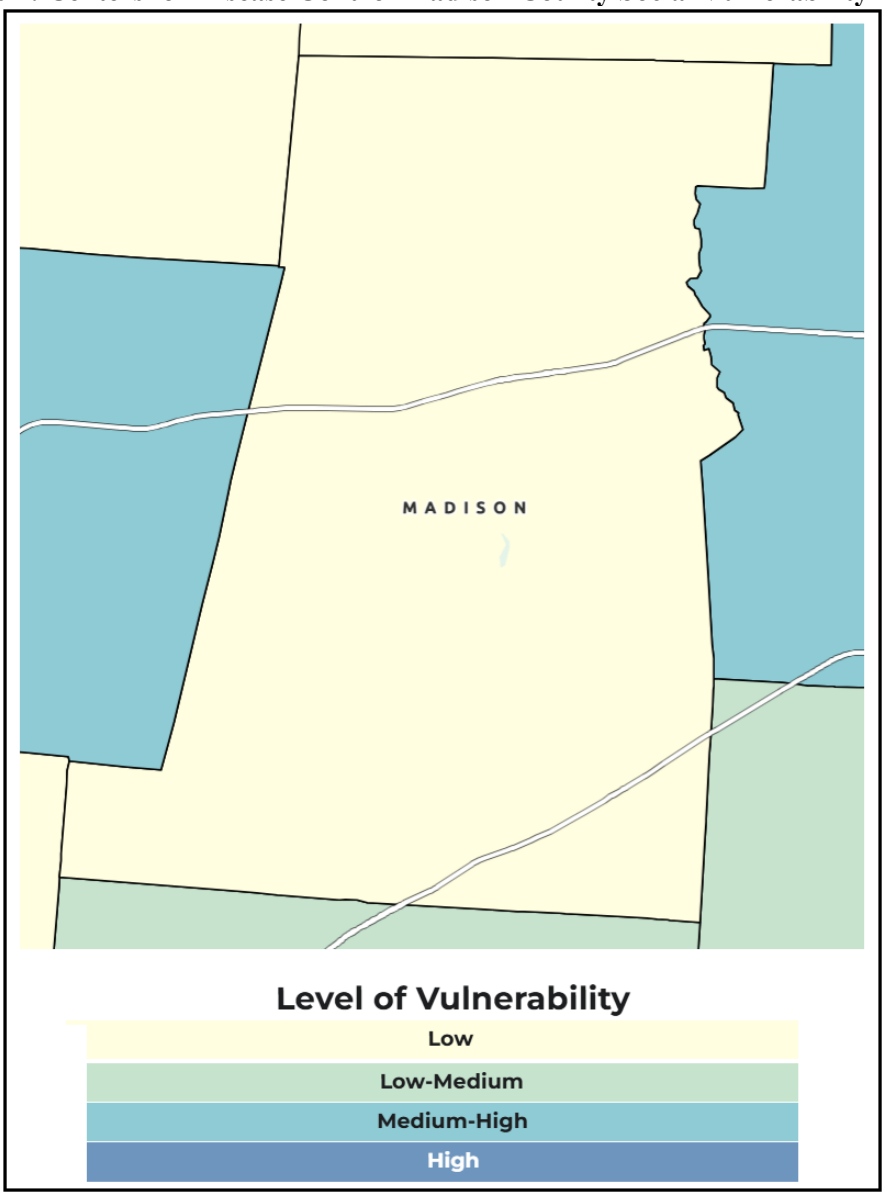
Table 8: Madison County Socially Vulnerable and At-Risk Populations as Percentage of Total Population

Jurisdiction	Percentage of Population Age Five and Under	Percentage of Population Age 65+	Percentage of Population Speaking Language Other Than English	Percentage of Population Living Below Poverty Level	Percentage of Persons with a Disability, Under the Age of 65
Madison County	19.6%	6.5%	25.0%	10.6%	6.8%
City of London	14.6%	5.9%	45.5%	8.1%	5.7%
Village of Midway	18.8%	6.4%	18.8%	5.6%	6.3%
Village of Mt. Sterling	14.3%	7.7%	33.2%	5.3%	4.7%
Village of Plain City	11.6%	5.0%	28.6%	11.1%	5.5%
Village of South Solon	46.4%	10.2%	11.3%	11.0%	9.7%
Village of West Jefferson	18.1%	5.1%	33.4%	16.7%	7.4%
Township of Canaan	26.9%	9.7%	7.1%	14.7%	8.3%
Township of Darby	9.5%	4.7%	11.9%	12.5%	8.5%
Township of Deer Creek	24.4%	4.5%	130.2%	10.3%	6.8%
Township of Fairfield	38.5%	6.4%	170.9%	28.0%	8.2%
Township of Jefferson	21.1%	5.3%	31.2%	15.4%	7.5%
Township of Monroe	11.2%	10.3%	28.6%	4.9%	6.4%
Township of Oak Run	66.8%	6.0%	0%	0%	4.2%
Township of Paint	39.3%	5.8%	123.6%	13.5%	7.8%
Township of Pike	42.1%	10.1%	0%	24.4%	9.9%
Township of Pleasant	20.7%	6.4%	33.3%	7.4%	5.8%
Township of Range	13.2%	4.5%	13.2%	6.9%	4.2%
Township of Somerford	30.9%	5.2%	98.9%	13.0%	10.7%
Township of Stokes	25.9%	7.0%	19.1%	12.7%	11.9%
Township of Union	361.7%	23.3%	22.3%	340.4%	5.4%

Source: US Census Bureau
-: Data unavailable

The Centers for Disease Control's Social Vulnerability Index Map shows the relative social vulnerability of communities based on factors such as socioeconomic status, household composition, disability, minority status, language, housing type, and transportation access. This map highlights areas where populations may have increased difficulty preparing for, responding to, and recovering from the impacts of hazard events. The following map helps identify vulnerable populations that may require additional resources and targeted support during mitigation planning and response efforts. By integrating this data, participating jurisdictions can prioritize investments, tailor outreach strategies, and ensure equitable distribution of resources to reduce disaster impacts on those most at risk.

Map 2: Centers for Disease Control Madison County Social Vulnerability Map



Source: CDC

A Community Disaster Resilience Zone is a designated area that has been identified as particularly vulnerable to natural disasters and other hazards. The goal of establishing such zones is to focus resources, planning efforts, and mitigation strategies on areas that need the most support to improve their resilience to disasters. These zones are typically selected based on factors such as the frequency and severity of past disasters, the level of community vulnerability, and the potential impact of future events. Communities designated as Community Disaster Resilience Zone can receive increased financial and technical assistance to plan and implement resilience projects. As of this plan, no communities within Madison County have received this designation.

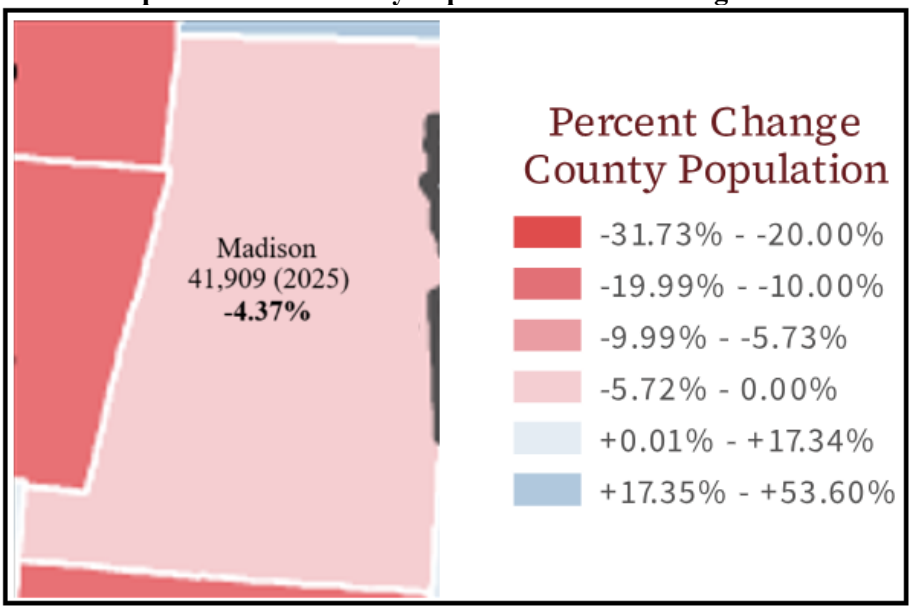
3.5 Regional Population Migration

Madison County is experiencing consistent population decline as people increasingly migrate from rural areas to urban centers. This transformation reflects broader demographic trends witnessed across the United States. Demographic research indicates that this migration is occurring due to the following factors:

- **Economic Opportunity:** A primary driver of the population movement from rural to urban areas is the quest for better economic prospects. Urban centers, such as Columbus, offer a diverse range of employment opportunities in sectors like manufacturing, healthcare, finance, and technology. These opportunities often come with higher wages and better access to educational and healthcare facilities compared to rural areas.
- **Access to Education and Training:** Urban centers are often home to educational institutions, including colleges, universities, and vocational schools. Young people from rural areas often migrate to these urban settings to pursue higher education and vocational training.

The rural-to-urban population movement has significant implications for Madison County. Communities may experience declining populations, school closures, and reduced economic activity. The following map, using data from the Ohio Department of Development, indicates a decreasing population (-4.37%)for Madison County through 2050:

Map 3: Madison County Population Trend through 2050



Source: Ohio Department of Development

3.6 Housing Data

Closely tracking population data, but tending to lag population changes, housing data is a good indicator of changing demographics and growth. The following table and associated charts, using data from the U.S. Census, present occupied housing unit information for Madison County.

Table 9: Madison County Housing Data

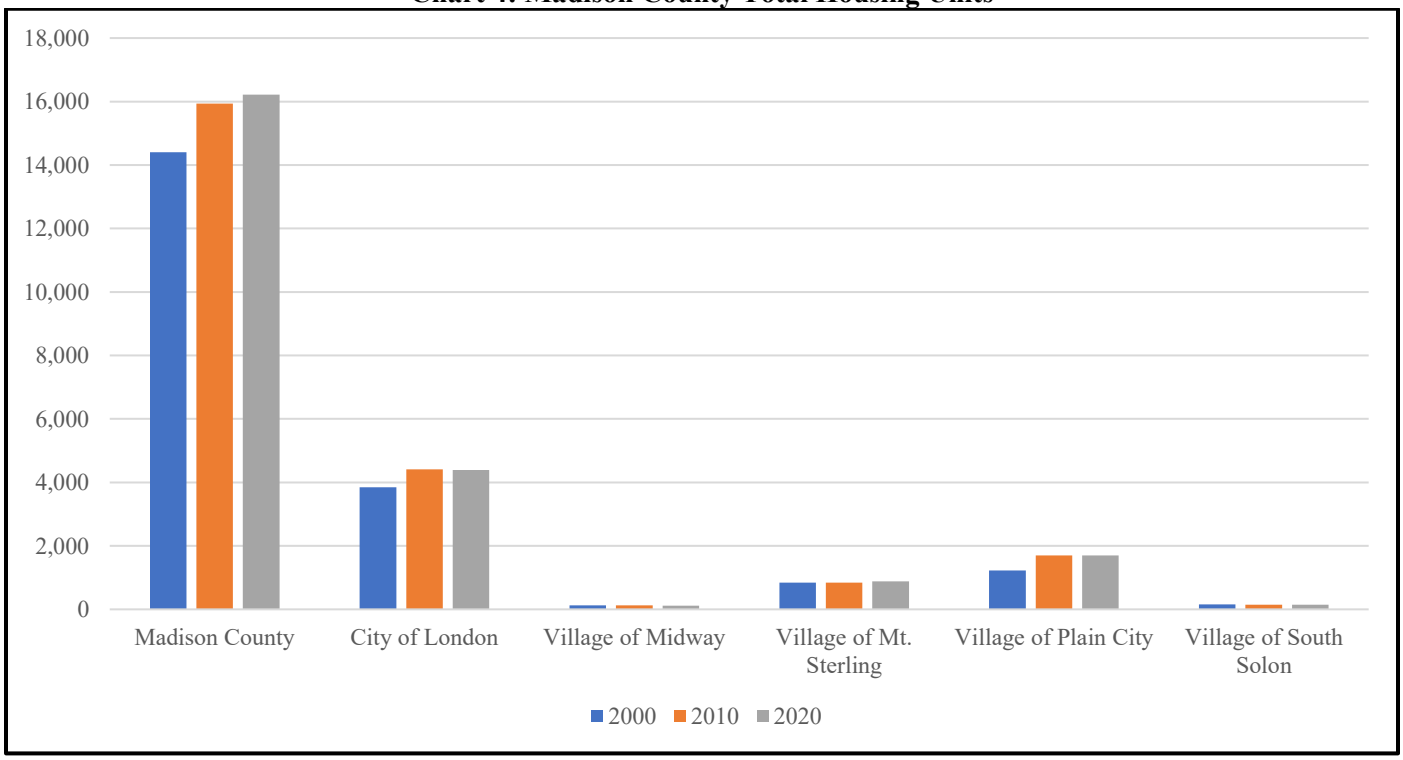
Jurisdiction	2000		2010		2020		2000 - 2020	
	Total	Occupied	Total	Occupied	Total	Occupied	Numeric Change	Percent Change
Madison County	14,399	13,672	15,939	14,734	16,216	15,234	1,817	12.6%
City of London	3,850	3,593	4,410	3,991	4,390	4,049	540	14.0%
Village of Midway	125	110	127	116	120	111	-5	-4.0%
Village of Mt. Sterling	838	780	841	738	884	829	46	5.5%
Village of Plain City	1,220	1,139	1,699	1,609	1,697	1,612	477	39.1%
Village of South Solon	158	145	145	123	145	134	-13	-8.2%
Village of West Jefferson	1,672	1,601	1,709	1,617	1,737	1,679	65	3.9%

Table 9: Madison County Housing Data

Jurisdiction	2000		2010		2020		2000 - 2020	
	Total	Occupied	Total	Occupied	Total	Occupied	Numeric Change	Percent Change
Township of Canaan	932	899	947	907	967	934	35	3.8%
Township of Darby	1,116	1,061	1,652	1,572	1,725	1,641	609	54.6%
Township of Deer Creek	402	381	410	370	410	373	8	2.0%
Township of Fairfield	521	477	560	527	564	537	43	8.3%
Township of Jefferson	2,720	2,616	2,885	2,737	2,982	2,867	262	9.6%
Township of Monroe	639	612	630	571	620	593	-19	-3.0%
Township of Oak Run	147	147	199	193	207	202	60	40.8%
Township of Paint	2,264	1,663	224	212	232	216	-2,032	-89.8%
Township of Pike	143	143	161	157	170	163	27	18.9%
Township of Pleasant	1,350	1,286	1,358	1,228	1,411	1,331	61	4.5%
Township of Range	399	370	405	370	397	361	-2	-0.5%
Township of Somerford	1,162	1,092	1,246	1,120	1,302	1,190	140	12.0%
Township of Stokes	293	276	284	249	277	255	-16	-5.5%
Township of Union	525	519	568	530	562	522	37	7.0%

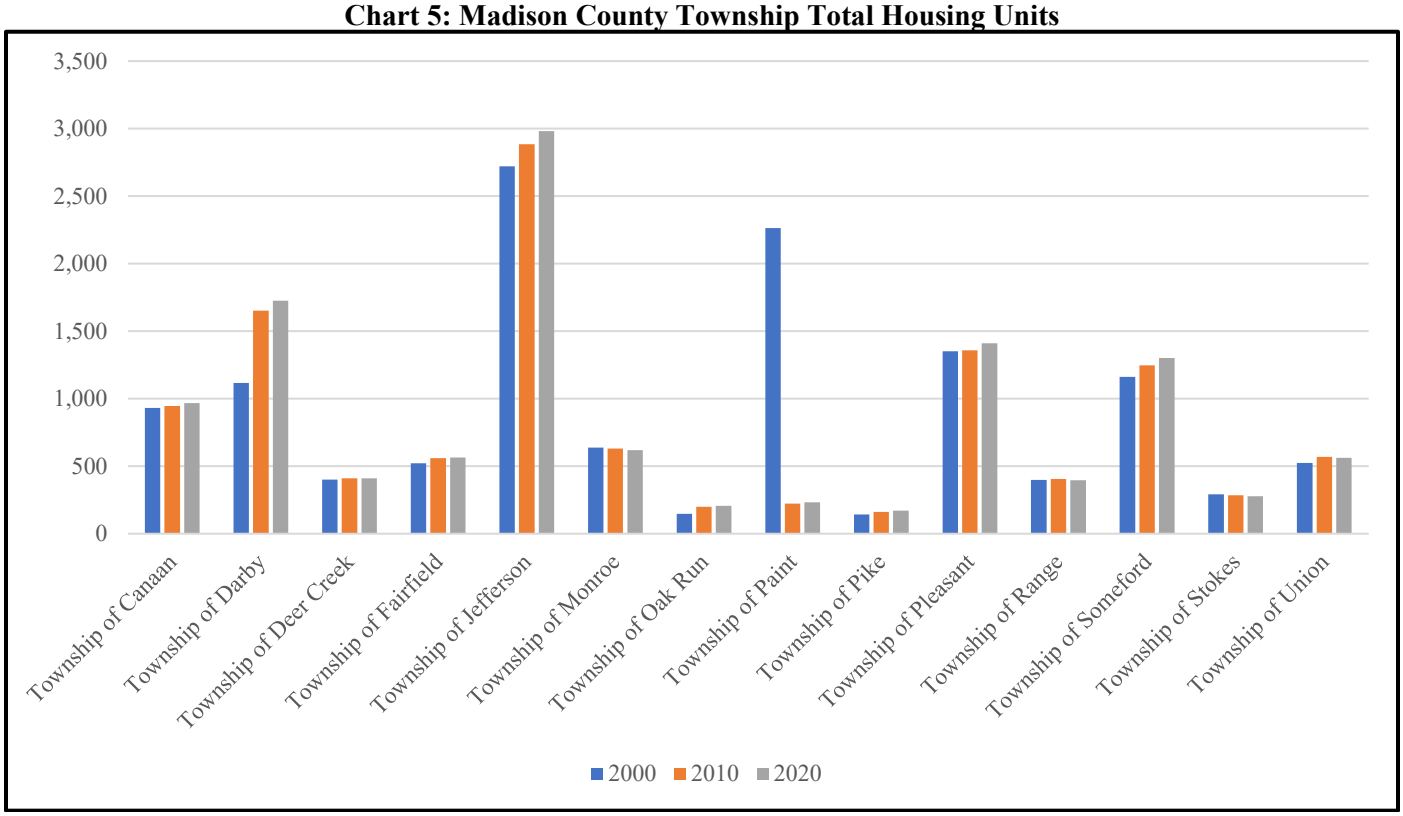
Source: US Census Bureau
-: No data

Chart 4: Madison County Total Housing Units



Source: US Census Bureau

Chart 5: Madison County Township Total Housing Units



Source: US Census Bureau

Of particular concern when considering housing data is mobile home residences. Data from the NOAA National Severe Storms Laboratory reports that people living in mobile homes are especially at risk for injury and death as even anchored mobile homes can be seriously damaged when winds gust over 80 miles per hour. Additionally, study data from Michigan State University reported that the two biggest factors related to wind event fatalities were housing quality (measured by mobile homes as a proportion of housing units) and income level. When a tornadic wind strikes, a county with double the number of mobile homes as a proportion of all homes will experience 62% more fatalities than a county with fewer mobile homes, according to the study data. The following indicates the percentage of mobile homes for each Madison County participating jurisdiction:

Table 10: Madison County Mobile Home Data

Jurisdiction	2000		2010		2020		2000 - 2020
	Total	Percentage of Total Housing Units	Total	Percentage of Total Housing Units	Total	Percentage of Total Housing Units	Numeric Change
Madison County	1,163	8.1%	1,047	6.6%	721	4.4%	-442
City of London	15	0.4%	51	1.2%	0	0.0%	-15
Village of Midway	3	2.4%	7	5.5%	1	0.8%	-2
Village of Mt. Sterling	21	2.5%	5	0.6%	7	0.8%	-14
Village of Plain City	52	4.3%	15	0.9%	12	0.7%	-40
Village of South Solon	9	5.7%	9	6.2%	7	4.8%	-2
Village of West Jefferson	48	2.9%	0	0.0%	27	1.6%	-21
Township of Canaan	407	43.7%	341	36.0%	201	20.8%	-206
Township of Darby	45	4.0%	7	0.4%	14	0.8%	-31
Township of Deer Creek	36	9.0%	156	38.0%	44	10.7%	8
Township of Fairfield	0	0.0%	0	0.0%	0	0.0%	0
Township of Jefferson	223	8.2%	233	8.1%	175	5.9%	-48
Township of Monroe	333	52.1%	145	23.0%	230	37.1%	-103
Township of Oak Run	0	0.0%	0	0.0%	0	0.0%	0

Table 10: Madison County Mobile Home Data

Jurisdiction	2000		2010		2020		2000 - 2020
	Total	Percentage of Total Housing Units	Total	Percentage of Total Housing Units	Total	Percentage of Total Housing Units	Numeric Change
Township of Paint	705	31.1%	0	0.0%	0	0.0%	-705
Township of Pike	0	0.0%	0	0.0%	4	2.4%	4
Township of Pleasant	1,286	95.3%	74	5.4%	34	2.4%	-1,252
Township of Range	9	2.3%	7	1.7%	1	0.3%	-8
Township of Somerford	10	0.9%	0	0.0%	0	0.0%	-10
Township of Stokes	9	3.1%	11	3.9%	7	2.5%	-2
Township of Union	17	3.2%	21	3.7%	6	1.1%	-11

Source: US Census Bureau
-: No data

3.7 Valuation Data

The Madison County Auditor's Office was contacted to determine if a valuation of properties was available for participating jurisdictions. It was determined that, due to the reporting format of available data, determining valuations for each jurisdiction was not feasible. As such, data on building valuation for participating jurisdictions was sourced from the FEMA NRI by both county and Census tract, presented in the following table:

Table 12: Participating Jurisdiction Building Valuation

Jurisdiction	Census Tract	Building Valuation
Madison County	All	$8,575,780,568
-	39097040101	$360,428,450
Village of Plain City	39097040102	$959,651,490
-	39097040201	$614,467,717
Village of West Jefferson	39097040202	$396,618,083
Village of West Jefferson, City of London	39097040400	$1,620,441,850
Village of West Jefferson	39097040500	$905,703,289
City of London	39097040600	$1,265,523,359
City of London	39097040700	$495,763,245
-	39097041000	$206,622,535
-	39097041100	$745,916,700
Village of Mt. Sterling	39097041200	$633,891,214
Village of Midway and South Solon	39097041300	$370,752,636

Source: FEMA NRI

3.8 School District Data

Children are among the most vulnerable populations during disasters, requiring special consideration in preparedness and response efforts. A community with high school enrollment typically has a significant portion of its population dependent on schools for safety, education, and emergency support during crises. Additionally, disruptions to education during disasters can have long-term impacts on children's well-being and development. Communities with higher school enrollment may face increased challenges in ensuring the safety and continuity of education during hazard events, making it essential to prioritize schools in mitigation planning and resource allocation.

The following table presents school enrollment information from the Ohio Public Education Department for school years 2020 and 2025:

Table 13: Madison County School Enrollment Information

School Name	2020 Enrollment	2025 Enrollment	Change, 2020-2025
Jonathan Alder Local	2,197	2,337	-140
Jefferson Local	1,188	974	214
London City	2,031	2,114	-83
Madison-Plains Local	1,184	1,087	97

Source: State of Ohio

Chart 6: Madison County School Enrollment Trends

Source: State of Ohio

3.9 Critical Facilities and Infrastructure

Critical facilities have a net positive value on the community as they contribute to the public good by facilitating the basic functions of society. These locations help maintain order, public health, education, and help the economy function. Additionally, components are integral to disaster response and recovery operations. The following is a list of considered critical facilities:

- Fire facilities
- Law enforcement facilities
- Medical facilities
- Educational facilities

Critical infrastructure refers to the essential systems, assets, and services that are vital for the functioning of society and the economy. These infrastructures are necessary for public safety, economic stability, and quality of life. If disrupted or destroyed, the impacts could be severe, affecting the community's ability to function. The following is a list of considered critical infrastructure:

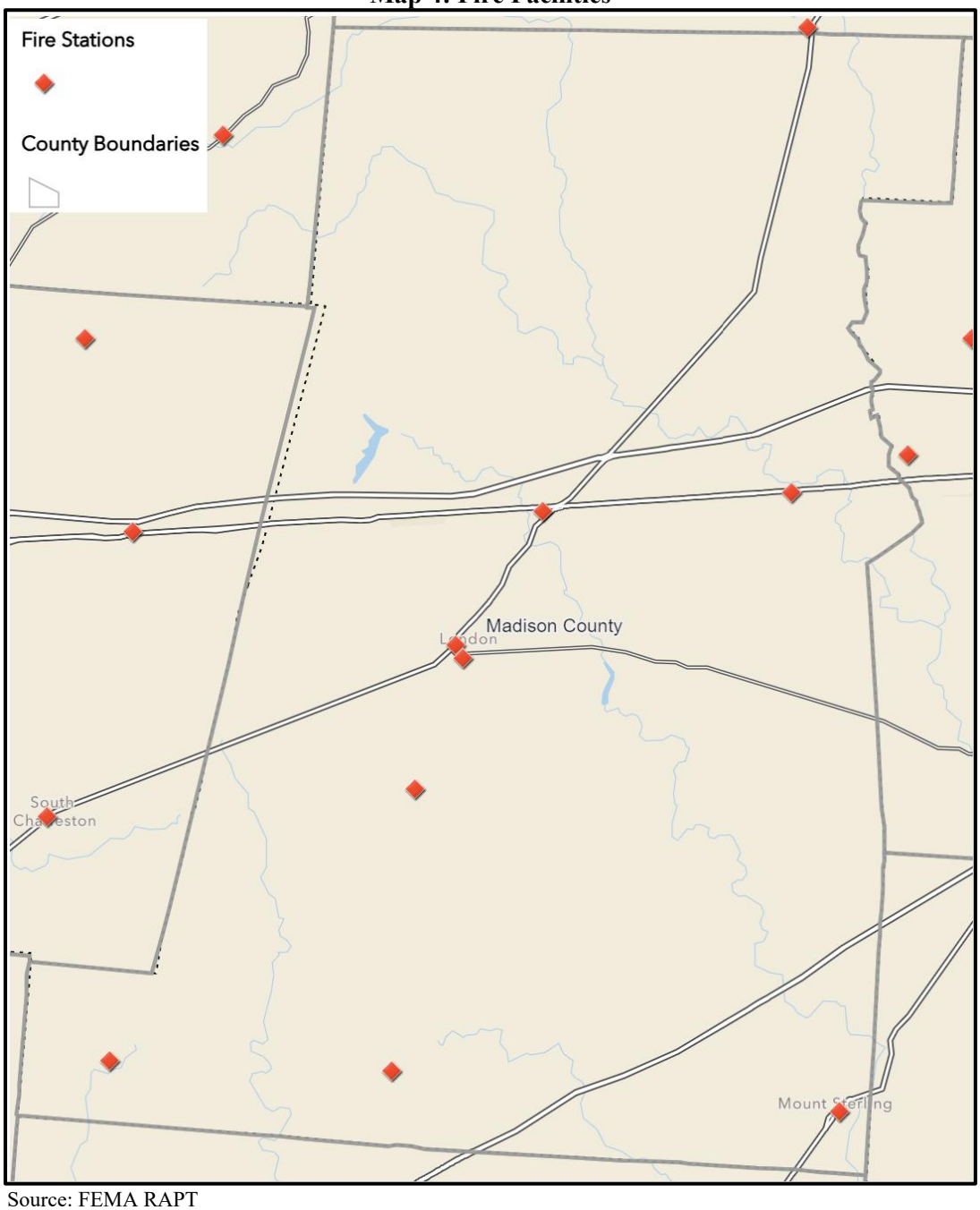
- Transportation Infrastructure
- Communications
- Energy generation and regulation
- Water and Wastewater treatment

The following tables and maps break down community critical facilities and infrastructure using available data:

Table 14: Madison County Fire Departments

Station	Department	City
251	Jefferson Township Fire Department	West Jefferson
261	Pleasant Valley Fire Department	Plain City
281	Madison County EMS	London
291, 292, 293	Central Township Fire Department	Lafayette
341	Range Township Fire Department	Sedalia
351	Stokes Township Fire Department	South Solon
360, 361	London Fire Department	London
371	Sterling Joint Fire Department	Mt. Sterling
491	Sterling Joint Ambulance District	Mt. Sterling
490	Tri-County Joint Fire District	Mt. Sterling

Map 4: Fire Facilities

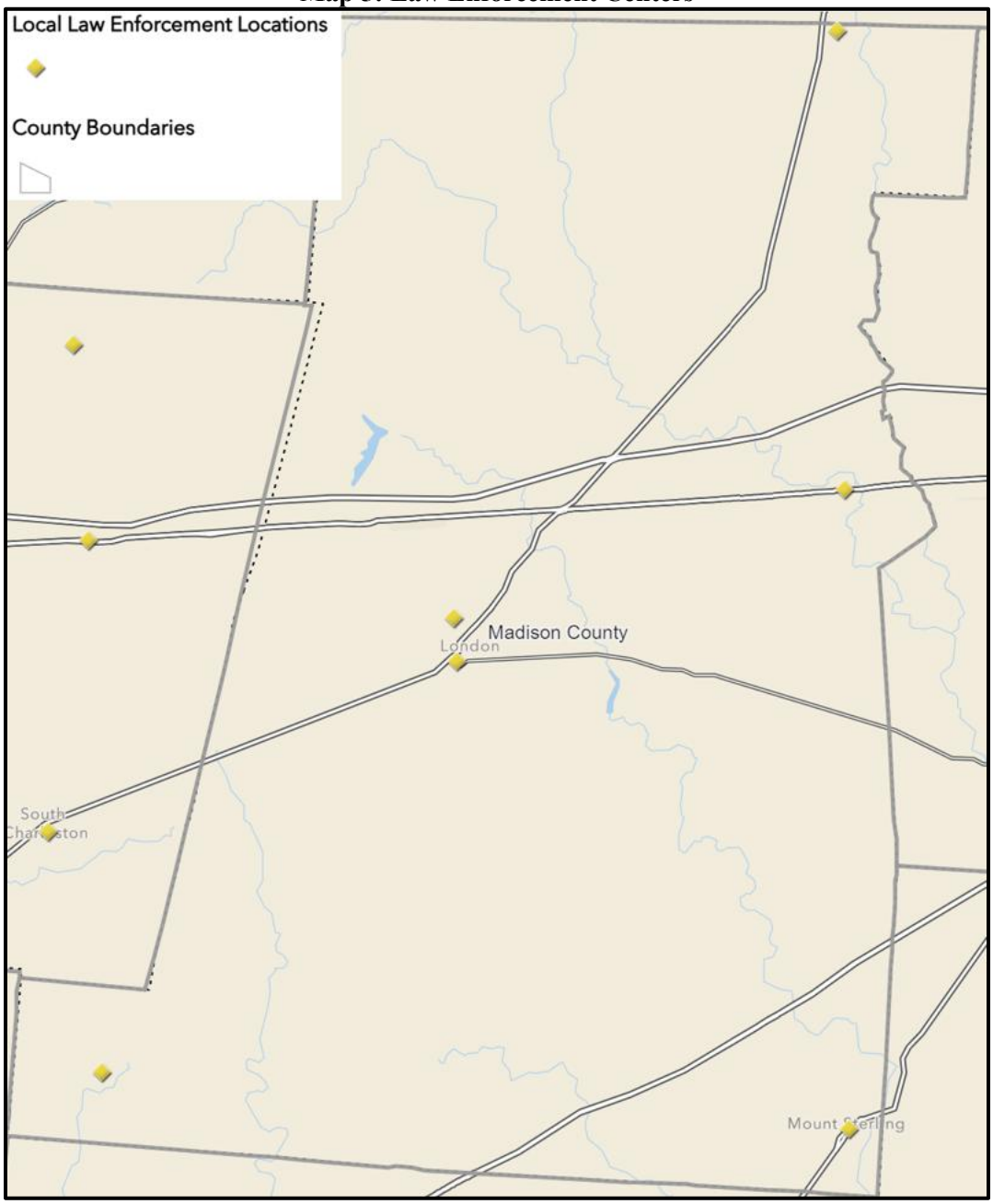


Source: FEMA RAPT

Table 15: Madison County Law Enforcement Departments

Department	City
Madison County Sheriff's Office	London
London Police Department	London
Mt. Sterling - Madison County Sheriff's Office	Mt. Sterling
Plain City Police Department	Plain City
South Solon - Madison County Sheriff's Office	South Solon
West Jefferson Police Department	West Jefferson
West Jefferson - Ohio State Patrol Office	West Jefferson

Map 5: Law Enforcement Centers

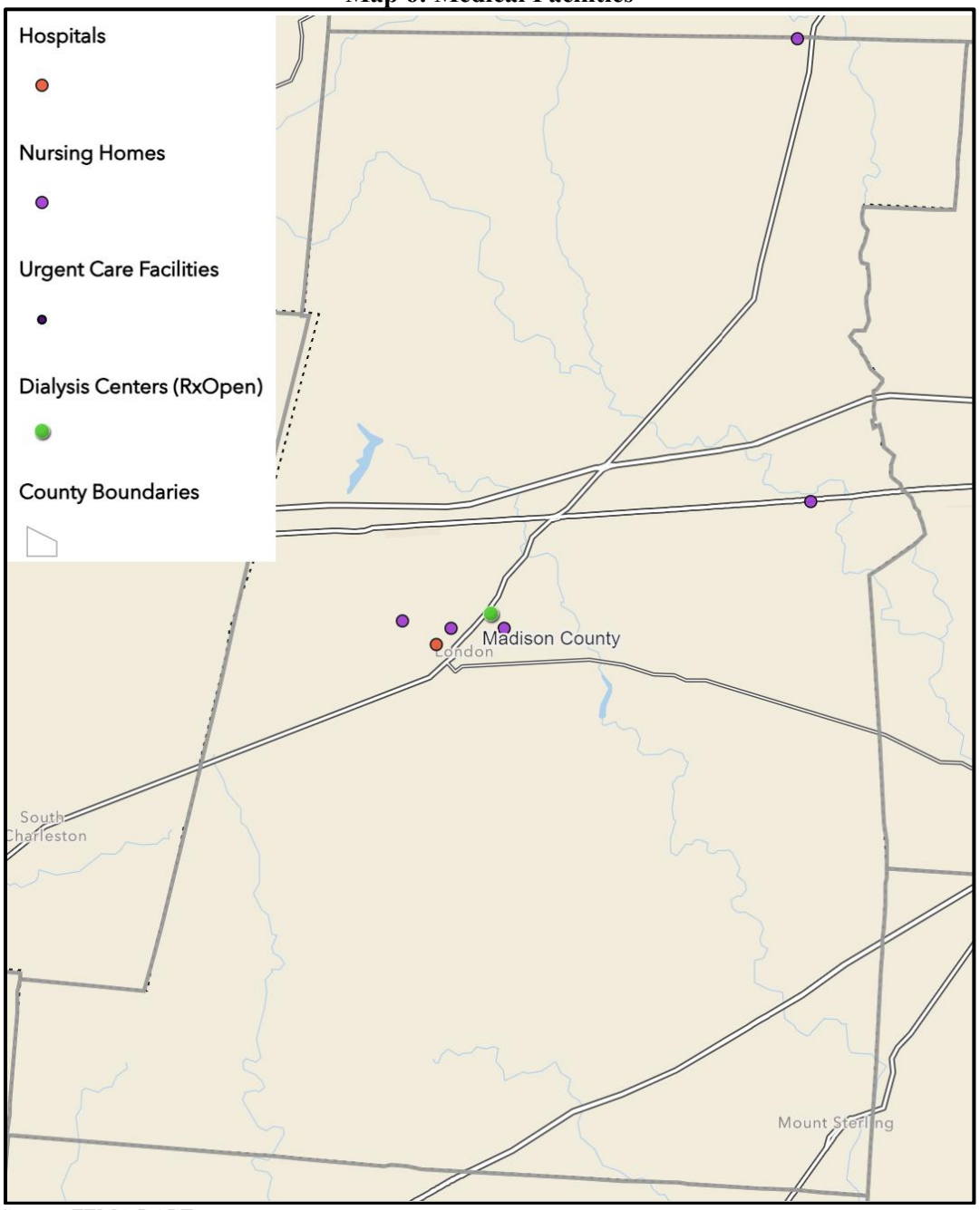


Source: FEMA RAPT

Table 16: Madison County Medical Facilities

Medical Facility	Type	City
Madison Health	Hospital	London
Fresenius Kidney Care	Dialysis Center	London
Sisters Senior Living	Nursing Home	London
Universal Home and Health Hospice	Nursing Home	London
Edgewater Place	Nursing Home	Plain City
Arbors West	Nursing Home	West Jefferson

Map 6: Medical Facilities

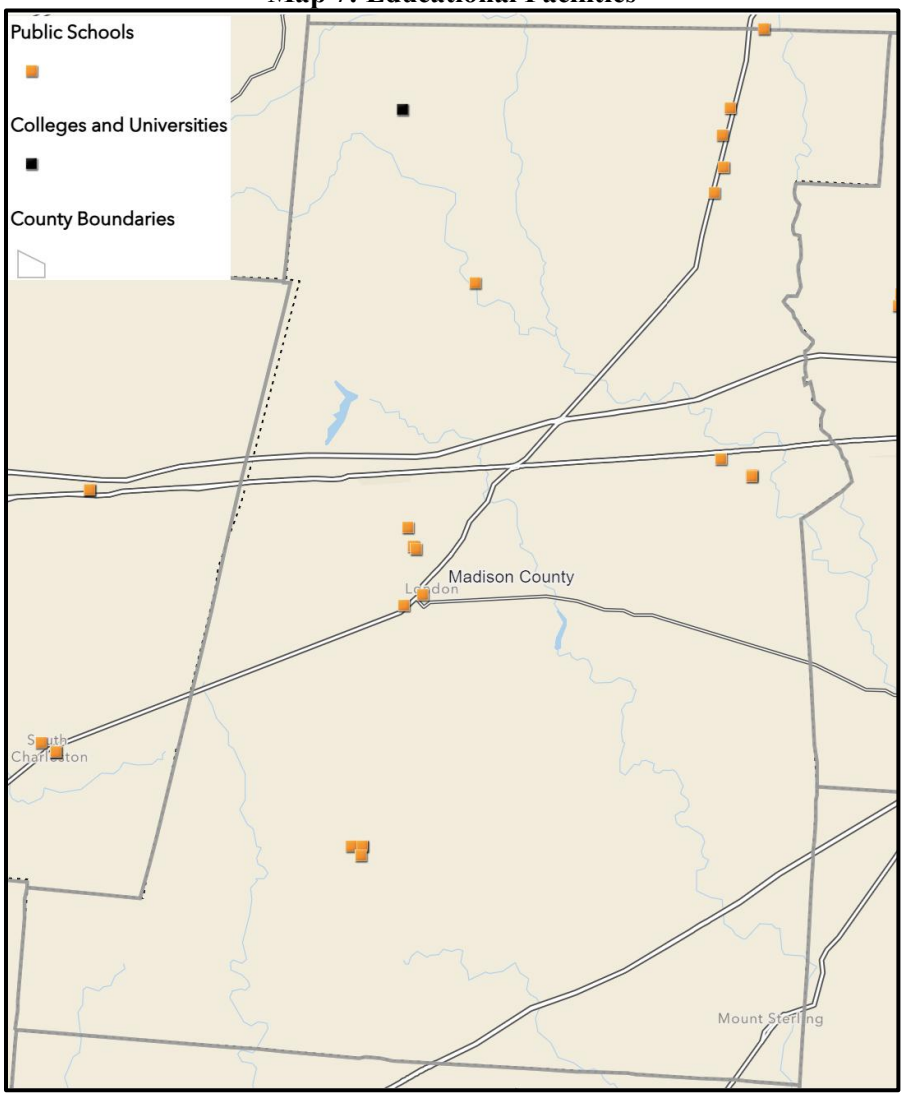


Source: FEMA RAPT

Table 17: Madison County Schools

School	Type	City
Buckeye Community School	Alternative	London
London High School	High School	London
London Middle School	Middle School	London
London Elementary	Elementary School	London
Madison-Plains Elementary	Elementary School	London
Madison-Plains Intermediate	Middle School	London
Madison-Plains Junior High School	Junior High School	London
Madison-Plains High School	High School	London
Jonathan Alder High School	High School	Plain City
Jonathan Alder Junior High School	Junior High School	Plain City
Canaan Middle School	Middle School	Plain City
Monroe Elementary School	Elementary School	Plain City
Plain City Elementary School	Elementary School	Plain City
Tolles Technical School	Vocational	Plain City
West Jefferson High School	High School	West Jefferson
West Jefferson Middle School	Middle School	West Jefferson
Norwood Elementary	Elementary School	West Jefferson

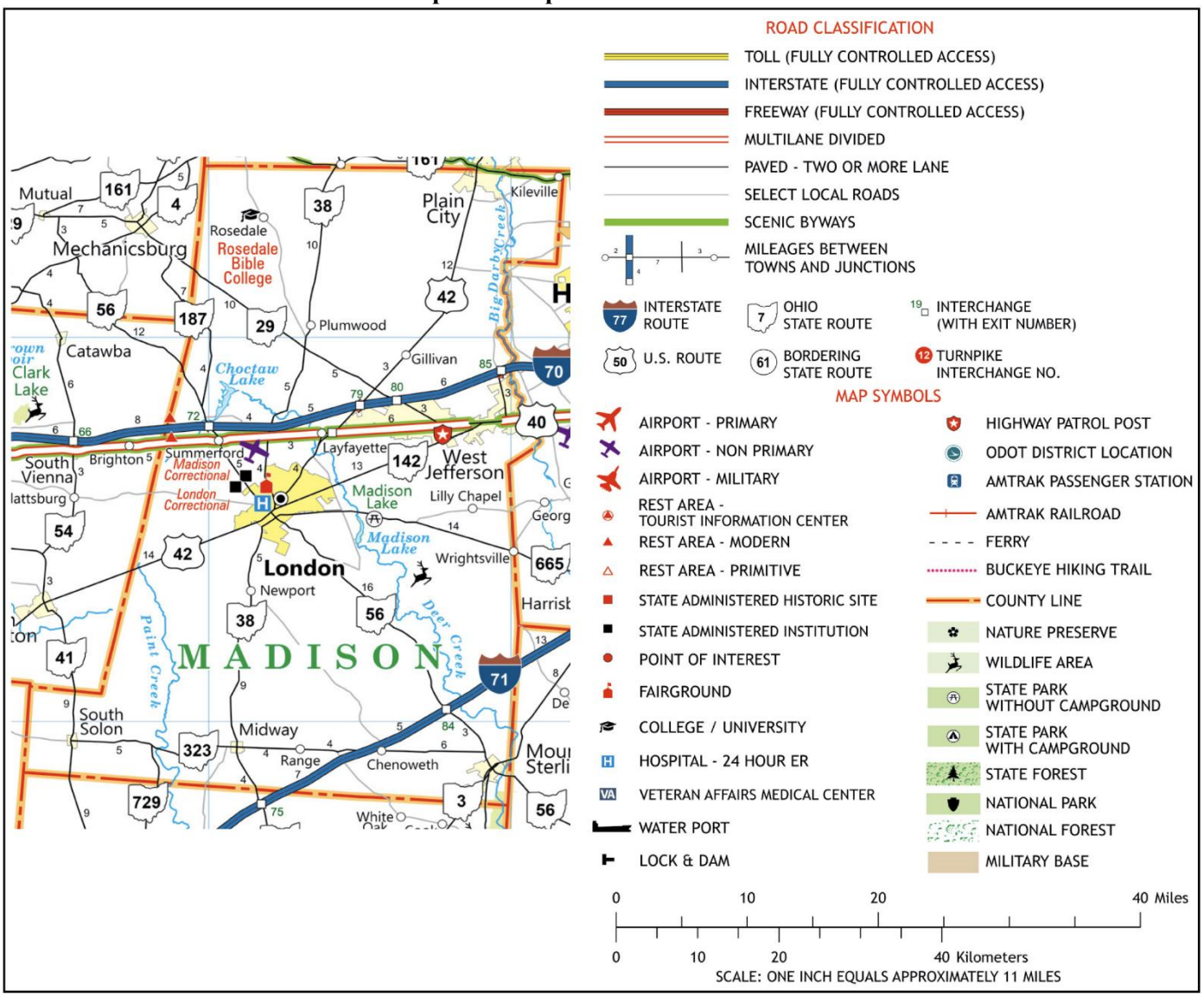
Map 7: Educational Facilities



Source: FEMA RAPT

Transportation infrastructure is essential in supporting emergency response, evacuation, and the delivery of critical supplies during disasters. Well-maintained roads, bridges, and transit systems enable first responders to access affected areas quickly and help residents evacuate safely. Identifying and reinforcing vulnerable transportation routes reduces the risk of isolation, delays, and infrastructure failure during events like floods, storms, or earthquakes. The following map details major transportation infrastructure within Madison County:

Map 8: Transportation Infrastructure



Source: Ohio Department of Transportation

Communication tower infrastructure ensures reliable, real-time communication before, during, and after emergencies. These towers support cellular networks, emergency alerts, public warning systems, and coordination among first responders. In disaster situations such as severe storms, floods, or power outages, communication towers enable critical information to reach residents, emergency services, and government agencies quickly and efficiently. Incorporating the protection, backup power, and strategic placement of communication towers into hazard mitigation plans helps reduce response times, improve situational awareness, and enhance overall community resilience during crises. The following map details the location of communications tower, including commercial cellular towers, within Madison County:

Map 9: Communications Tower Infrastructure

Source: Federal Communications Commission and Tower Maps

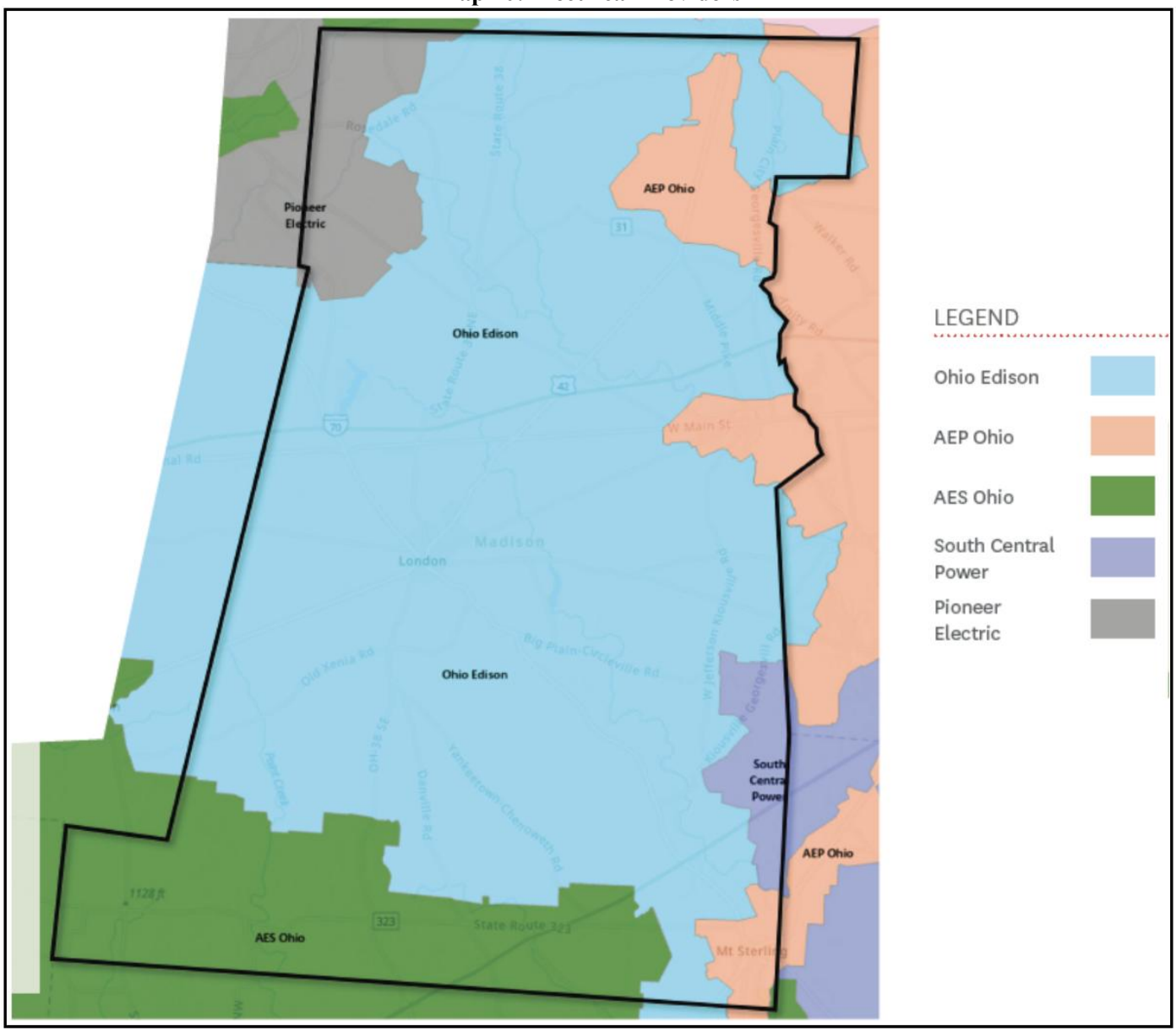
In Madison County, electricity services are provided by private utility companies rather than a county-operated department. The primary electric utilities serving the area include:

- American Electric Power (AEP) Ohio
- AES Ohio
- Ohio Edison
- Pioneer Electric
- South Central Power

These companies are responsible for electricity generation, transmission, and distribution to residents and businesses throughout the county. Additionally, Madison County has implemented an Electric Aggregation Program for residents

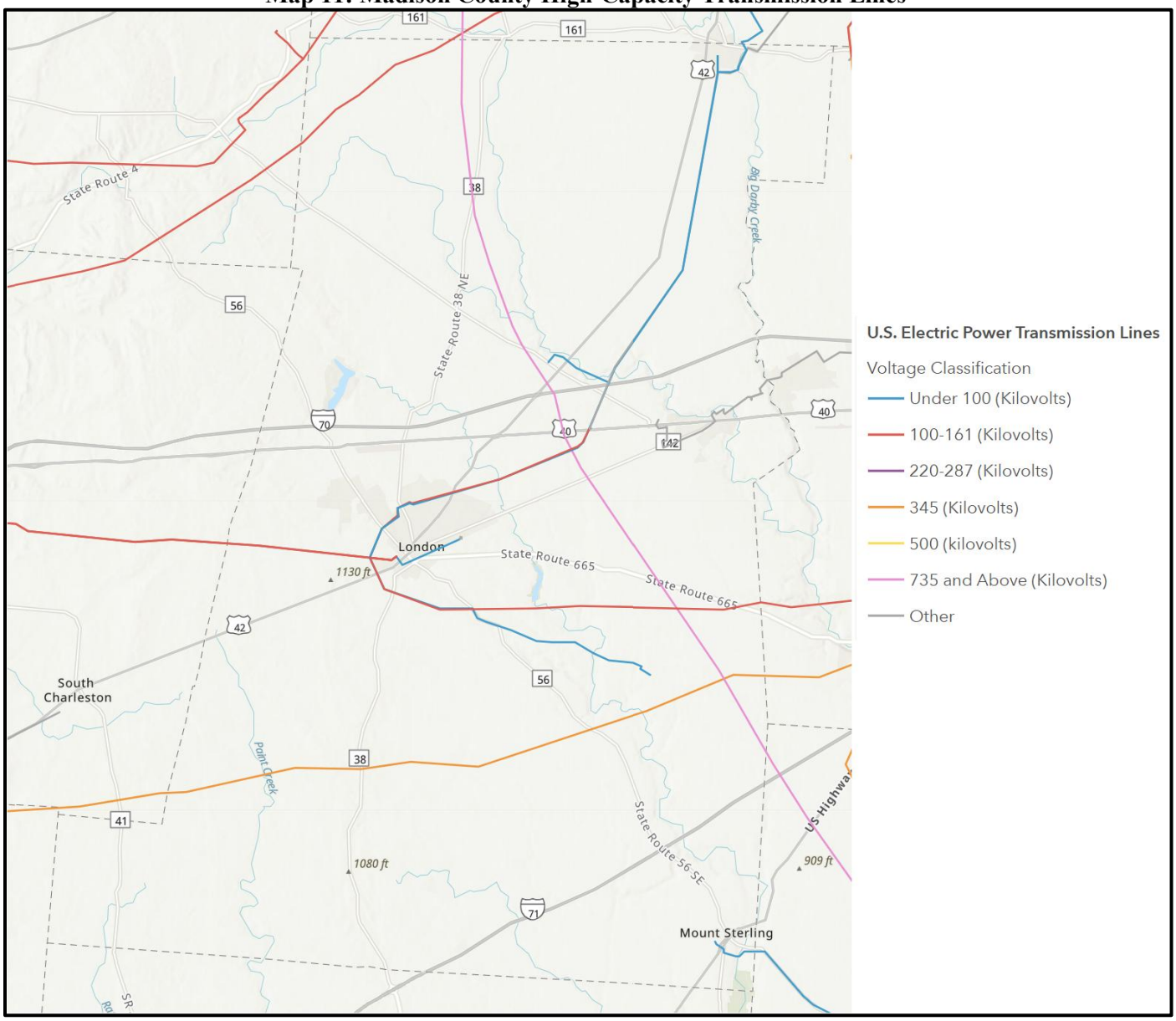
and small businesses in unincorporated areas. This program allows the county to negotiate electricity supply rates on behalf of its constituents, aiming to secure more favorable pricing.

Map 10: Electrical Providers



Source: Madison County Comprehensive Plan

Map 11: Madison County High-Capacity Transmission Lines



Source: FEMA RAPT

The Mid-Ohio Water and Sewer District is responsible for overseeing water and wastewater services in various areas of the county, and includes the following treatment systems.

- **Sewer District 1:** The Madison County Sanitary Sewer and Water District provides sanitary sewer service for the businesses located along US 42 near the I70 intersection. The sanitary sewer system includes a gravity flow collection system, a lift station to pump waste from the northern areas along US 42 under I70 and a wastewater treatment facility. The system operates under US EPA and Ohio EPA regulations and is issued an operating permit known as the National Pollution Discharge Elimination System permit. This permit provides the standards set by the Ohio EPA for testing of the wastewater before and after treatment and ultimately discharged into Glade Run. The facility has a designed capacity of 150,000 gallons per day and may be expanded as residential and commercial development occurs in the immediate area.
- **Sewer District 2:** Sewer District 2 was designed and constructed to serve the areas along SR 56 and Old Columbus Road, including Somerford Township and Choctaw Lake. The sanitary sewer system includes a low-pressure sewer system in Choctaw Lake, individual grinder pump stations and a wastewater treatment facility. The treatment facility is designed to treat 300,000 gallons of wastewater per day and operates under a National

Pollution Discharge Elimination System permit issued by the Ohio EPA. The facility operates the treatment plant to ensure compliance with federal and state regulations, including performing analytical laboratory test of the water stream prior to discharging in Deer Creek.

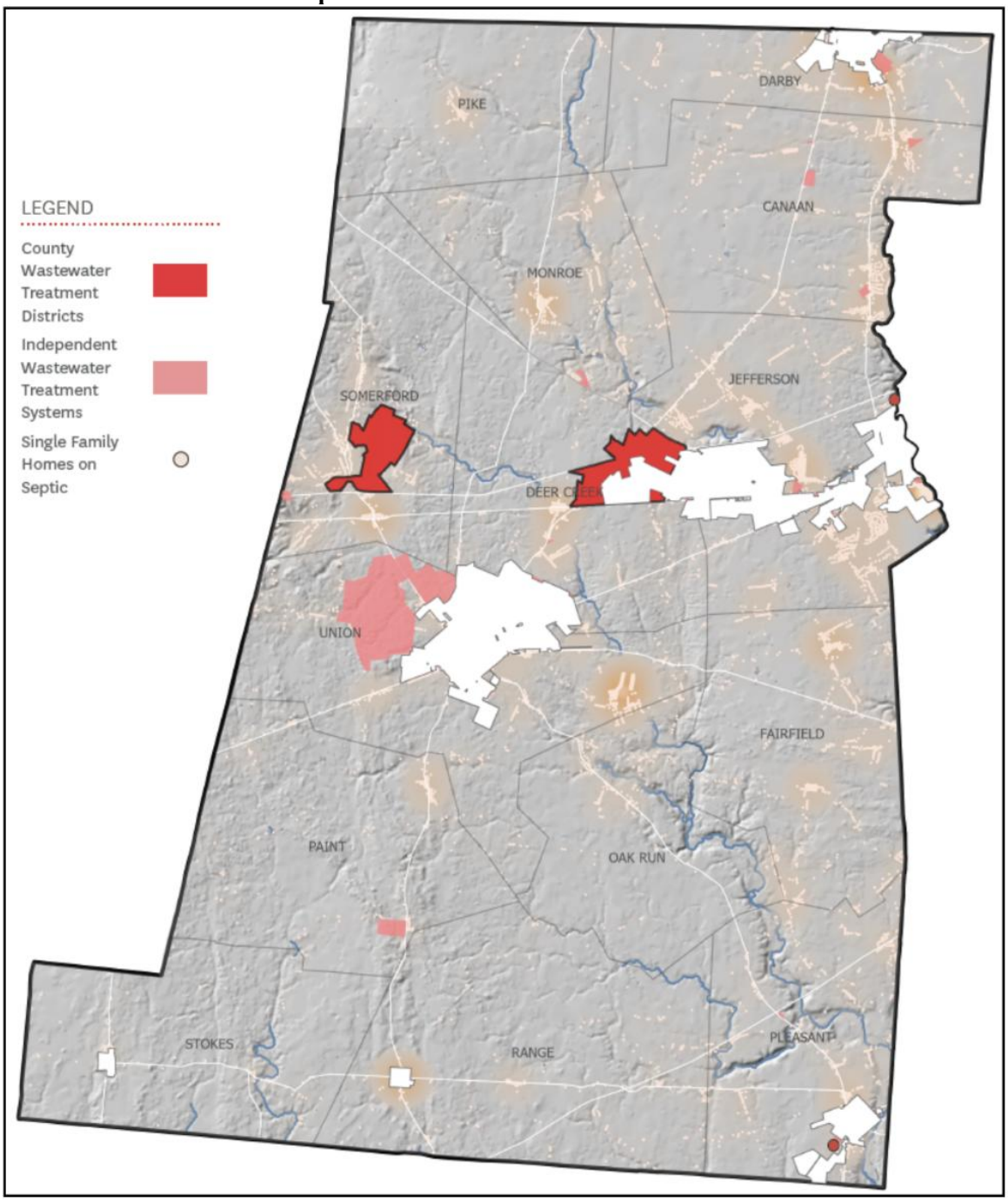
- **Camp Wissalohican:** The Madison County Sanitary Sewer and Water District constructed a sanitary sewer collection system, wastewater treatment facility, water distribution system and water treatment plant to serve the Camp Wissalohican development in 1998. This area is located near SR142 along High Free Pike and serves the 21 homes currently located in the development. Both treatment plants operate under the regulations of the US EPA and the Ohio EPA, including analyzing the wastewater and water for proper treatment. The residents are serviced by the gravity flow sanitary sewer collection system and a small treatment facility. The water supply consists of a deep water well and treatment facility which includes disinfection of the treated water.
- **Burr Oak :** The Burr Oak subdivision is located just outside the village limits of Mt. Sterling and consists of a gravity flow sanitary sewer system which ultimately flows to the Mt. Sterling wastewater treatment facility. The businesses and residents are required to install a water meter on their individual well supply as the meter is read monthly to determine the customer billing for the sanitary sewer service.

The Madison County Commissioners and the Sanitary Engineer are responsible for the management and financial condition of all treatment facilities operated by the District. The District staff are responsible for the day-to-day operation of the systems, ensure compliance with all federal and state regulations, perform preventative maintenance on facility equipment and operate the systems in a cost-effective manner.

In addition, the City of London, Village of West Jefferson, and Village of Mount Sterling, manage their own wastewater services.

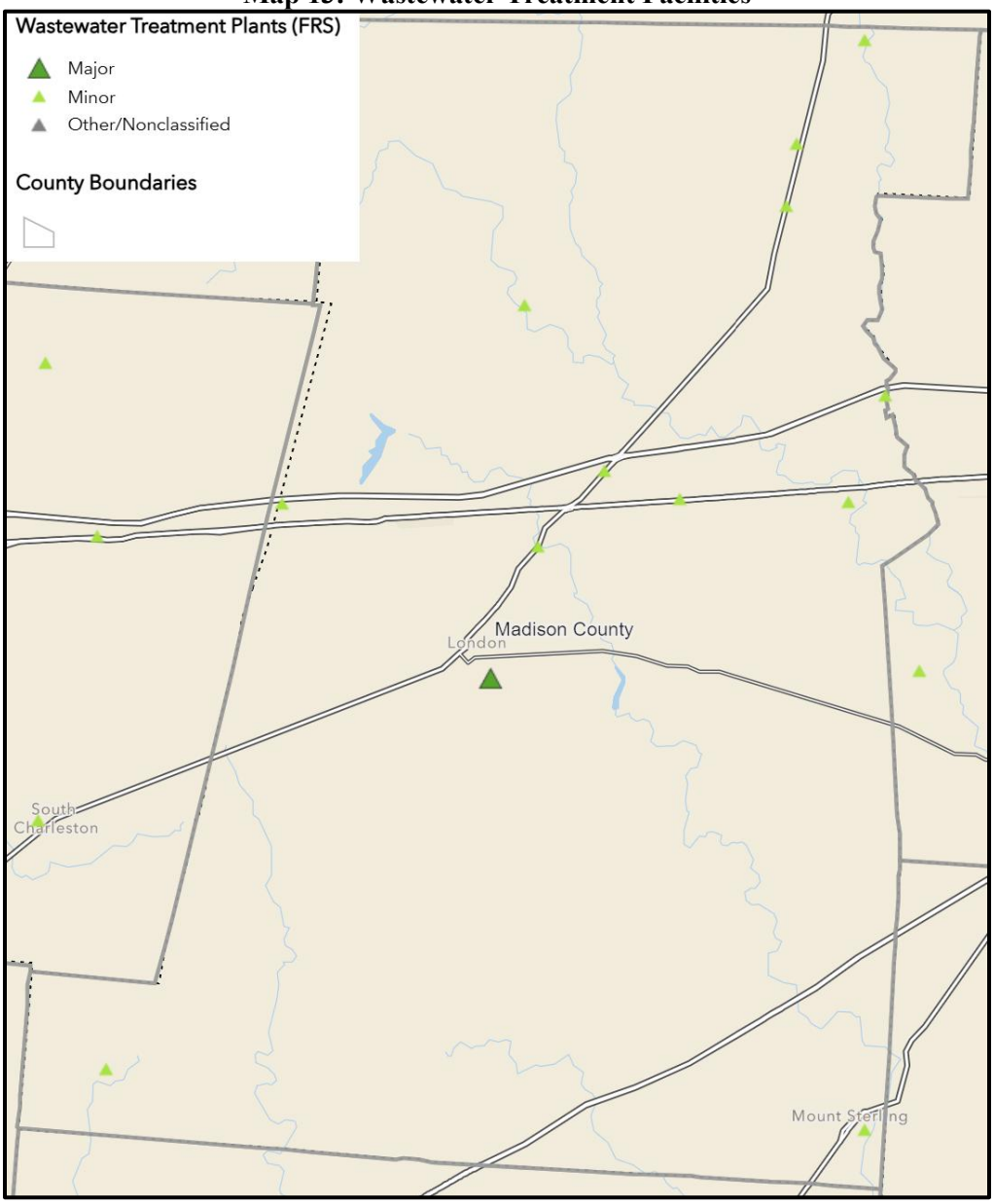
A large percentage of Madison County residents, especially those in unincorporated townships and rural areas, use septic systems for wastewater treatment. These systems are privately owned and maintained, and are regulated by the Madison County Public Health Department. Septic use is widespread due to the lack of access to centralized sewer infrastructure in rural and agricultural areas.

Map 12: Wastewater Treatment Districts



Source: Madison County Comprehensive Plan

Map 13: Wastewater Treatment Facilities



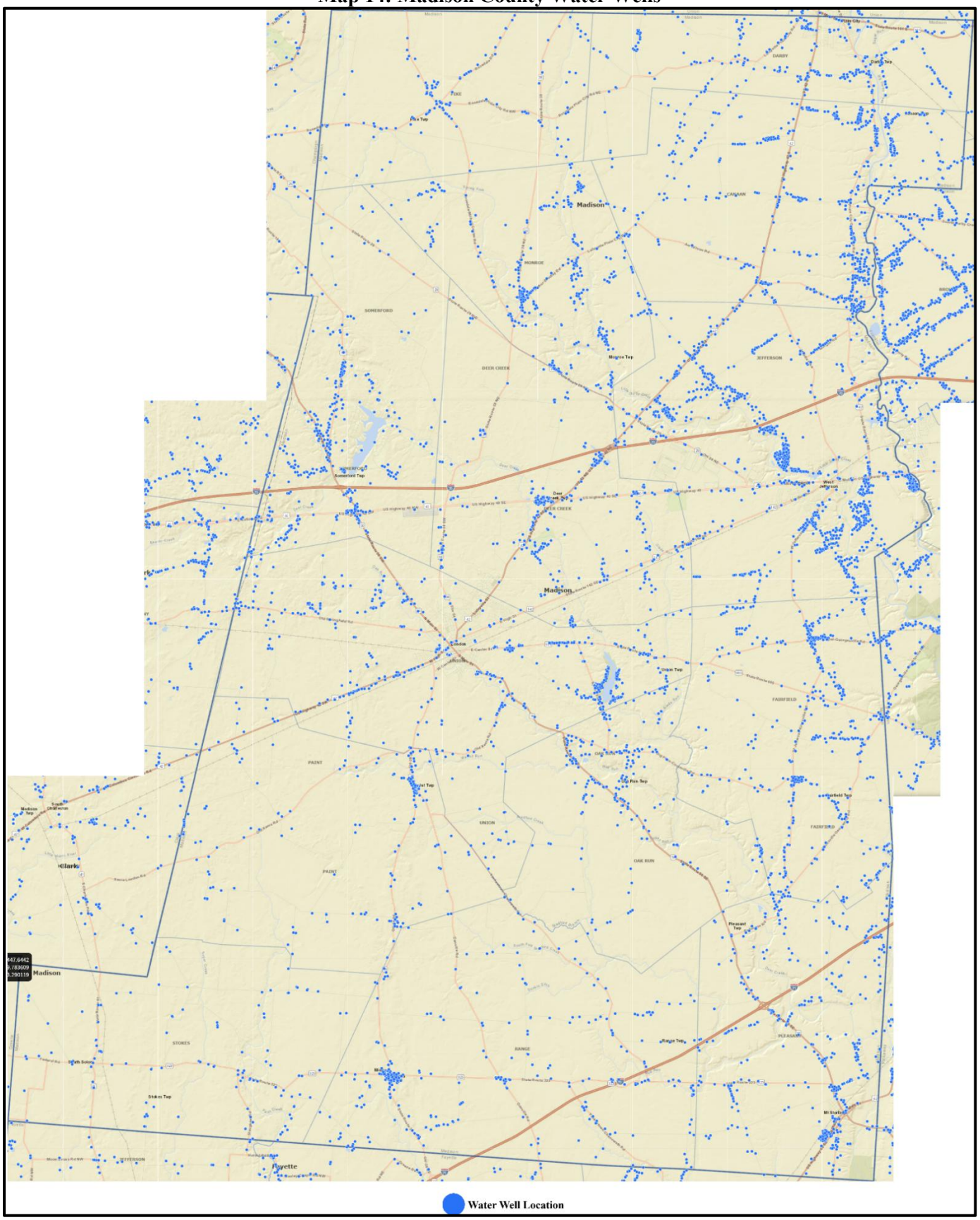
Source: FEMA RAPT

A significant portion of Madison County residents, particularly those in rural areas and townships, still rely on private wells. However, those living in incorporated villages and cities are mostly served by public water systems. The mix of water access methods reflects the county's combination of urban, suburban, and rural land uses.

- In rural and unincorporated parts of the county, especially in agricultural and low-density residential areas, many homes rely on private water wells.
- These wells are drilled and maintained by the property owner and regulated for safety and water quality by the Madison County Public Health Department.
- Homes with private wells also typically have septic systems for wastewater treatment.

In municipalities and villages, such as the City of London, West Jefferson, Mount Sterling, and parts of Plain City, residents and businesses are more likely to be connected to a municipal water system.

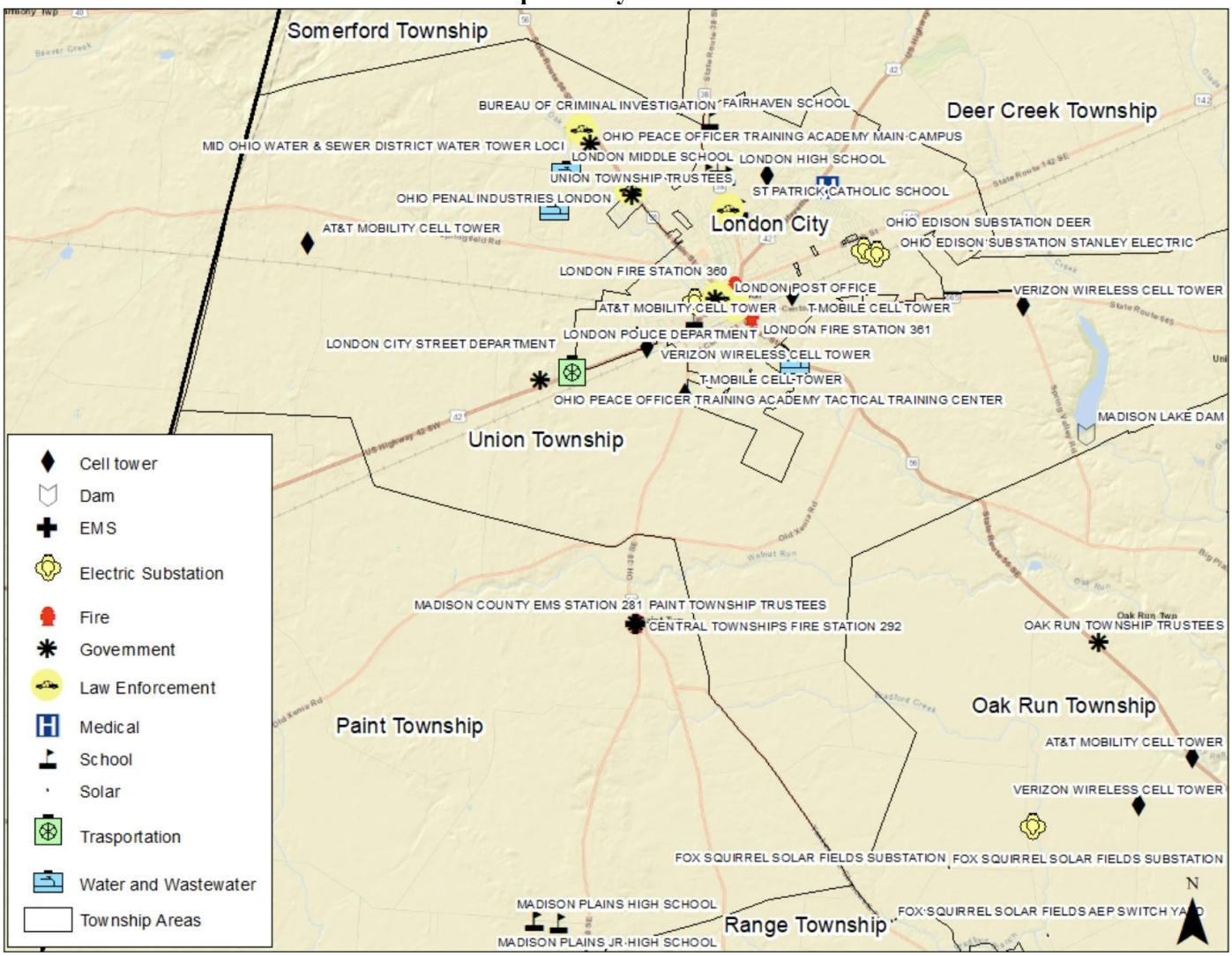
Map 14: Madison County Water Wells



Source: State of Ohio Division of Geological Survey

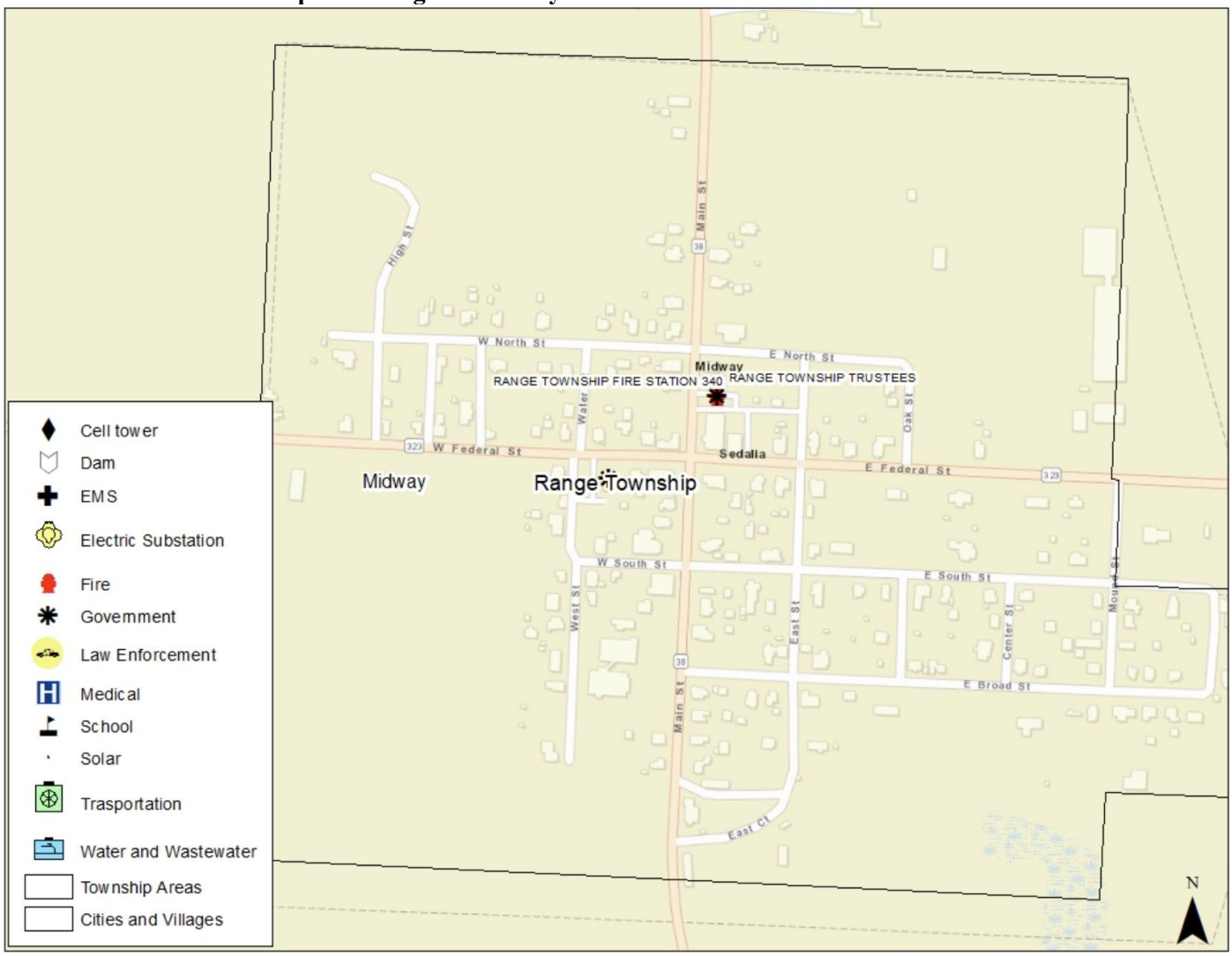
The following maps provide critical facility and infrastructure details for participating jurisdictions:

Map 15: City of London



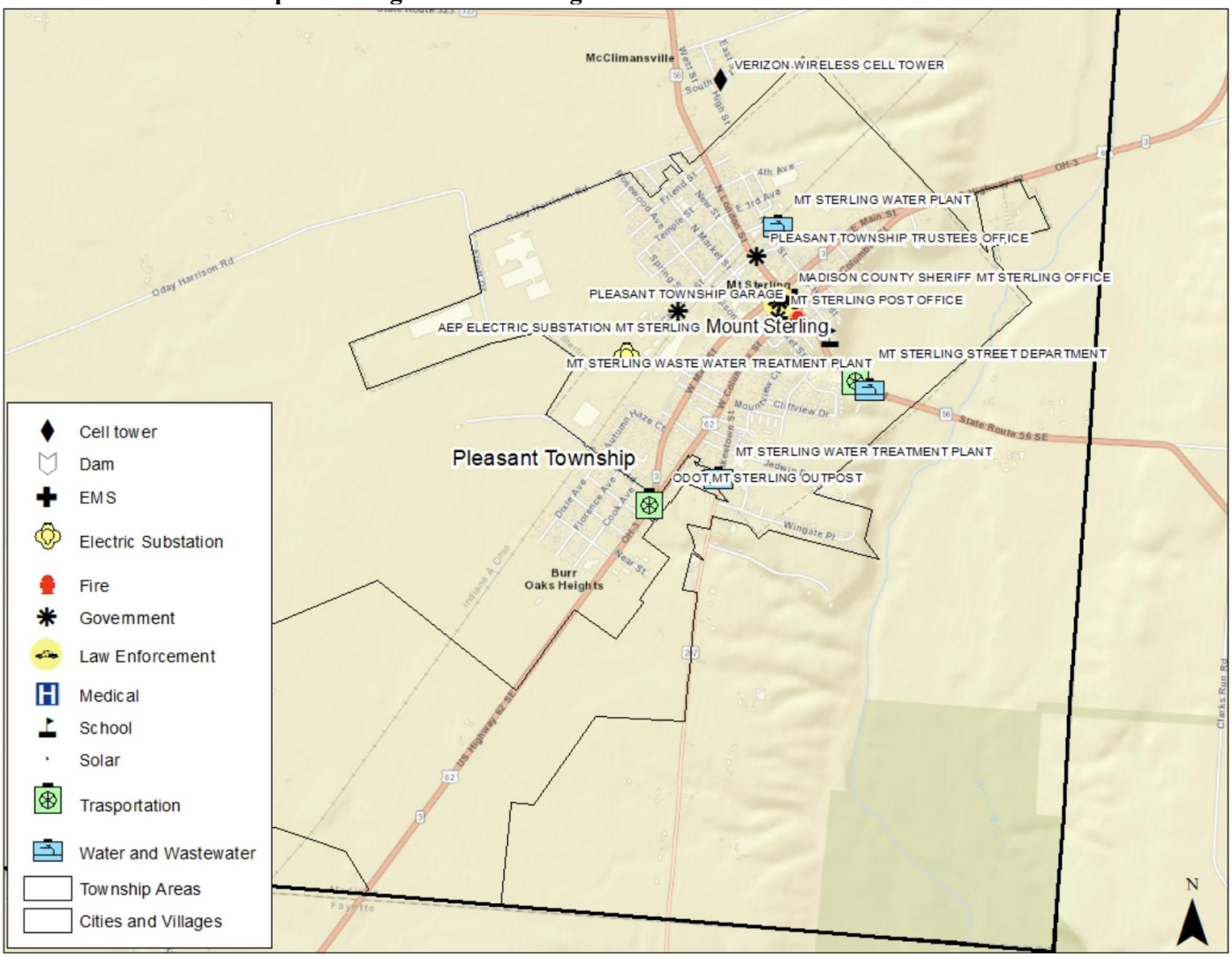
Source: Janey Camp, GIS data

Map 16: Village of Midway Critical Facilities and Infrastructure



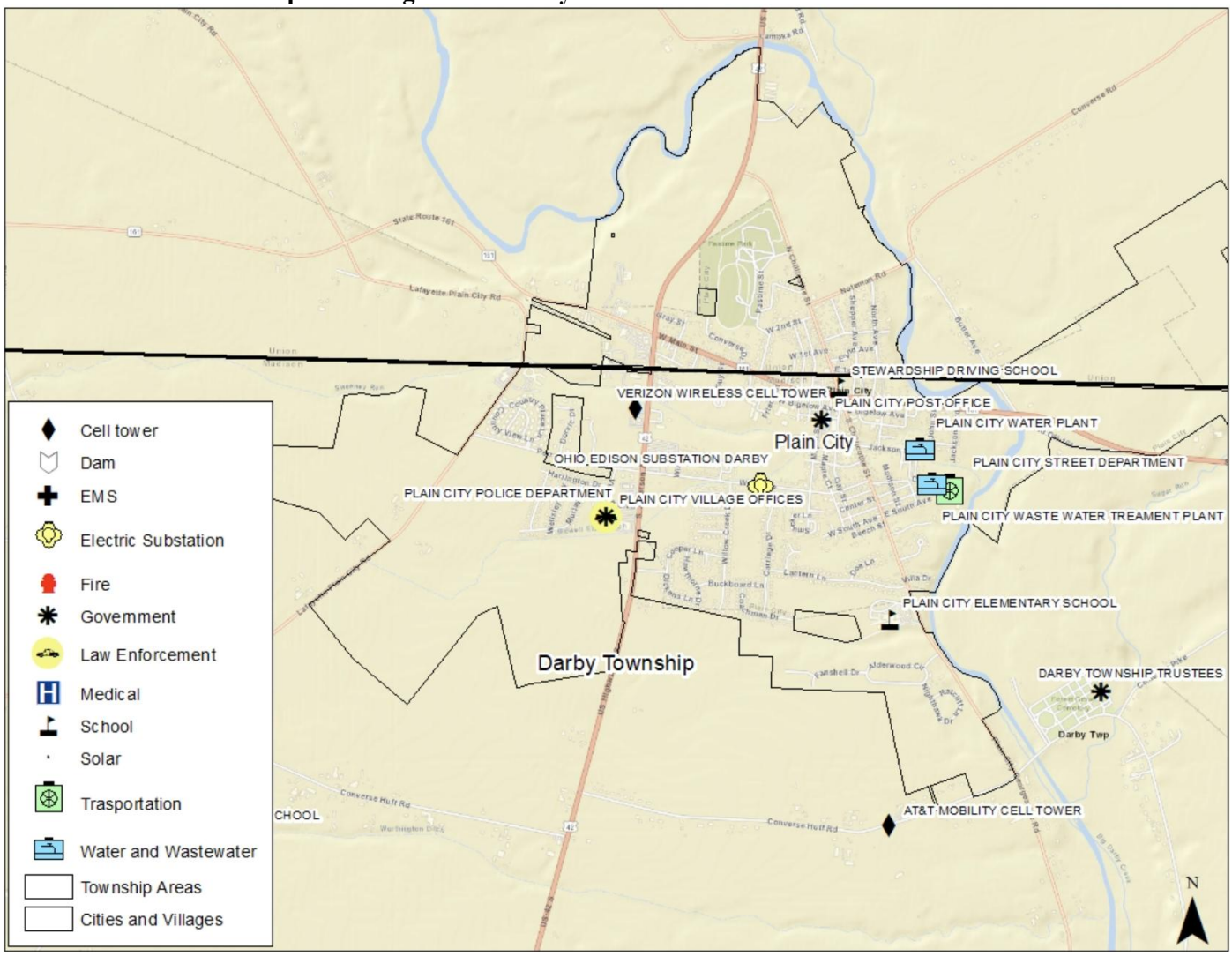
Source: Janey Camp, GIS data

Map 17: Village of Mt. Sterling Critical Facilities and Infrastructure



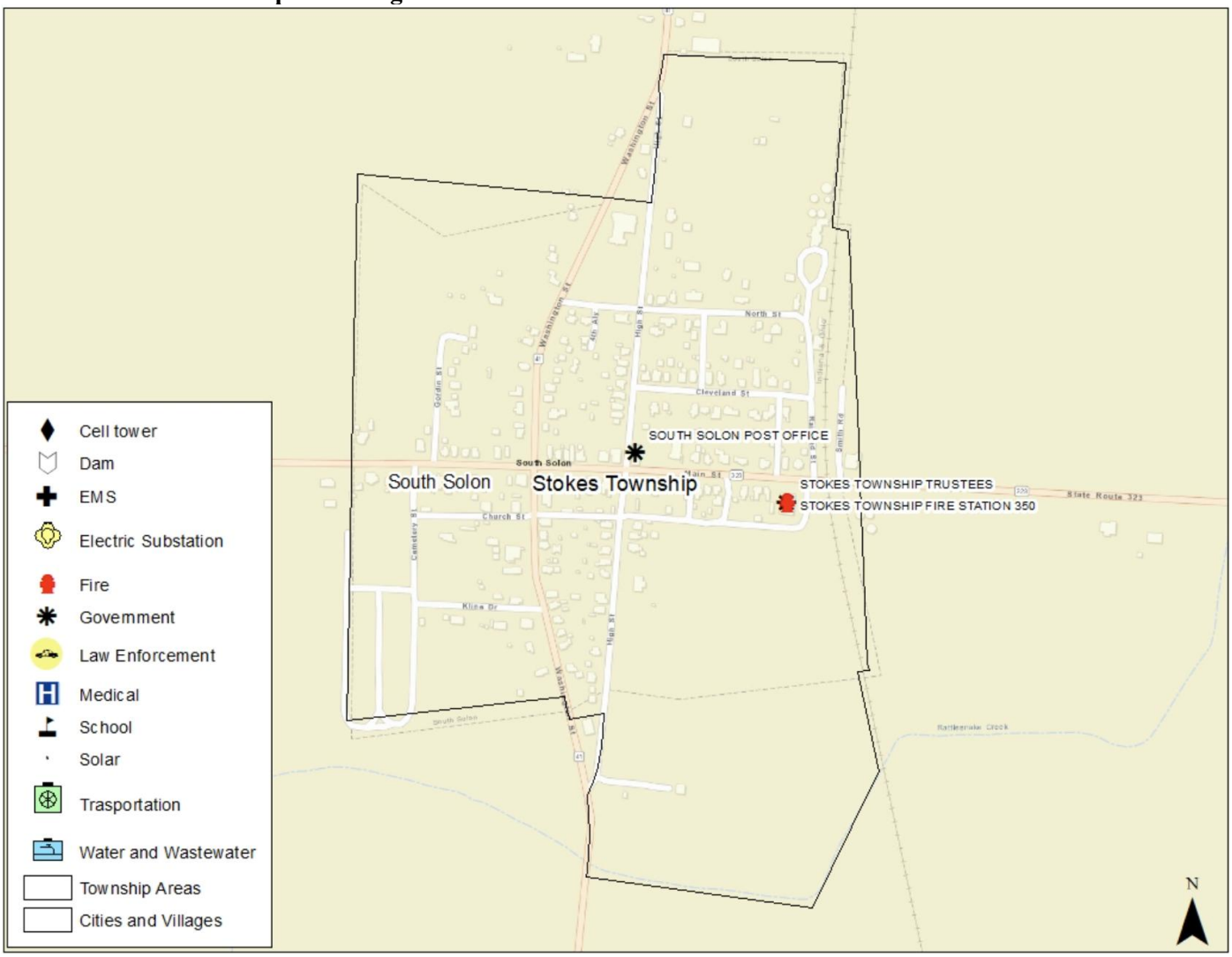
Source: Janey Camp, GIS data

Map 18: Village of Plain City Critical Facilities and Infrastructure



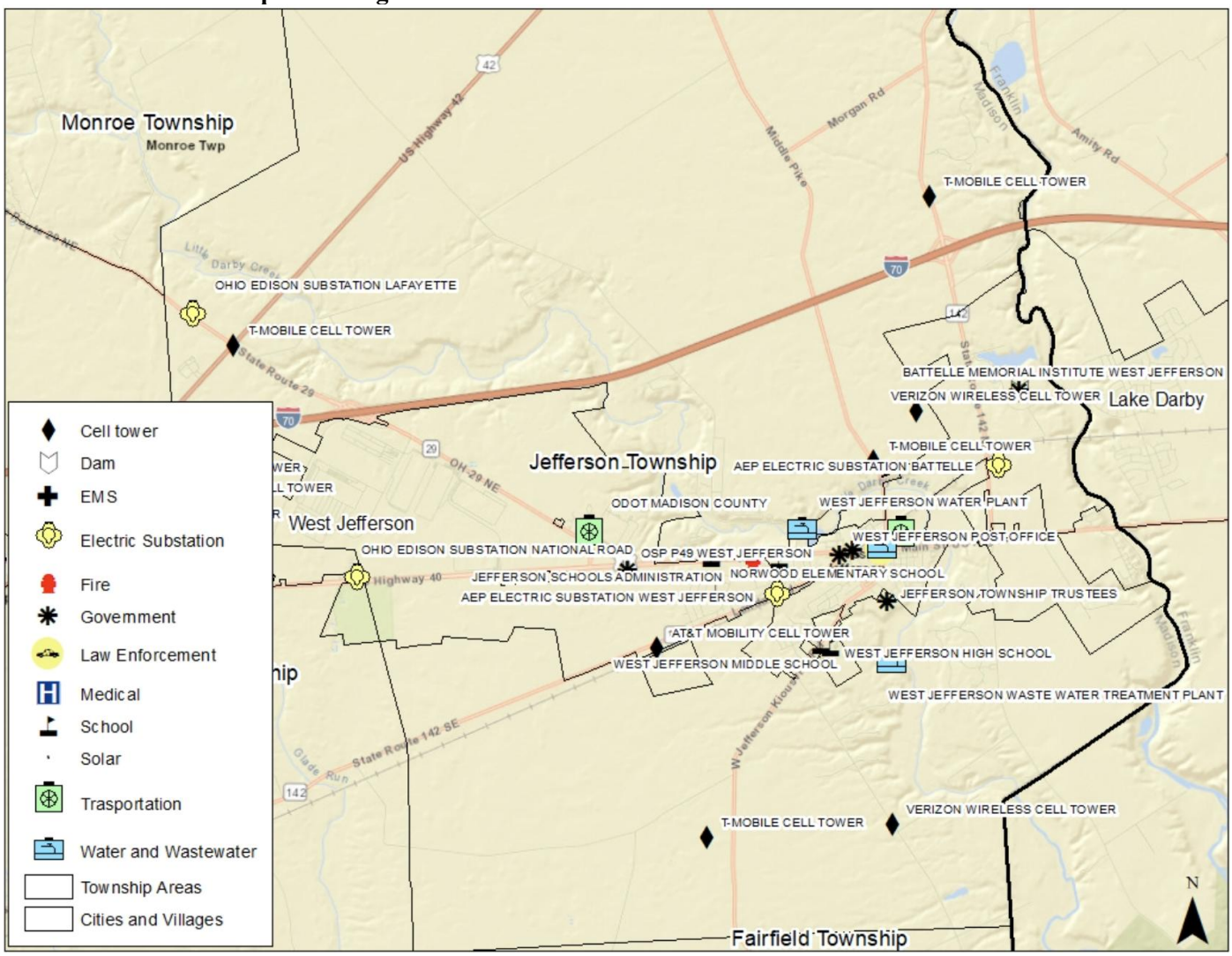
Source: Janey Camp, GIS data

Map 19: Village of South Solon Critical Facilities and Infrastructure



Source: Janey Camp, GIS data

Map 20: Village of West Jefferson Critical Facilities and Infrastructure



Source: Janey Camp, GIS data

3.10 Historic Places

Historic buildings are generally more vulnerable to natural hazards due to their age, materials, and construction methods. These structures were often built before modern building codes and may lack the structural reinforcements required to withstand hazards. Additionally, the materials used in historic buildings, like old brick, wood, or mortar, may have deteriorated over time, further reducing their resilience. However, the MPC has determined that, in general, these locations are no more or less vulnerable to the identified hazards within this plan.

Preserving historic buildings poses unique challenges in hazard mitigation because retrofitting or upgrading them to meet modern safety standards must balance maintaining their historical integrity. This vulnerability underscores the importance of integrating historic preservation with hazard mitigation planning, ensuring that these culturally significant structures are protected while minimizing risks to public safety. For cultural and historic locations within Madison County the following resources were consulted:

- **National Register of Historic Places**: The official list of the United States' historic properties deemed worthy of preservation for their significance in American history, architecture, archaeology, engineering, or culture. Administered by the National Park Service under the Department of the Interior, it includes districts, sites, buildings, structures, and objects. Established by the National Historic Preservation Act of 1966, the register seeks to recognize and protect cultural heritage. While listing does not impose restrictions on private property, it provides eligibility for preservation incentives.

The following table details properties and locations in Madison County and participating jurisdictions listed on the register:

Table 18: Madison County Historic Places

Location	Jurisdiction	National Register
Cary Village Site	Plain City	x
Farmers National Bank	Plain City	x
First United Methodist Church	London	x
London Commercial Business Historic District	London	x
Madison County Courthouse	London	x
Mount Sterling Historic District	Mount Sterling	x
Price Corners	Plain City	x
Red Brick Tavern	Lafayette	x
Skunk Hill Mounds	West Jefferson	x
Swetland House	London	x
Wilson, Valentine, House	Somerford	x

Source: National Register of Historic Places, Ohio State Register of Cultural Properties

3.11 Economic Conditions

U.S. Census data provides key insights into the working-age population actively participating in the economy. This data helps measure the labor force participation rate, a critical economic indicator reflecting the proportion of the eligible population contributing to the workforce. It excludes certain groups, such as retirees, students, or those not seeking employment, giving a clearer picture of economic engagement and workforce trends.

As of current U.S. Census Bureau data, approximately 20,891 civilian residents over the age of 16 were in the workforce in 2024, as shown in the following table:

Table 19: Jobs Held by Madison County Residents, by Type of Industry, 2024

Jurisdiction	Population over 16	In Labor Force	Employed	Unemployed
Madison County	36,316	20,891	20,050	836
City of London	8,388	5,265	4,976	284
Village of Midway	169	100	100	0
Village of Mt. Sterling	1,431	806	763	43
Village of Plain City	2,940	2,010	1,942	68
Village of South Solon	277	165	163	2
Village of West Jefferson	3,433	2,241	2,201	40
Township of Canaan	2,046	1,392	1,366	26
Township of Darby	3,171	2,210	2,135	75
Township of Deer Creek	645	392	364	28
Township of Fairfield	1,310	988	988	60
Township of Jefferson	6,134	4,019	3,874	145
Township of Monroe	1,168	712	587	125
Township of Oak Run	558	353	353	0
Township of Paint	638	393	393	0
Township of Pike	398	262	257	5
Township of Pleasant	2,659	1,599	1,544	55
Township of Range	671	414	397	17
Township of Somerford	2,608	1,892	1,878	14
Township of Stokes	515	339	337	2
Township of Union	5,407	661	661	0

Source: U.S. Census Bureau

Community activities of value are initiatives that promote engagement, collaboration, and well-being within a community. These activities may include volunteer programs, cultural festivals, educational workshops, and recreational events that foster connections among residents and enhance the quality of life. They often address local needs, celebrate diversity, and build a sense of shared identity and purpose, contributing to a more resilient and vibrant community. The following is a brief list of notable activities of value throughout the county:

- **Farm Science Review:** Held annually in September near London, the Farm Science Review and attracts over 100,000 visitors from all over the United States and Canada, who come for three days to peruse 4,000 product lines from 600 commercial exhibitors, and learn the latest in agricultural production.
- **Madison County Fair:** Held annually in July, the Madison County Fair is a family-oriented event where community members showcase agricultural products and livestock. The fair features various entertainment options, including livestock shows, indoor exhibits, and commercial booths.
- **London Strawberry Festival:** Celebrated in June, the event takes place in downtown London with rides, games, crafts, an AC Cobra Car Show, live entertainment and a parade.

3.12 Physical Setting and Land Cover

Madison County, situated in central Ohio, encompasses approximately 466 square miles of predominantly flat to gently rolling terrain. The county's topography is largely influenced by its glacial history, resulting in fertile plains that are extensively utilized for agriculture. Elevations in the county are relatively uniform, contributing to its expansive agricultural landscapes.

The land cover of Madison County is primarily characterized by agricultural fields, interspersed with patches of deciduous forests and grasslands. These wooded areas are mainly found along waterways and in regions less suitable for farming. Urban development is concentrated in municipalities such as London, the county seat, while rural residences and farmsteads are scattered throughout the countryside.

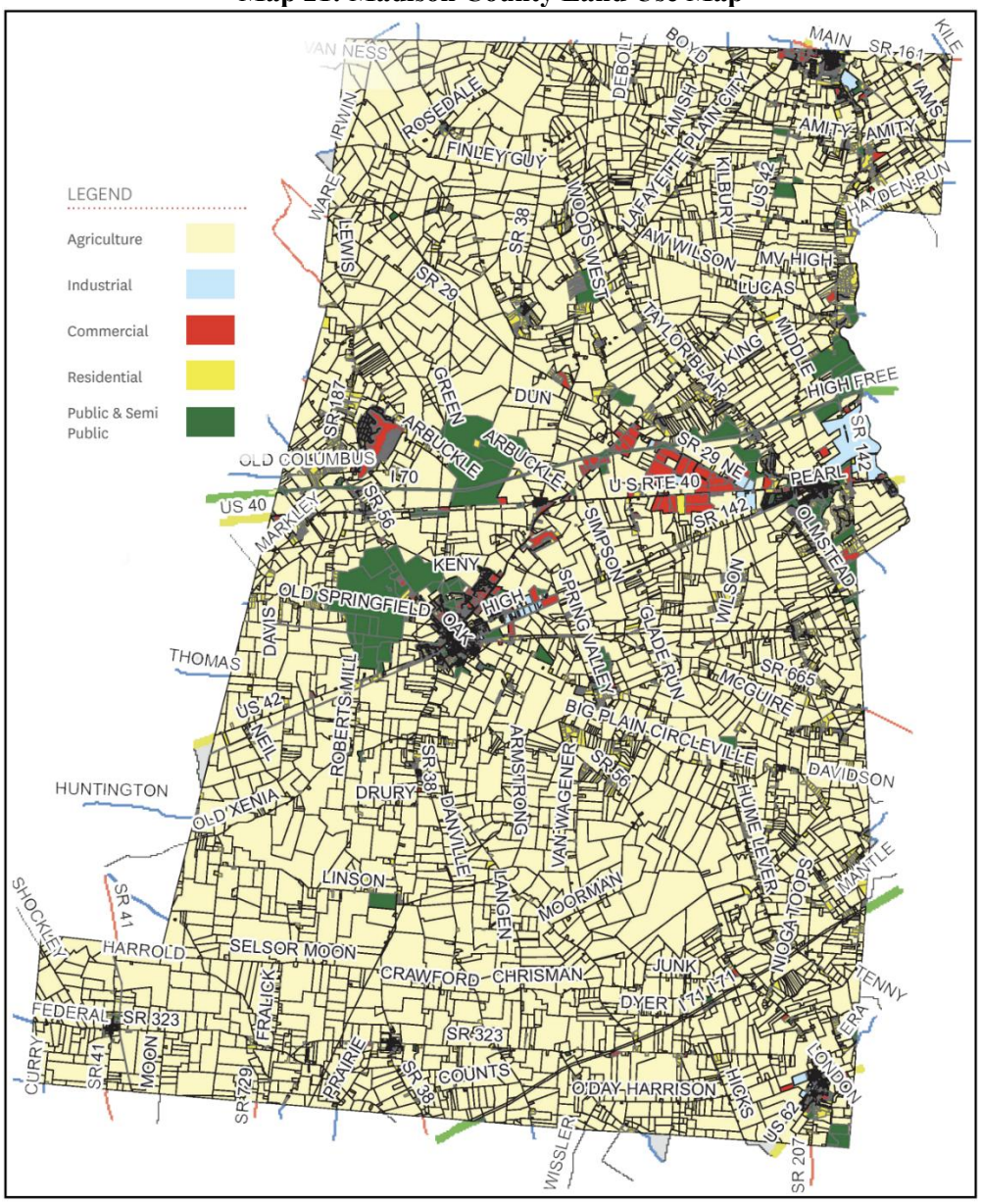
Hydrologically, Madison County is notable for the presence of Big Darby Creek and Little Darby Creek, both designated as state and national scenic rivers due to their exceptional biodiversity and ecological significance. Big Darby Creek flows southeast through the county, offering habitats for numerous aquatic species and recreational opportunities for residents and visitors. Additionally, Choctaw Lake, a man-made reservoir, serves as a focal point for residential communities and provides various water-based recreational activities.

Land use in a region has a profound and lasting impact on future development. The way land is allocated and utilized can shape the economic, social, and environmental aspects of a region for decades, and can impact:

- **Economic Development:** Land use decisions influence the location and type of economic activities in a region. Zoning regulations that encourage the development of industrial zones can attract manufacturing businesses, while zoning for commercial and residential areas can promote retail and housing development. These decisions can have long-term implications for job creation, revenue generation, and overall economic health.
- **Transportation and Infrastructure:** Land use planning is closely tied to transportation infrastructure. The location of roads and other transportation facilities is determined in part by land use decisions. Well-planned land use can lead to efficient transportation networks, reducing congestion, and improving mobility. Poorly planned land use, on the other hand, can result in traffic congestion and increased infrastructure costs.
- **Housing and Urbanization:** Land use policies influence the availability and affordability of housing in a region. Zoning regulations, for example, can determine the density of residential areas and the types of housing permitted. Inadequate or restrictive land use policies can lead to housing shortages and higher costs, while well-planned policies can support diverse housing options and affordability.
- **Long-Term Costs:** Land use decisions can affect the long-term costs of development. Efficient land use planning can reduce the need for costly infrastructure extensions and maintenance, while inefficient or sprawling development can strain municipal budgets.

As indicated by the following map from the Madison County, land use consists largely of agriculture areas:

Map 21: Madison County Land Use Map

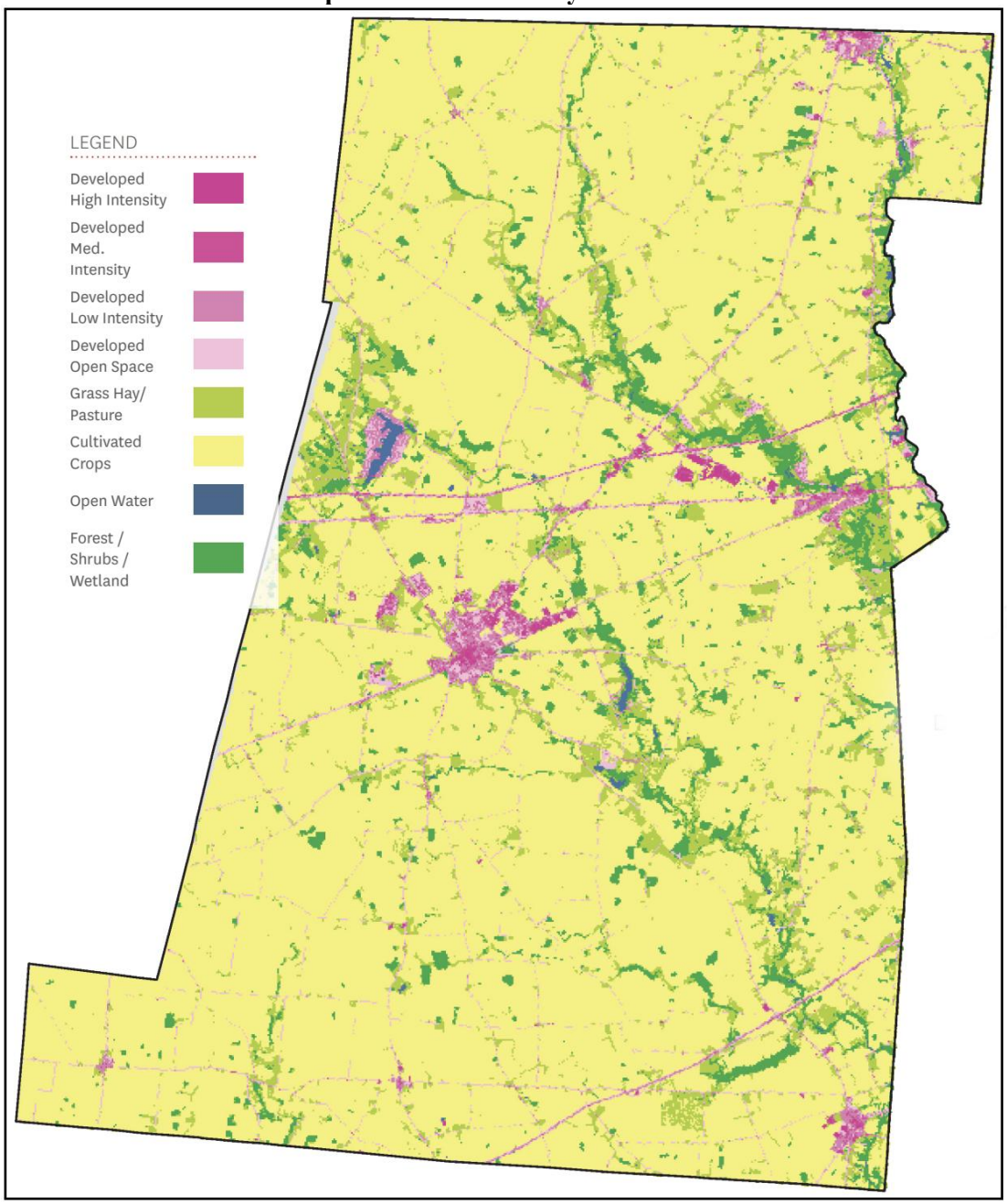


Source: Madison County Comprehensive Plan

The land cover in Madison County reflects its semi-arid climate and varied topography. The rolling plains are primarily covered by grasslands, which support cattle ranching, a significant component of the local economy. In the higher elevations of the Manzano Mountains, vegetation transitions to forests dominated by ponderosa pine, aspen, and spruce-fir species. These forested areas are part of the Cibola National Forest and include the Manzano Mountain Wilderness, which provides habitat for diverse wildlife and opportunities for recreation.

As indicated by the following map from the Madison County Comprehensive Plan, land cover consists largely of cultivated crops:

Map 22: Madison County Land Cover



Source: Madison County Comprehensive Plan

Rural areas tend to retain their rural nature over time, but there are several factors that can influence the evolution of these areas, including:

- **Economic Conditions:** The economic viability of agriculture can vary significantly over time due to factors like crop prices, weather patterns, and changes in agricultural technology. Economic challenges may lead some farmers to sell their land for non-agricultural uses, potentially affecting the rural landscape.
- **Urbanization and Development:** In some cases, rural areas may experience suburbanization or the expansion of nearby urban centers. This can result in residential and commercial development encroaching on agricultural land. However, the extent of this development depends on local zoning and land use regulations.
- **Infrastructure Development:** The construction of new transportation infrastructure, such as highways or railroads, can influence land use patterns. Improved infrastructure may make it easier to transport agricultural products to markets or to access rural areas for development.

- **Government Policies:** Government policies, including agricultural subsidies, land use regulations, and conservation programs, can impact the way rural and agricultural land is used. For example, conservation programs may encourage farmers to preserve land for wildlife habitat rather than development.
- **Local Planning and Zoning:** Local governments play a key role in land use planning and zoning regulations. These policies can determine whether agricultural land can be converted to non-agricultural uses, such as residential or commercial development. Some areas may have strict zoning that preserves agricultural character, while others may allow more flexibility.
- **Population Trends:** Demographic trends, including population growth or decline, can influence the demand for land in rural areas. If there is an influx of new residents seeking a rural lifestyle, it can drive demand for residential development in formerly agricultural areas.

Based on the available data, it is likely that Madison County and all participating jurisdictions will retain their mostly rural character during the life of this plan.

3.13 Infrastructure Development

Infrastructure repair can have a significant impact on regional development, both positive and negative. The specific effects depend on the scale of the repair projects, the quality of the infrastructure, and the overall economic and social context of the region, and may include:

- **Improved Connectivity:** Repairing and upgrading infrastructure, such as roads, bridges, and ports, can enhance connectivity within and between regions. This improved connectivity can reduce transportation costs, facilitate the movement of goods and people, and attract businesses and investments to the region.
- **Economic Growth:** Functional infrastructure supports economic activities. When infrastructure is repaired, it can create jobs directly in the construction and maintenance sectors. Additionally, it can indirectly stimulate economic growth by providing a reliable foundation for businesses to operate and expand, leading to increased production and trade.
- **Enhanced Productivity:** Well-maintained infrastructure can increase productivity by reducing downtime and transportation delays. This, in turn, can make regional industries more competitive and efficient.
- **Attracting Investment:** Regions with modern and well-maintained infrastructure are often more attractive to investors. Businesses are more likely to invest in regions with reliable transportation, utilities, and communication networks, as it reduces operational risks and costs.
- **Quality of Life:** Infrastructure repair can enhance the quality of life for residents by providing access to essential services such as clean water, sanitation, healthcare, and education. This can contribute to improved human development indicators and overall well-being.
- **Resilience and Disaster Mitigation:** Infrastructure repair can include upgrades to make infrastructure more resilient to natural disasters. This can help protect communities and assets and reduce the long-term costs of recovery and reconstruction.
-

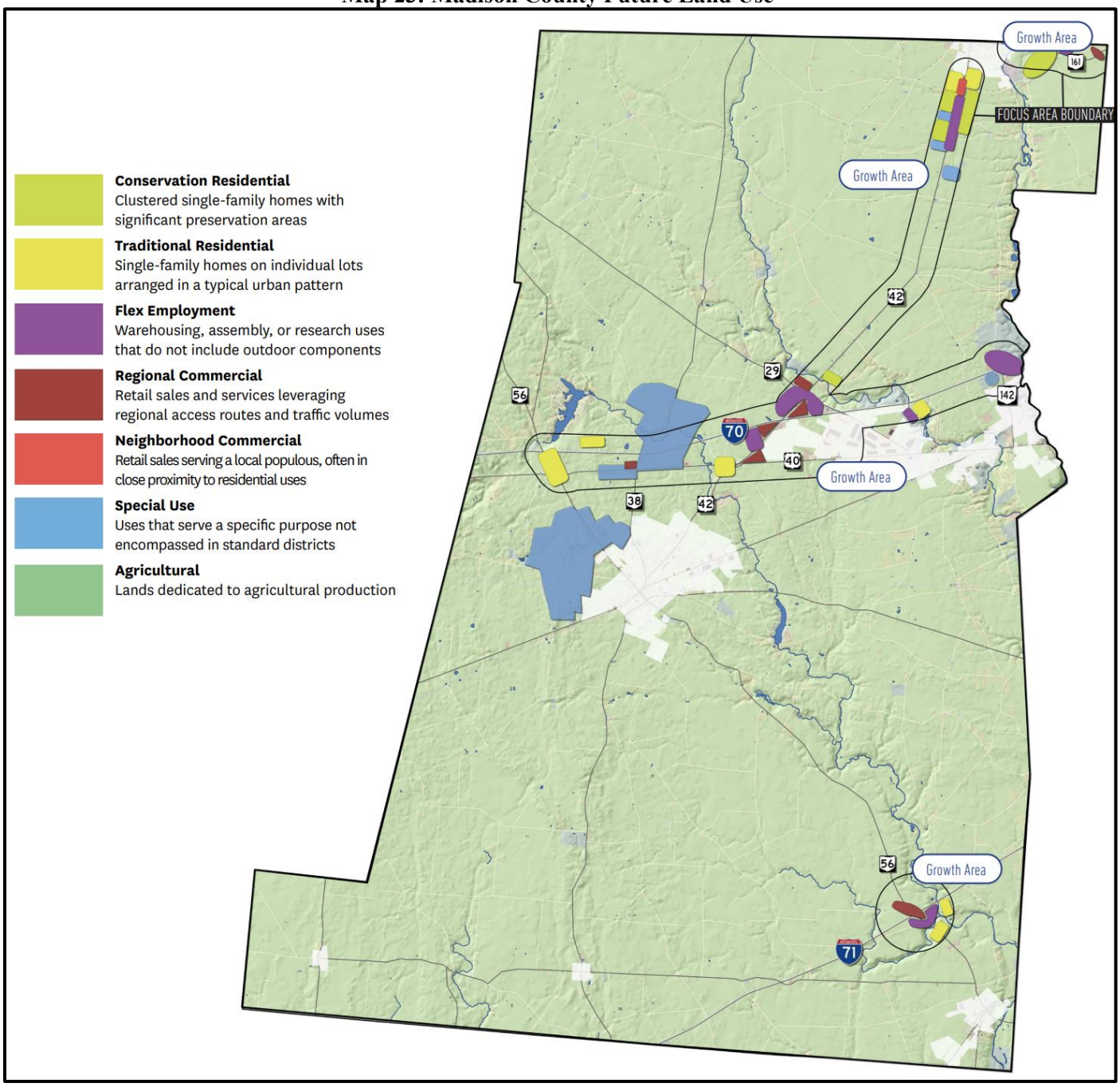
However, it is important to note that there can be negative impacts as well, including:

- **Disruption During Construction:** Repair projects can disrupt communities and businesses during the construction phase, leading to short-term challenges.
- **Costs and Budget Constraints:** Large-scale infrastructure repair projects can be costly, and they may strain regional budgets or lead to increased taxes or debt.
- **Environmental Concerns:** If not done carefully, infrastructure repair projects can have adverse environmental impacts, such as habitat disruption or water pollution.

The Future Land Use Plan illustrates the major concepts for where and how Madison County should guide future physical development. The intent is to preserve the existing agricultural heritage and character which has made the

County distinct, while accommodating growth within areas that can support additional development. The Future Land Use Plan is a graphical representation of the development principles established in this chapter. These development principles are the guiding factors of future development and suggest land appropriate for development, the general form physical development should follow, and how differing land uses should interact with one another. The boundaries of the character areas are intentionally blurred to allow flexibility on behalf of County leadership. The underlying zoning districts provide parcel-specific regulations for physical development. This Conceptual Development Plan should be consulted when determining appropriate zoning designations for property when rezoning requests are evaluated by Madison County. The following map details potential future land use:

Map 23: Madison County Future Land Use



Source: Madison County Comprehensive Plan

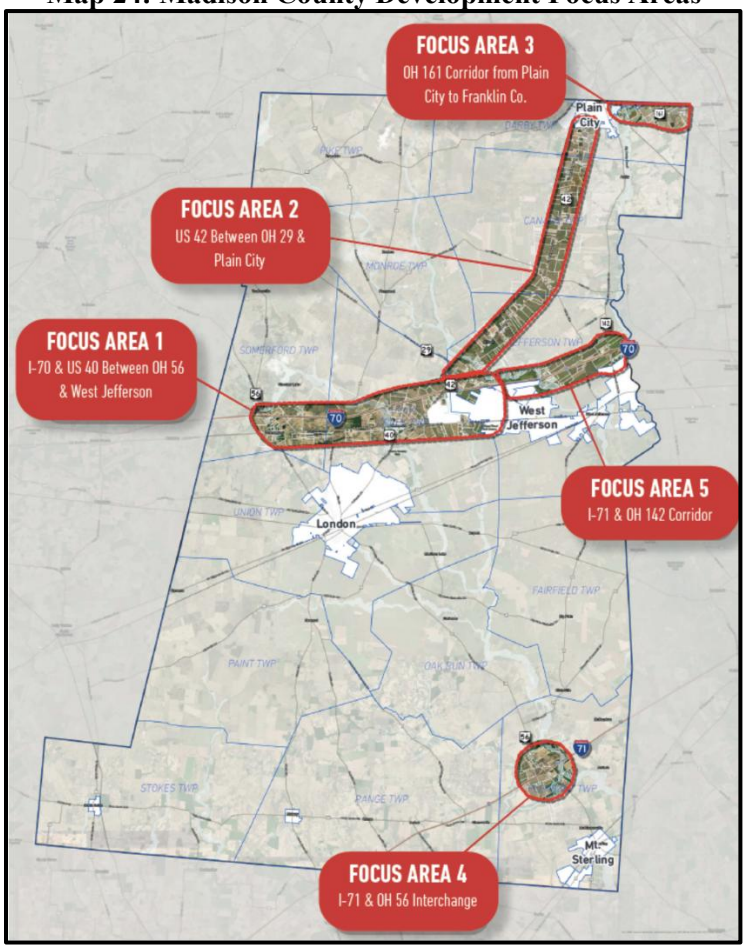
Madison County will remain an agriculturally focused community, but the County also sits within a fast-growing central Ohio region. To maintain the county's rural heritage and tap into the benefits of regional growth, five focus areas were identified. These areas account for less than ten percent of the overall land area of the county, but share special

opportunities for development. Collectively, these areas are an opportunity for the county to guide thoughtful and additive developments that collectively enhance the community's quality of life, place, and opportunity.

- **Focus Area 1:** Representing the geographic heart of Madison County, this swath of land contains the parallel spines of US 40 and Interstate 70.
- **Focus Area 2:** Aligns with the 10-mile corridor along US 42, stretching from OH 29 to Plain City. The corridor crosses through Jefferson and Canaan Townships and is very rural in nature.
- **Focus Area 3:** Located in the far northeast of the County, this corridor represents a key gateway between Franklin County and Madison County, with just three miles separating Plain City from the bustling employment center on Dublin's western border.
- **Focus Area 4:** located in the southeast portion of the County, situated at the convergence of Interstate 71 and State Route 56, about 2.5 miles north of the Village of Mount Sterling.
- **Focus Area 5:** Located in the eastern portion of the County along I-70, Focus Area 5 is a roughly 5-mile corridor stretching from the Little Darby Creek/West Jefferson east to the border of Franklin County, near the interchange at I-70 & OH 142.

The following map details the locations of these focus areas:

Map 24: Madison County Development Focus Areas



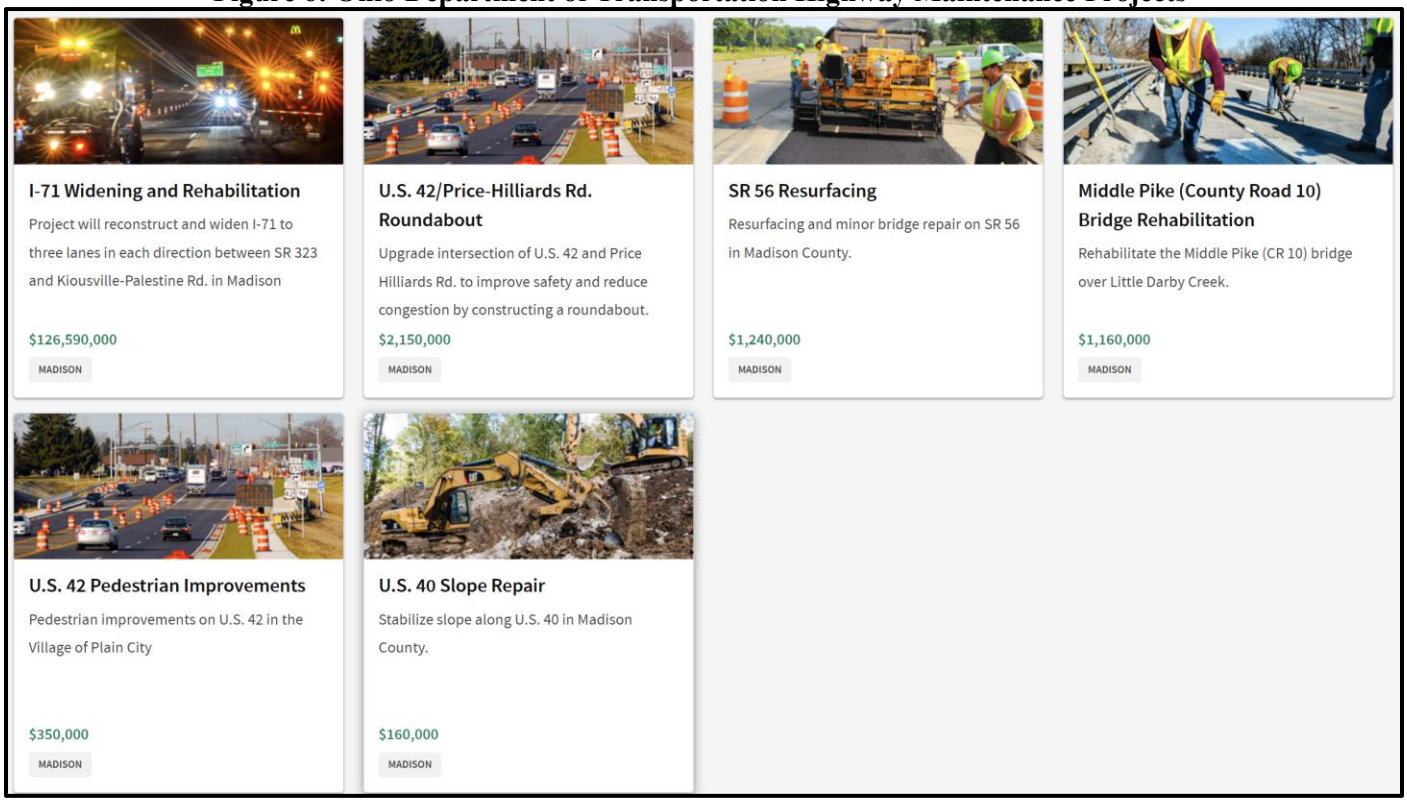
Source: Madison County Comprehensive Plan

Road maintenance projects play a critical role in hazard mitigation by improving the resilience and functionality of transportation infrastructure. Consistent repair and maintenance can help mitigate hazards by:

- **Reduced Flooding Risk:** Regular maintenance, such as cleaning and repairing drainage systems, helps prevent flooding on roadways. Properly maintained culverts, ditches, and stormwater systems ensure that water can flow away from roads, reducing the risk of water damage and road erosion.
- **Strengthening Infrastructure:** Road maintenance projects often include reinforcing bridges, overpasses, and retaining walls to withstand seismic activity, heavy rains, and other hazards.
- **Slope Stabilization:** Road maintenance projects often include measures to stabilize slopes and prevent landslides that can block roads and isolate communities. This includes planting vegetation, installing retaining walls, and improving drainage.
- **Erosion Control:** Implementing erosion control measures such as riprap, geotextiles, and retaining structures helps protect roadways from erosion caused by heavy rains and flooding.
- **Resilient Design:** Maintenance projects can incorporate resilient design features that account for climate change impacts, such as increased precipitation, higher temperatures, and more frequent extreme weather events. This includes elevating roadways, improving drainage systems, and using materials that can withstand changing conditions.
- **Monitoring and Adaptation:** Ongoing maintenance allows for continuous monitoring and adaptation of road infrastructure to changing environmental conditions, ensuring long-term resilience.

The following figure details current and future Ohio Department of Transportation maintenance projects for Madison County:

Figure 6: Ohio Department of Transportation Highway Maintenance Projects



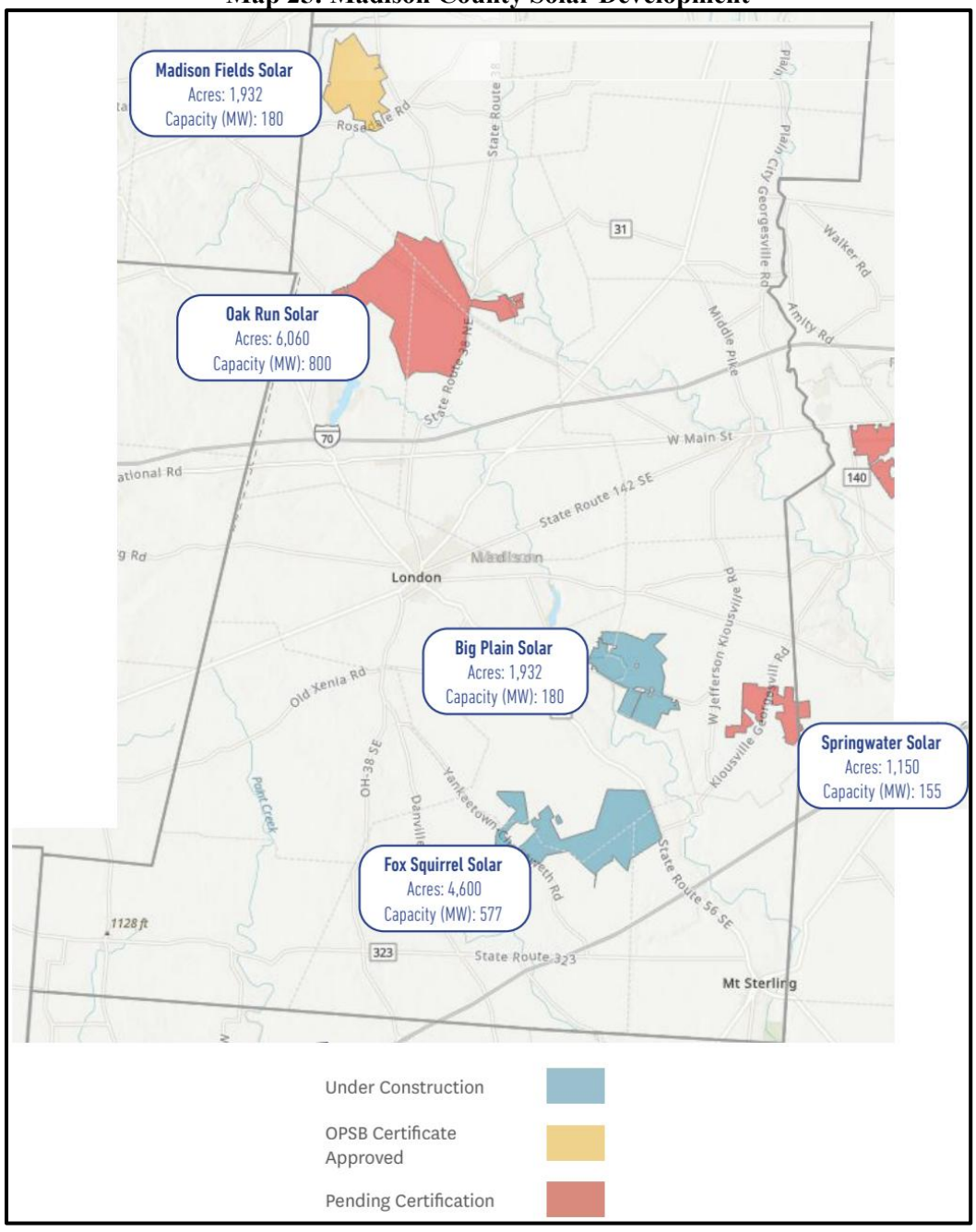
Source: Ohio Department of Transportation

Madison County is currently seeing an expansion of solar electrical generation capacity, with the Oak Run Solar project recently approved by the Ohio Public Utilities Commission. This project has the potential to generate up to 800 MW of electricity. With this scale comes the potential for extensive economic benefits to the host townships, school districts, and Madison County:

- An estimated $250 million in tax revenue for Madison County over the solar project's estimated 35-year operational life, creating an immense positive effect on the local economy.
- Several hundred new Madison County construction jobs during the 4 to 8-year construction phase.
- Dozens of new long-term jobs in Madison County during the project's operating phase.

Numerous other additional projects are in various stages of approval, as indicated by the following map:

Map 25: Madison County Solar Development



Source: Madison County Comprehensive Plan

Based on the available data, it is likely that Madison County and all participating jurisdictions will retain a mostly rural character during the life of this plan. Additionally, no near future development charges are anticipated to increase jurisdictional vulnerability to identified hazards. Rather, the noted demographic decrease is expected to potentially reduce across the board vulnerability to identified hazards.

3.14 Agricultural Data

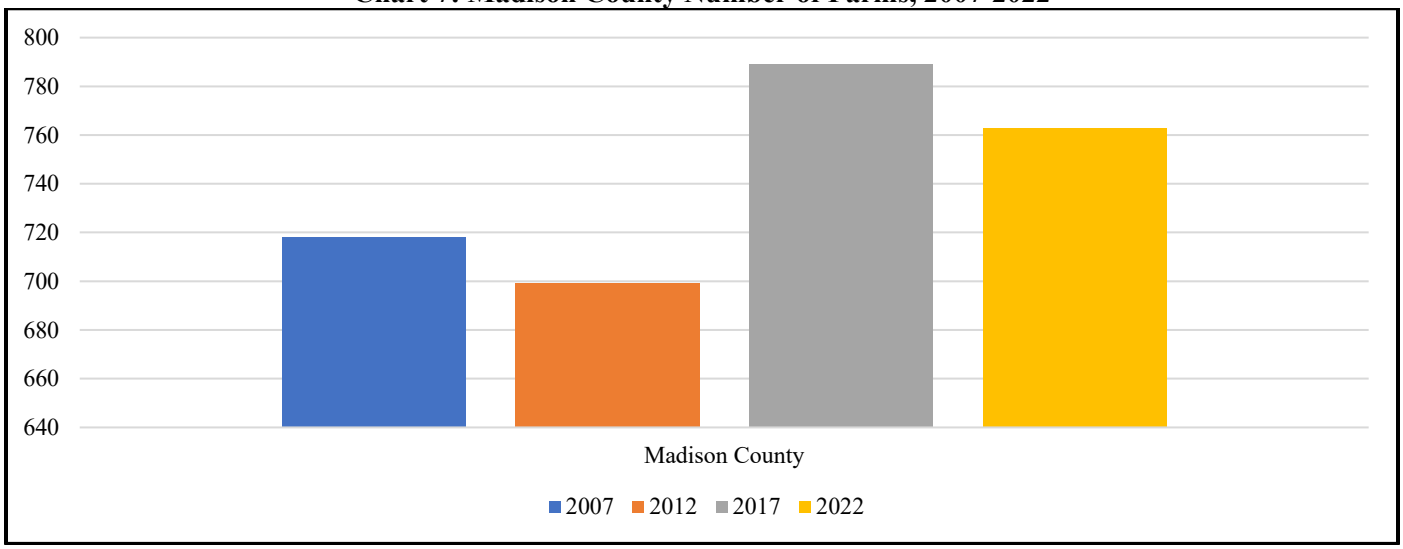
Agriculture forms a large part of both the economic and social fabric of Madison County. USDA National Agricultural Statistics Service data from 2007, 2012, 2017, and 2022 (the latest available data) was used to develop an understanding of the agricultural footprint within the county, as detailed in the following table and charts:

Table 20: Madison County Regional Agricultural Data

Year	2007	2012	2017	2022
Number of Farms	718	699	789	763
Total Farm Acreage	247,913	263,275	252,392	236,886
Market Value of Products Sold	$122,040,000	$193,784,000	$201,844,000	$233,851,000
Value of Machinery and Equipment*	$144,089	$202,772	$215,221	$238,351
Value of Lands and Buildings*	$1,337,872	$1,917,923	$2,218,215	$2,874,795

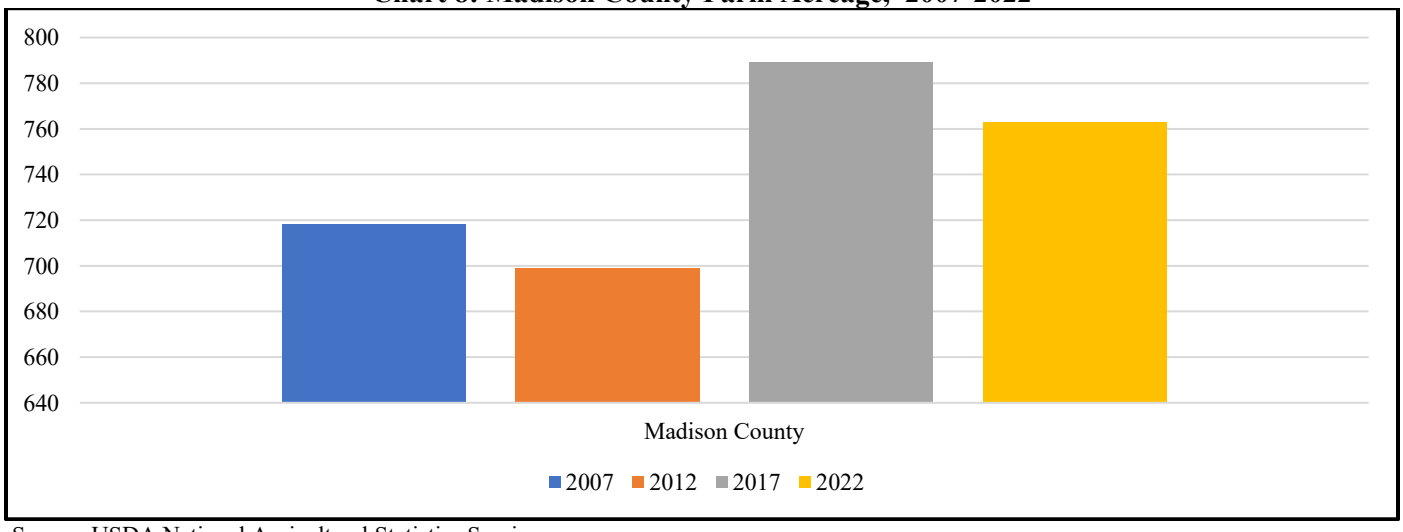
Source: USDA National Agricultural Statistics Service
*: Average per farm

Chart 7: Madison County Number of Farms, 2007-2022



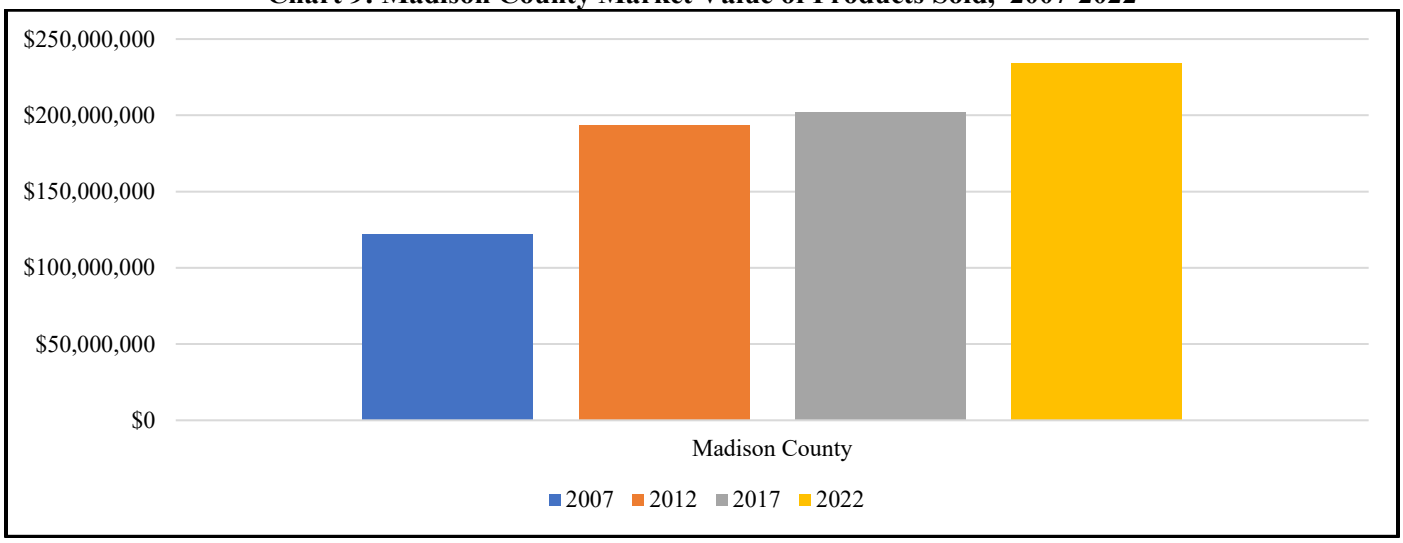
Source: USDA National Agricultural Statistics Service

Chart 8: Madison County Farm Acreage, 2007-2022



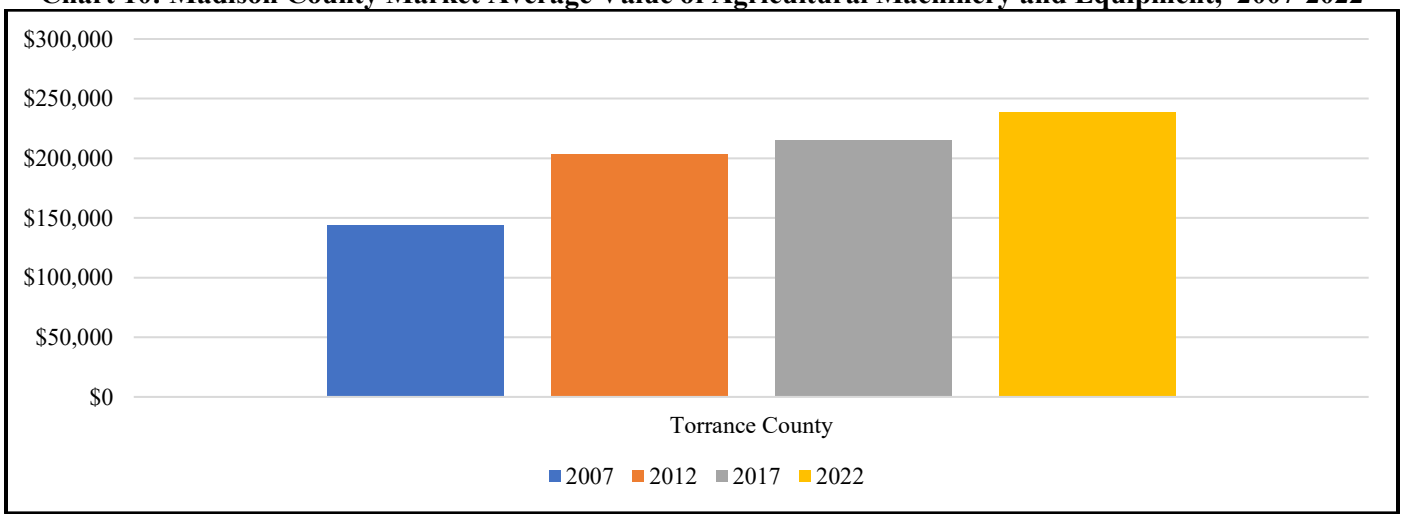
Source: USDA National Agricultural Statistics Service

Chart 9: Madison County Market Value of Products Sold, 2007-2022



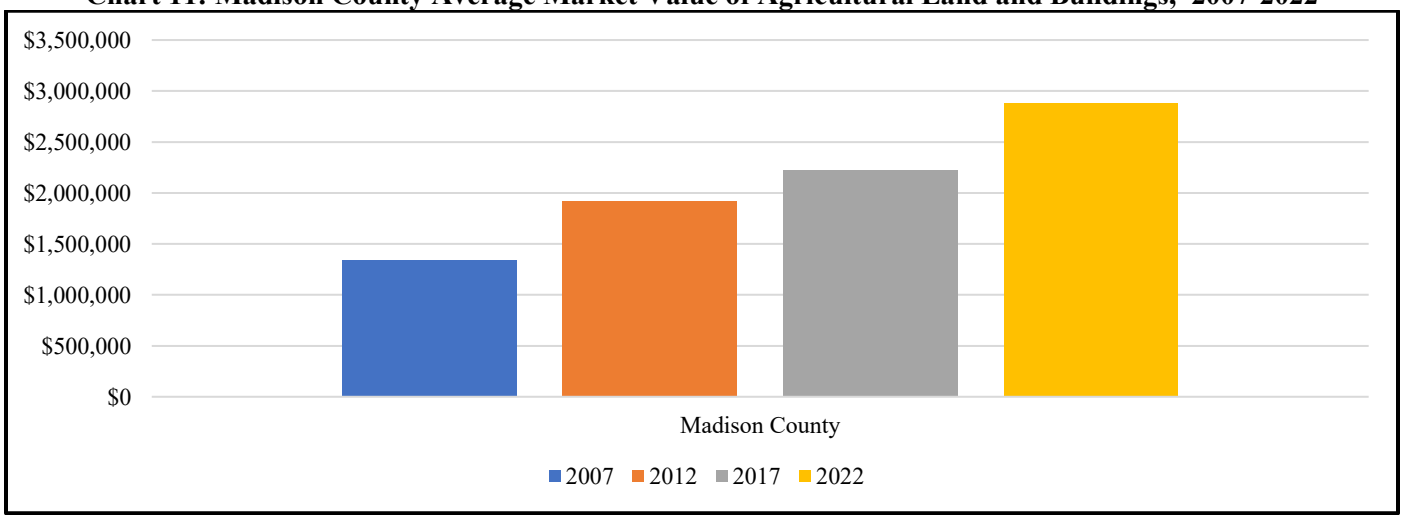
Source: USDA National Agricultural Statistics Service

Chart 10: Madison County Market Average Value of Agricultural Machinery and Equipment, 2007-2022



Source: USDA National Agricultural Statistics Service

Chart 11: Madison County Average Market Value of Agricultural Land and Buildings, 2007-2022



Source: USDA National Agricultural Statistics Service

3.15 Regional Climate

Madison County, located in central Ohio, experiences a humid continental climate, defined by its distinct seasonal variations and a wide range of temperatures throughout the year. This type of climate is common in the Midwest and plays a significant role in shaping the county's agricultural economy, natural ecosystems, and daily life.

Winters in Madison County are typically cold and moderately snowy. Average high temperatures in January, the coldest month, hover around the low 30s °F, while overnight lows often dip into the low 20s or even teens. Snowfall is common but usually not extreme, averaging between 20 to 30 inches annually. While snow events can occasionally disrupt travel and operations, most winter storms are manageable. Periods of bitter cold can occur during Arctic air outbreaks, occasionally sending wind chills below zero. Despite the cold, many residents adapt through seasonal activities and preparation, and infrastructure is generally well-equipped to handle winter weather.

Spring in Madison County is marked by warming temperatures, and blooming vegetation. Average highs rise from the upper 40s in March to the upper 60s in May. However, spring can also bring unpredictable weather, with frequent rain showers, occasional thunderstorms, and large temperature swings. Severe weather is a possibility, particularly in late spring, with thunderstorms capable of producing hail, strong winds, and, on rare occasions, tornadoes. Spring is also a critical time for local agriculture, as fields are prepared and planted for the growing season.

Summers are warm to hot and humid, with average highs in the mid-80s °F and occasional peaks into the 90s. Humidity levels can be high, especially in July and August, which can make temperatures feel even hotter. Thunderstorms are common in the afternoons and evenings, often developing rapidly due to heat and moisture. While most storms are routine, the region can occasionally experience localized flooding, strong winds, or lightning-related damage. These summer storms play an important role in replenishing soil moisture for crops such as corn and soybeans, which dominate the county’s farmland.

Autumn is marked by mild temperatures, lower humidity, and the area experiences a gradual cooling that provides relief from the summer heat. Average highs in September are in the mid-70s, cooling to the 50s by November. Rainfall decreases slightly during this season, and conditions are generally calm and stable. This period is vital for harvesting crops and preparing the community for winter.

Precipitation in Madison County is fairly evenly distributed throughout the year, averaging around 38 to 42 inches annually, including both rain and melted snow. While the area is not prone to extreme weather disasters like hurricanes or large-scale flooding, it is vulnerable to severe thunderstorms, ice storms, and short-term drought conditions during unusually dry summers.

Section 4 –Capability Assessment

4.1 Introduction

This capability overview for Madison County and participating jurisdictions documents programs, policies, and funding mechanisms for participating jurisdictions. All listed capabilities documented in the previous LHMP were reviewed for relevance and updated to reflect the current environment, as necessary. Additionally, any programs, policies, or funding mechanisms that are no longer applicable, are outdated, or are no longer in existence have been removed. As part of this process, updated jurisdictional capability profiles were sent for review and, if necessary, further revision.

This section of the plan discusses the current capacity of regional communities to mitigate the effects of identified hazards. A capability assessment is conducted to determine the ability of a jurisdiction to execute a comprehensive mitigation strategy, and to identify potential opportunities for establishing or enhancing specific mitigation policies, programs or projects.

A capability assessment helps to determine which mitigation actions are practical based on a jurisdiction's fiscal, staffing and political resources, and consists of:

- An inventory of relevant plans, ordinances, or programs already in place
- An analysis of the capacity to carry them out.

A thoughtful review of jurisdictional capabilities will assist in determining gaps that could limit current or proposed mitigation activities, or potentially aggravate a jurisdiction's vulnerability to an identified hazard. Additionally, a capability assessment can detail current successful mitigation actions that should continue to receive support.

4.2 Administrative and Technical Capabilities

The administrative and technical functions of Madison County and participating jurisdictions are critical in the effective implementation of hazard mitigation strategies. These functions ensure that the jurisdiction is prepared to reduce risks associated with natural and human-made hazards and can efficiently identify, integrate, and manage mitigation projects.

Madison County has a dedicated staff across multiple departments for hazard mitigation roles including planning, engineering, and mapping. Additionally, the county has numerous communication channels available, including websites and social media platforms, and a variety of trained Public Information Officers and general staff to disseminate hazard mitigation information to all stakeholders and the public. The staffing capabilities of participating jurisdictions vary, with many having small, but dedicated teams.

The following table details Madison County and participating municipalities (village, town, city) departments and positions and their roles in supporting hazard mitigation planning:

Table 21: Madison County and Participating Jurisdictions Departments Supporting Mitigation Planning

Department or Position	Hazard Mitigation Roles
Governing Board or Chief Executive	• Provides adoption resolution for LHMP. • Approves ordinances and bylaws and facilitates capital improvements budget.
Building Department and/or Planning and Zoning	• Enforces building codes that enhance structural resilience to hazards. • Conducts inspections and issues permits ensuring compliance. • Establishes limits on construction in hazard areas.
Emergency Management Department	• Develops, implements, and updates the LHMP. • Coordinates between various departments, agencies, and external stakeholders to ensure a cohesive approach to hazard mitigation. • Provides public education on matters concerning hazard mitigation. • Coordinates hazard grant application process.

Table 21: Madison County and Participating Jurisdictions Departments Supporting Mitigation Planning

Department or Position	Hazard Mitigation Roles
	• Involving local businesses, non-profits, and residents in the planning process to foster a collaborative approach to mitigation. • Supports the planning and implementation of mitigation projects.
Finance Department	• Allocates funding for hazard mitigation projects. • Manages grants and other financial resources to support mitigation efforts.
Fire Department	• Wildfire mitigation through controlled burns and fuel management. • Outreach programs to educate the public on fire safety, such as how to prevent home fires, create defensible spaces around properties.
Geographic Information System (GIS)	• Provides data and mapping services for hazard identification and assessments. • Utilizes advanced modeling techniques to predict the impact of various hazards. • Supports the planning and implementation of mitigation projects.
Health Department	• Addresses public health risks associated with identified hazards. • Plans for emergency medical response and disease control measures. • Monitors environmental hazards (e.g., water contamination, hazardous materials).
Parks Department	• Manage open space and wetlands for flood control. • Manage vegetation in parks to reduce fire hazards. • Provision of green spaces to help mitigate the urban heat island effect by cooling surrounding areas through shade and evapotranspiration
Planning Department	• Enforces zoning and land-use policies to minimize hazard risks. • Integrates hazard mitigation into comprehensive and capital improvement plans.
Public Works (Road) Department	• Manages infrastructure resilience projects (e.g., road improvements, drainage systems).

The following table indicates if Madison County or a participating jurisdiction has the above noted departments:

Table 22: Participating Jurisdiction Departments

Jurisdiction	Board or Chief Executive	Building	Emergency Management	Financial	Fire	GIS	Health	Parks	Planning	Public Works
Madison County	x	x	x	x	x	x	x	x	x	x
City of London	x	x			x					x
Village of Midway	x				x					x
Village of Mt. Sterling	x	x		x	x			x	x	x
Village of Plain City	x	x		x				x	x	x
Village of South Solon	x				x					x
Village of West Jefferson	x	x		x	x			x	x	x
Jonathan Alder Local	x			x						
London City Schools	x			x						
Madison-Plains Local	x			x						

Note: Blank indicates no current department

4.3 Regulation of Development

The regulation of development plays a crucial role in helping a community become more resilient in the face of various hazards. Effective regulation of development contributes to community resilience through:

- **Risk Reduction:** Regulations guide land use and construction practices, ensuring that they provide strong protection against hazards.
- **Public Safety:** Building codes and land-use regulations establish minimum safety standards for construction, including structural integrity, fire resistance, and the use of resilient materials.
- **Infrastructure Resilience:** Regulations may require infrastructure improvements, such as the construction of resilient roads, bridges, utility systems, and drainage systems. This strengthens a community's ability to withstand hazards, ensures the continued operation of critical services, and aids in recovery.
- **Floodplain Management:** Regulations in flood-prone areas can mandate elevation requirements for new construction, ensuring that structures are built above the base flood elevation. This minimizes flood damage, reduces the need for costly post-disaster repairs, and protects property values.
- **Land Use Planning:** Effective land-use planning helps communities avoid inappropriate development in areas at high risk of hazards.
- **Community Awareness:** Public education and outreach can be incorporated into regulations, requiring communities to inform residents about local hazards, evacuation routes, and preparedness. Informed residents are more likely to take protective measures and respond effectively to disasters.

The following sections provide further detail on building codes, zoning ordinances, and floodplain management.

Building Codes

The Ohio Building Code is a critical component in Ohio's hazard mitigation strategy. Administered by the Ohio Board of Building Standards, the Ohio Building Code establishes minimum requirements for the construction, alteration, and occupancy of buildings throughout the state. It serves as a foundational regulatory tool for ensuring structural safety, fire protection, energy efficiency, and resilience to natural and human-made hazards. The Ohio Building Code is adopted under Ohio Revised Code Chapter 3781 and 3791, granting the Ohio Board of Building Standards authority to develop a statewide code that is uniform and enforceable across jurisdictions.

Building codes establish general minimum construction standards and are enforced through authorized local building inspection agencies and inspectors. Building codes provide for:

- **Life Safety:** Building codes include provisions for fire safety, emergency egress, and the use of fire-resistant materials.
- **Accessibility and Life Support:** Building codes incorporate accessibility standards, ensuring that buildings are designed to accommodate all individuals. This is crucial during and after disasters when people with mobility issues may require assistance. Accessible features also benefit emergency responders and support recovery efforts.
- **Retrofitting Existing Buildings:** Building codes may require the retrofitting of older structures to meet modern safety standards.
- **Public Awareness:** Building codes promote public awareness of hazards and the importance of resilient construction. This can lead to informed decision-making by property owners, builders, and developers, resulting in safer structures.

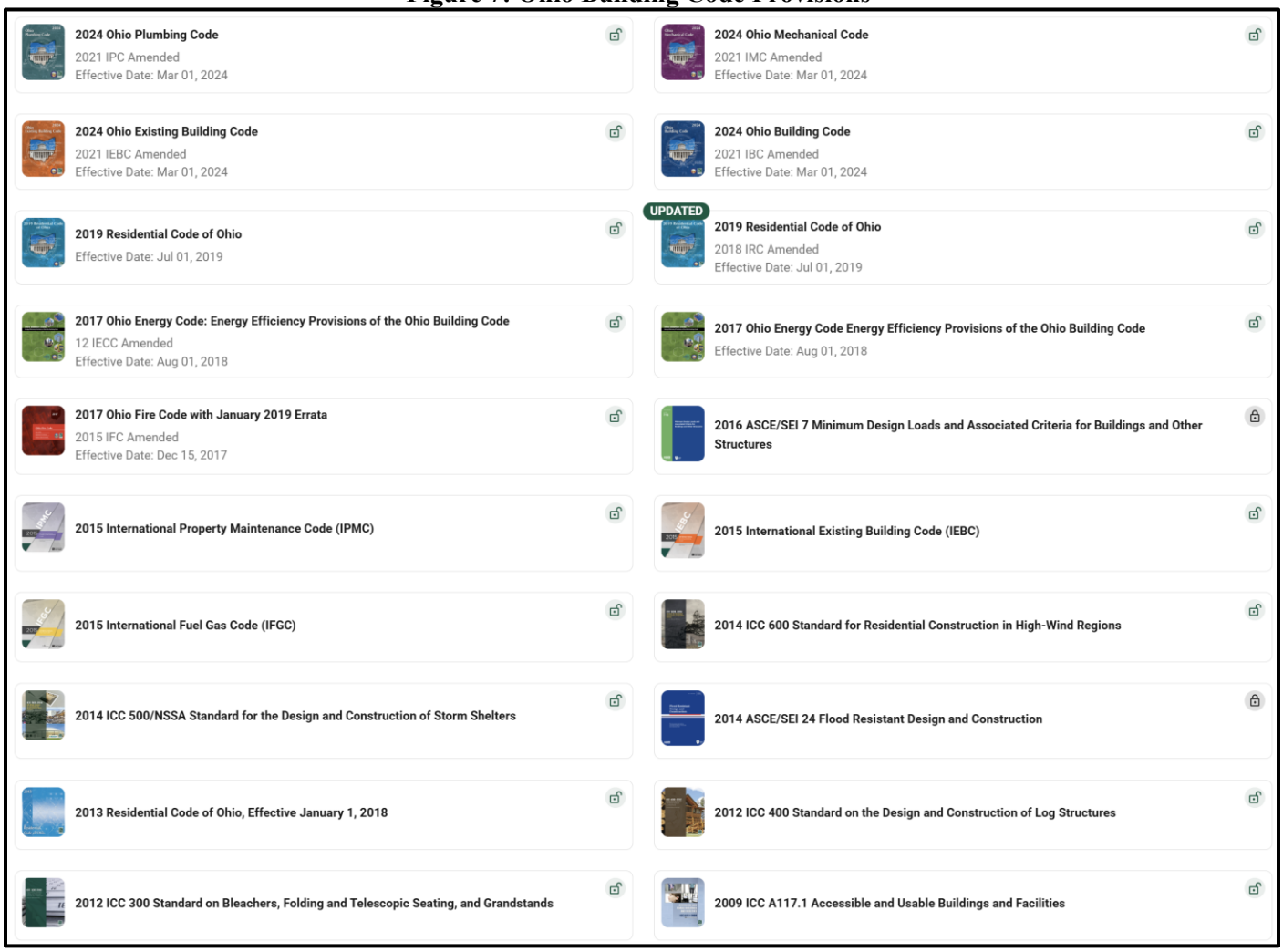
Key hazard resistant building code provisions found in current building codes include:

- **Structural Design Requirements:** Provides requirements for the structural design of buildings to ensure their resistance to various hazards, including earthquakes, high winds, and snow loads. These requirements are aimed at enhancing the overall structural integrity and safety of buildings.

- **Wind Design Requirements:** Provides specific provisions for wind design, considering the geographical location of the structure. Wind loads are calculated based on factors such as wind speed, exposure, and building height.
- **Seismic Design Requirements:** Incorporates seismic design provisions to address earthquake hazards. The code includes seismic design categories and requirements for the design and construction of buildings in seismic-prone regions.
- **Flood-Resistant Design Requirements:** Includes provisions related to flood-resistant design, particularly in areas prone to flooding. It may specify elevation requirements, construction materials, and other considerations to reduce the risk of flood damage. The vast majority of the regulations required by the NFIP are included within the International Building Code and the International Residential Code.
- **Fire-Resistant Construction Requirements:** Requirements for fire-resistant construction are included to mitigate the risk of fire hazards. This includes specifications for fire-resistant materials, assemblies, and building features.
- **Material and Construction Standard Requirements:** Establishes standards for building materials and construction methods to ensure the durability and safety of structures, considering various hazards.

The following figure, from the Ohio Board of Building Standards, details the provisions of the Ohio Building Code:

Figure 7: Ohio Building Code Provisions



Source: Ohio Board of Building Standards

In Madison County, building codes are enforced in accordance with the provisions detailed in the Ohio Building Code. In general, Madison County and all participating jurisdictions require building permits for the following activities:

- Construction
- Manufactured home placement
- New Utility service/meter relocation/service upgrade
- Grading-Solar panels
- Accessory structures
- Additions
- Roofs
- Wells
- Demolition

Zoning Ordinances
Zoning ordinances in Madison County govern land use, development, and building requirements and are overseen by the Planning and Zoning Departments. Zoning ordinances work by dividing the land into different zoning districts and establishing rules and guidelines for land use, building placement, density, and setback within the zoning districts. In general, zoning ordinances establish:

- **Zoning districts:** Areas designated for specific types of land use, such as residential, commercial, industrial, agricultural, mixed-use, or special districts.
- **Land usage within a zoning district:** Specifications as to which activities, buildings, and operations are permitted in each zoning district.
- **Enforcement:** Zoning ordinances are enforced by the local building department or zoning enforcement officers.

Zoning is the traditional, and most common, tool available to local jurisdictions to control the use of land. Zoning is used to promote health, safety, and the general welfare of the community. Zoning is used to dictate the type of land use and to set minimum specifications for use such as lot size, building height and setbacks, and density of population.

Zoning ordinances play a significant role in enhancing hazard resilience for communities and can help reduce vulnerability to various natural and man-made hazards by regulating land use and development practices. In Madison County, locally instituted and enforced zoning ordinances provide for:

- **Land Use Planning:** Zoning ordinances designate land use zones within a community, ensuring that certain areas are reserved for particular uses. This can prevent the construction of critical infrastructure, homes, or businesses in high-risk zones, such as floodplains or wildfire-prone areas.
- **Setback Requirements:** Zoning ordinances often mandate specific setbacks, which are distances between structures and property lines or natural features. These setbacks can help prevent buildings from being too close to potential hazards, potentially reducing the risk of damage.
- **Building Height and Design Standards:** Zoning codes can establish building height limits to reduce exposure to certain hazards. Design standards, including materials and construction methods, can be specified to make structures more resilient.
- **Floodplain Management:** Many zoning ordinances incorporate floodplain regulations, which dictate where and how buildings can be constructed within flood-prone areas. These regulations may require buildings to be elevated, use flood-resistant materials, or include openings to allow floodwaters to pass through.

Properly applied, zoning restriction is one of the most effective hazard mitigation tools available.

Floodplain Management Ordinances
Floodplain ordinances and management are one of the most effective hazard mitigation tools available against flooding. Local floodplain ordinances, required for NFIP participants, are often used to prevent inappropriate development in floodplains and to reduce flood hazards. In general, they allow the jurisdiction to:

- Minimize the extent of floods by preventing obstructions that inhibit water flow and increase flood height and damage.
- Prevent and minimize loss of life, injuries, and property damage in flood hazard areas.
- Promote the public health, safety and welfare of citizens in flood hazard areas.
- Manage planned growth.
- Grant permits for use in development within special flood hazard areas that are consistent with the community ordinance and the NFIP under 44 CFR 60.3.

The NFIP floodplain management regulations work alongside local building codes by providing specific flood-related requirements that must be met in addition to general building code standards. In NFIP communities, when constructing or substantially improving a structure in a Special Flood Hazard Area (SFHA), the structure must be elevated to or above the Base Flood Elevation (BFE), which is a requirement imposed by the NFIP's regulations.

Code and Ordinance Summary
The following table indicates, with an x, if the participating jurisdiction has the above enumerated codes and ordinances. Please note that none of the participating school districts have codes or ordinances.

Table 23: Jurisdictional Codes and Ordinances

Jurisdiction	Building Code	Zoning Ordinance	Floodplain Ordinance
Madison County	X (RCO 2019)	x	x
City of London	x (OBC 2024, RCO 2019)	x	x
Village of Midway			
Village of Mt. Sterling	x (OBC 2024, RCO 2019)	x	
Village of Plain City	x (OBC 2024, RCO 2019)	x	x
Village of South Solon			
Village of West Jefferson	x (OBC 2024, RCO 2019)	x	x

Note: Blank indicates no code or ordinance

Additionally, as part of this planning effort, personnel charged with regulating or overseeing development and zoning were given the opportunity to review and comment of the elements of this plan. The following personnel were identified:

Table 24: Madison County Building and Zoning Stakeholders

Name	Title	Jurisdiction or Agency
Madison County	Thomas Hale	Building Official
City of London	Thomas Hale	Building Official
Village of Midway	-	-
Village of Mt. Sterling	Thomas Hale	Building Official / Zoning Administrator
Village of Mt. Sterling	Kristie West	Zoning and Code Enforcement Officer
Village of Plain City	Thomas Hale	Building Official
Village of Plain City	Derek Hutchinson	Village Planner
Village of South Solon	-	-
Village of West Jefferson	Thomas Hale	Director / Building Official
Village of West Jefferson	Kristie West	Zoning and Code Enforcement Officer

4.4 Jurisdictional Plans

Planning plays a critical role in hazard mitigation by helping communities identify, assess, and reduce risks associated with natural and man-made hazards. Effective planning involves a proactive, strategic, and comprehensive approach to minimize the impact of disasters and enhance community resilience. Jurisdictions were asked if they had completed the following plans:

- **Capital Improvement Plan:** Allocates funding for infrastructure projects, including those that enhance resilience, such as stormwater management systems and seismic retrofits.

- **Community Wildfire Protection Plan**: Focused on reducing wildfire risks, this plan involves community input and includes strategies for fuel reduction, public education, and emergency response improvements.
- **Comprehensive Plan:** A comprehensive plan establishes the overall vision for a jurisdiction and serves as a guide to decision making, and generally contains information on demographics, land use, transportation, and facilities. As a comprehensive plan is broad in scope the integration of hazard mitigation measures can enhance the likelihood of achieving risk reduction goals.
- **Emergency Operations Plan:** An emergency operations plan outlines the responsibility and means and methods by which resources are deployed during and following an emergency or disaster. In Madison County, the overarching county provides emergency operation planning for jurisdictions within its borders.
- **Floodplain Management Plan:** This plan aims to manage flood risks through zoning, building codes, and public education, often in coordination with FEMA's NFIP.
- **Land Use and Zoning Plan:** These plans regulate development to minimize exposure to hazards, such as restricting construction in flood-prone or wildfire-prone areas.

The following table indicates, with an x, if Madison County and participating municipalities (village, town, city) have the above enumerated plans. Please note that some of these are umbrella plans from Madison County providing coverage to the community.

Table 25: Jurisdictional Plans

Jurisdiction	Capital Improvement	Community Wildfire Protection	Comprehensive	Emergency Operations*	Floodplain Management	Land Use and Zoning
Madison County	x		x	x	x	x
City of London				x	x	
Village of Midway				x		
Village of Mt. Sterling				x		
Village of Plain City	x		x	x		x
Village of South Solon				x		
Village of West Jefferson				x	x	x

Note: Blank indicates no plan
Note: * May be under county plan

4.5 Financial Capabilities

Madison County and all participating jurisdictions can raise revenue through the application of a tax, an assessment, or a fee, each approved by a statutory authority. The differences between a tax, assessment, and fee are primarily related to their purpose and how they are imposed:

- **Tax:** A mandatory financial charge imposed by a government on individuals or entities to generate revenue for public services, such as schools, roads, and public safety. Taxes are broad and general in nature.
- **Assessment:** A charge levied on property owners to fund specific local improvements that benefit their property, like road paving or sewer systems. It is usually proportional to the benefit received.
- **Fee:** A charge for a specific service provided by the government, such as a building permit, park entry, or utility connection. Fees are usually voluntary and paid directly by the user of the service.

Additionally, Madison County and all participating jurisdictions can borrow money in a number of different ways, generally used as a means of financing large projects such as infrastructure and buildings. Major methods include:

- **General Obligation Bonds:** General obligation bonds have been the traditional form of financing for capital projects such as land acquisition, park development, and transportation projects that are owned and operated by the county. In general, repayment is guaranteed by both tax revenue and operating revenue.

- **Revenue Bonds:** Generally used to finance water and wastewater projects, airports, and stormwater systems. Payment for debt service on revenue bonds comes from user fees generated by the capital facility that is being built.
- **Local Improvement District Bonds:** When a capital project is going to primarily benefit a subset of the population, a Local Improvement District can be formed. Local Improvement Districts are commonly used for projects such as street improvements, water and sewer systems, and the burying of power lines. Bond payment is through an assessment to property owners in the improvement district.

Concerning hazard mitigation, Madison County and all participating jurisdictions have numerous avenues to fund potential projects, including:

- **Grants:** Participating jurisdictions can apply for state and federal grants for hazard mitigation projects through myriad programs.
- **Bond Issuance:** Participating jurisdictions can issue bonds to finance large-scale mitigation projects, such as infrastructure upgrades.
- **Public-Private Partnerships:** Participating jurisdictions can collaborate with private entities to fund and implement mitigation measures.
- **Reserves and General Funds:** Participating jurisdictions may allocate funds from their general budget or reserves for mitigation activities.

Participating Stakeholder Financial Capability Summary
The following table indicates, with an x, if Madison County and participating municipalities (village, town, city) have the above enumerated financial capabilities:

Table 26: Participating Jurisdiction Financial Capabilities

Jurisdiction	Tax	Assessment	Fee	Grant Application	Public-Private Partnership	Reserves and General Funds
Madison County	x	x	x	x	x	x
City of London	x	x	x	x	x	x
Village of Midway	x	x	x	x	x	x
Village of Mt. Sterling	x	x	x	x	x	x
Village of Plain City	x	x	x	x	x	x
Village of South Solon	x	x	x	x	x	x
Village of West Jefferson	x	x	x	x	x	x

In Ohio, public school districts possess limited but defined financial capabilities that can support hazard mitigation. Districts rely primarily on state funding and local property tax revenues, which must be authorized by voters through levies. They also have the ability to issue bonds, subject to voter approval, to finance capital improvements such as facility upgrades and safety enhancements. While this authority provides a mechanism to fund large-scale projects, discretionary revenues are generally limited, and schools cannot impose tuition, mandatory fees, or special assessments. Consequently, hazard mitigation initiatives in Madison County school districts typically depend on successful voter support for levies or bonds, supplemented by external funding sources such as state or federal mitigation grants or partnerships with local governments.

4.6 Community-Based Classifications

Madison County currently participates in the following community-based classifications, which attest to the continued investment in community resilience.

StormReady Community
The StormReady program is a community preparedness initiative developed by the NWS to enhance the ability to prepare for and respond to severe weather events. The goal of StormReady is to help communities develop comprehensive weather safety plans that save lives and protect property. Key Components of the program include:

- **Establishing Warning Systems:** Communities must have multiple ways to receive severe weather warnings and alert the public. This can include NOAA Weather Radios, emergency alert systems, and local broadcast media.
- **Emergency Operations Center:** A designated location where emergency managers and public officials can monitor weather conditions and coordinate responses.
- **Public Education Programs:** Communities in this program must promote weather safety and preparedness through public outreach, including safety fairs, school programs, and distributing weather information materials.
- **Training:** Community leaders and emergency managers undergo training on how to prepare for, respond to, and recover from severe weather.
- **Advanced Monitoring Systems:** Communities are required to monitor local weather conditions in real-time, often using local spotters, weather stations, and other technology to keep track of changing weather patterns.
- **Formal Emergency Plans:** Communities must develop and maintain formal plans for responding to various types of severe weather, including hurricanes, tornadoes, floods, and winter storms. These plans should detail evacuation routes, shelter locations, and post-disaster recovery strategies.
- **Collaboration with the NWS:** Communities work closely with their local NWS office to ensure they have the latest information and resources for weather preparedness and response.
- **Potential Insurance Benefits:** Some insurance providers may offer benefits or discounts to communities that are StormReady certified, reflecting the reduced risk of weather-related damage.

Madison County is a StormReady community.

4.7 Special District Mitigation Capabilities

Special districts, which are independent government units created for specific purposes, have several mitigation capabilities:

- **Infrastructure Development and Maintenance:** They can build and maintain infrastructure like levees, drainage systems, or firebreaks to reduce the impact of natural hazards.
- **Emergency Services:** Some districts manage fire protection, flood control, or emergency medical services, which are critical in disaster response and mitigation.
- **Land Use and Zoning:** They can enforce zoning regulations that limit development in high-risk areas.
- **Public Education and Outreach:** Special districts often provide information and resources to help communities prepare for and respond to hazards.
- **Collaboration:** They often work with local, state, and federal agencies to coordinate mitigation efforts and share resources.

Fire districts mitigation capabilities include:

- **Fire Prevention Programs:** They conduct inspections, enforce fire codes, and promote fire-safe practices within communities.
- **Hazardous Fuels Management:** Fire districts manage vegetation to reduce fuel loads, including controlled burns and clearing brush, to prevent the spread of wildfires.
- **Emergency Response Planning:** They develop and implement response plans for wildfires, floods, and other emergencies, ensuring quick and effective action.
- **Public Education:** Fire districts educate residents on fire safety, evacuation procedures, and emergency preparedness.
- **Infrastructure Protection:** They work to protect critical infrastructure and buildings by ensuring compliance with building codes and fire-resistant construction practices.

Participating school district mitigation capabilities include:

- **Building Safety:** They enforce building codes and design schools to withstand hazards like earthquakes, floods, and tornadoes.
- **Emergency Preparedness Plans:** School districts develop and regularly update emergency response plans, including evacuation routes, shelter-in-place procedures, and communication strategies.
- **Drills and Training:** They conduct regular safety drills and provide training for students, teachers, and staff on how to respond during emergencies.
- **Community Coordination:** School districts collaborate with local emergency services, law enforcement, and public health agencies to ensure a coordinated response to hazards.
- **Resilience Education:** They integrate disaster preparedness into the curriculum, teaching students about hazard awareness and safety practices.

Additionally, Ohio public school districts possess multiple statutory revenue mechanisms beyond their routine operating funds. Boards may secure voter approval for supplemental property-tax levies or bond issues, adopt a district income tax, and issue short-term anticipation notes backed by forthcoming collections. Additional income from instructional-material fees, extracurricular charges, facility rentals, grants, donations, and TIF-related payments further diversifies funding sources, ensuring districts can credibly meet the 25 percent non-federal share required for FEMA hazard-mitigation projects.

The above enumerated capabilities allow special districts to play a crucial role in reducing risks and enhancing community resilience against natural hazards. The following table list relevant special districts within Madison County:

Table 27: Madison County Special Districts

District Type	Special District Name	Representative	Title
Fire	Tri-County Joint Fire District	Dave Taylor	Fire Chief
School District	Jefferson Local	Dr. Jessica Mamais	Superintendent
School District	Jonathan Alder Local	James Miller, Ed.D.	Superintendent
School District	London City Schools	Dr. Lou Kramer	Superintendent
School District	Madison-Plains Local	Chad Eisler	Superintendent

4.8 Jurisdictional Compliance with NFIP

Madison County NFIP participating communities are committed to continued involvement and compliance. To help facilitate compliance, NFIP participating communities:

- Meet the minimum standards set forth in the program.
- Adopted floodplain regulations through local ordinance.
- Enforce floodplain ordinances through building restrictions.
- Regulate new construction in Special Flood Hazard Areas as outlined in their floodplain ordinance.
- Utilize FEMA DFIRMs, where available.
- Monitor floodplain activities.

A community's NFIP coordinator plays a crucial role in managing and implementing floodplain management activities to reduce flood risk. Their responsibilities typically include:

- **Administering Floodplain Regulations:** Ensuring the community complies with NFIP standards by enforcing local ordinances and building codes in designated flood-prone areas.
- **Assisting Property Owners:** Providing guidance on flood insurance requirements, helping residents understand their flood risk, and facilitating access to NFIP insurance.
- **Maintaining Flood Maps:** Keeping and updating FIRMs to reflect current flood risks and communicating changes to stakeholders.

- **Coordinating Flood Risk Reduction Efforts:** Collaborating with federal, state, and local agencies to implement flood mitigation strategies and projects.
- **Community Outreach:** Educating the public about flood hazards, mitigation measures, and the importance of flood insurance coverage.

By fulfilling these duties, NFIP coordinators help reduce flood damage and promote community resilience. The following represent NFIP coordinators for each participating community within Madison County. All eligible jurisdictions participate:

Table 28: Madison County Jurisdictional NFIP Coordinators

Jurisdiction or Agency	Name	Title
Madison County	Dennis Payne	Planning and Zoning Administrator
City of London	Thomas Hale	Building Official
Village of Plain City	Conin Powers	Zoning Specialist
Village of West Jefferson	Thomas Hale	Director / Building Official

Participation in the NFIP is based on an agreement between the municipality and the federal government. If a municipality agrees to adopt and enforce a floodplain ordinance designed to reduce future flood risks, all citizens in the participating municipality can purchase flood insurance.

As part of NFIP participation, communities must:

- Use current NFIP flood maps in adopting floodplain management regulations.
- Require permits for all development in SFHAs
- Ensure that development does not increase the flood hazard on other properties.
- Meet current elevation standards. Ensuring the lowest occupied floor is elevated to or above the base flood elevation indicated on the NFIP flood map.

While most floodplain requirements have been incorporated into the current Building Codes, some additional provisions and regulations may be required by a community. Communities participating in the NFIP are required to adopt, enforce and maintain a local floodplain ordinance as a stipulation of compliance with the program. The purpose of this ordinance is to ensure public safety, minimize impact to persons and property from flooding, protect watercourses from encroachment, and maintain the capability of floodplains to retain and carry off floodwaters. The local floodplain administrator is typically the municipal official responsible for overseeing the enforcement and update of the document.

Each participating jurisdiction in the NFIP has their own NFIP Coordinator to ensure base flood elevation certificates are completed for all new construction in the planning area, ensure any development in a flood plain is accompanied by a Flood Hazard Development Certificate, and further develops the NFIP program in the planning area to mitigate flood risk to its population. Both certificates are required prior to construction and to be completed by a licensed surveyor.

Madison County jurisdictional floodplain ordinances are typically enforced by law enforcement departments and/or code enforcement offices. For all Madison County NFIP participating communities the enforcement process works as follows:

- **Identification of Violations:** Violations are often identified through various means, such as citizen complaints, routine inspections, or observations by enforcement officers.
- **Notification:** Once a violation is identified, the responsible party is typically notified of the violation. This notification may come in the form of a written citation, warning letter, or verbal communication depending on the severity of the violation and local procedures.
- **Correction Notice:** In many cases, the responsible party is given a certain amount of time to correct the violation. They may be required to remedy the situation, obtain necessary permits, or comply with specific regulations.

- **Follow-up Inspections:** After the designated correction period, enforcement officers may conduct follow-up inspections to ensure that the violation has been addressed satisfactorily.
- **Penalties and Fines:** If the responsible party fails to comply with the ordinance or correct the violation within the specified timeframe, they may face penalties or fines. These penalties can vary depending on the nature and severity of the violation and may escalate for repeated offenses.
- **Legal Action:** In cases of persistent non-compliance or serious violations, local authorities may initiate legal proceedings against the responsible party. This can involve court appearances, injunctions, or other legal measures to compel compliance.

Additionally, FEMA has specific requirements NFIP communities must follow both before (pre-disaster) and after (post-disaster) a flood event. These requirements are designed to mitigate flood risks, promote sustainable development, and ensure eligibility for federal disaster assistance and flood insurance benefits. The following figure represents both pre- and post-disaster NFIP community requirements:

Figure 8: Pre- and Post-Disaster Community NFIP requirements

Source: FEMA

When structures located in the SFHAs are substantially modified (more than 50% damaged or improved) they are required to be brought into compliance with current NFIP standards and local building codes. In cases of repairs being conducted as a result of damage, jurisdictional NFIP Coordinators are responsible for substantial damage and improvement determinations. These determinations are required for compliance in the NFIP and must be completed before residents begin repairs or permits are issued.

All NFIP-participating jurisdictions in Madison County implement the substantial improvement/substantial damage provisions of their floodplain management ordinances after a disaster. After a damaging event, local Floodplain Administrators and building officials inspect affected structures in the Special Flood Hazard Area. Using FEMA's definitions (≥50% of the building's pre-damage market value), they determine whether repairs or improvements qualify as substantial damage or substantial improvement.

- **If substantial improvement/substantial damage is met (≥50%):** The structure must be brought into full compliance with current floodplain regulations, most often elevation of the lowest floor above the Base Flood Elevation, floodproofing (non-residential), and utility protection.
- **If substantial improvement/substantial damage is not met (<50%):** Repairs can proceed, but must still meet all regular floodplain and building code requirements.
- **For NFIP-insured buildings:** An official substantial improvement/substantial damage letter allows property owners to access Increased Cost of Compliance funds to help pay for elevation, demolition/rebuild, relocation, or floodproofing.

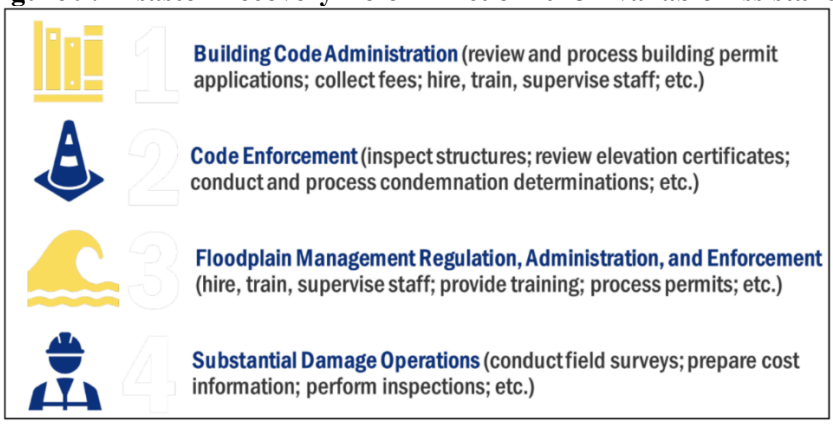
Jurisdictions typically use FEMA's Substantial Damage Estimator tool and follow guidance in FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference to document decisions.

However, the May 2020 Report to Congressional Committees on the National Flood Insurance Program by the United States Government Accountability indicates "FEMA generally does not collect or analyze the results of these assessments, limiting its ability to ensure the process operates as intended. Furthermore, FEMA has not clarified how communities can access NFIP claims data. Such data would help communities target substantial damage assessments

after a flood." This has been found to be true in Madison County, with submitted information and data underutilized and some FEMA available data unshared and/or unadvertised.

Section 1206 of the Disaster Recovery Reform Act of 2018 authorizes the FEMA to provide communities with the resources to administer and enforce building code and floodplain management ordinances following a major disaster declaration through FEMA's Public Assistance Program. To be eligible for reimbursement under the Public Assistance Program, including for the Disaster Recovery Reform Act of 2018 Section 1206, communities must be designated for Public Assistance permanent work under a major disaster declaration and be legally responsible to administer and enforce building codes or floodplain management regulations. Communities must also be in good standing with the NFIP. Available assistance includes:

Figure 9: Disaster Recovery Reform Act of 2018 Available Assistance



Source: FEMA

It is worth noting that this assistance is available for a variety of hazards occurrence types, not just flooding.

Key to achieving across the board reduction in flood damages is a robust community assistance, education, and awareness program. As such, NFIP participating jurisdictions will continue to develop both electronic (including social media) and in person outreach activities.

4.9 Challenges and Opportunities for Capability Improvement

As always, challenges exist for all participating jurisdictions due to the day-to-day demands of the working environment including staffing issues, budget restrictions, and staffing turnover. These issues can, and do, impact the utilization and incorporation of the LHMP and the completion of identified hazard mitigation projects.

As part of this planning process, the MPC worked to identify gaps and deficiencies identified in the completion of this LHMP. Resulting from this assessment is a series of problem statements, concise descriptions of issues or challenges that need to be addressed. These problem statements were determined to be applicable to all participating jurisdictions:

- Available funding for the completion of hazard mitigation projects is at a premium, with all participating jurisdiction seeing minimal room in the budget for any required project match.
- The difficulties in applying for and managing hazard mitigation grants are a challenge for both all participating jurisdictions
- Staffing at all levels is stretched thin, with many personnel wearing multiple hats, compromising mitigation capabilities.

Improving capabilities can lead to enhanced performance, increased efficiency, and better outcomes in hazard mitigation planning and implementation. The following identify recommended improvements for all jurisdictions, with some recommendations being applicable to all jurisdictions, and others being specific to identified jurisdictions:

- All participating jurisdictions should conduct more extensive educational outreach to all communities on mitigation actions and methodologies.

- Participating NFIP communities should apply for membership in the CRS to allow citizens to receive discounts off their federally backed flood insurance policies.
- All participating jurisdictions should apply for membership in the Firewise USA program.
- Continued instruction should be solicited from Ohio EMA and FEMA Region V on grant application and grant management strategies to reflect changing requirements.
- Participating jurisdictions not in the NFIP should apply for membership.
- Participating jurisdictions that do not have wildfire specific codes or ordinances should draft and adopt them.

Table 29: Participating Jurisdiction Opportunities for Improvement

	Community Outreach	CRS Application	Firewise Application	Grant Education	NFIP Application	Wildfire Ordinance
Madison County	x	x	x	x	x	x
City of London	x	x	x	x	x	x
Village of Midway	x	x	x	x		x
Village of Mt. Sterling	x	x	x	x		x
Village of Plain City	x	x	x	x	x	x
Village of South Solon	x	x	x	x		x
Village of West Jefferson	x	x	x	x	x	x
Jefferson Local	x			x		
Jonathan Alder Local	x			x		
London City Schools	x			x		
Madison-Plains Local	x			x		

To help overcome many of these identified challenges, participating jurisdictions will work collaboratively using the following strategies, as appropriate:

- **Innovation and Adaptation:** Foster a culture of innovation and adaptability. Encourage employees to think creatively, embrace change, and explore new ways of doing things to overcome challenges.
- **Training and Development:** Invest in training and development to enhance skills and knowledge.
- **Communication Improvement:** Enhance communications and provide clear and transparent communication when sharing information, aligning teams, and addressing concerns.
- **Collaboration and Teamwork:** Encourage collaboration and teamwork which allows for the pooling of diverse skills and perspectives, leading to more effective problem-solving (the MPC is a good example of effective use of this strategy).
- **Technology Adoption:** Embrace technology to streamline operations and enhance productivity.
- **Agile Project Management:** Implement agile project management methodologies to enhance flexibility and responsiveness to changing conditions. Agile approaches allow teams to adapt quickly to challenges.

As appropriate, these strategies will be tailored for specific circumstances, with a combination of these strategies often being more effective than relying on a single approach.

The authority to expand or improve jurisdictional capabilities reside in the Ohio Revised Code Titles 3 (Counties) and 7 (Municipal Corporations), which establish the jurisdictional authorities that form the foundation for hazard mitigation planning in Ohio. Title 3 grants counties authority over budgeting, emergency declarations, land use, and infrastructure decisions, enabling them to coordinate multi-jurisdictional mitigation strategies and allocate resources to resilience projects. Title 7 empowers municipalities through home rule to enforce zoning, building codes, and land-use regulations, while also maintaining responsibility for public safety, utilities, and critical infrastructure. Together, these authorities allow counties to lead regional coordination and resource management while municipalities implement local enforcement and infrastructure improvements, creating a complementary system that enhances overall jurisdictional capability to reduce hazard risks.

Section 5 – Hazard Identification and Risk Assessment

5.1 Introduction

The goal of this hazard mitigation is to reduce the future impacts of hazards, including deaths and injuries, property damage, and disruption to local and county economies, and to further reduce the amount of public and private funds spent to assist recovery. To complete this goal, hazard mitigation decision-making in this plan has been based on a robust risk assessment, completed to identify natural, human caused, and technological hazards that represent a risk to Madison County. The following provide a definition of the risk assessment terms used during this assessment:

- **Hazard:** An act or phenomenon that has the potential to produce harm or other undesirable consequences to a person or thing.
- **Exposure:** The people, property, systems, or functions that could be lost to a hazard. Generally, exposure includes what lies in the area the hazard could affect.
- **Vulnerability:** Vulnerability is susceptibility to physical injury, harm, damage, or economic loss. It depends on the asset's construction, contents, and economic value of its functions.
- **Risk:** A function of hazard, vulnerability, and exposure. It refers to the likelihood of an event resulting in an adverse condition that causes injury or damage.

In order to accomplish this assessment, all relevant natural, human caused, and technological hazards, potential vulnerabilities, and exposures were identified. As potential hazards, vulnerabilities, and exposure are identified Madison County can continue to develop a strategy to identify and prioritize mitigation action to defend against these potential risks.

5.2 Declared Federal Disasters

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 U.S.C. §§ 5121-5206) provides for the Federal support of State and local governments and their citizens when impacted by an overwhelming disaster. The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as amended, establishes the process for requesting a Presidential disaster declaration and defines the type of assistance available.

If it is apparent that a Presidential disaster declaration may be necessary to assist in the recovery of an impacted area, Madison County and FEMA Region V will conduct a Preliminary Damage Assessment (PDA). This assessment is used to determine:

- The extent of the event.
- The impact of the event on individuals and public facilities.
- The types of federal assistance that may be needed.

Once the PDA is complete, and if a determination is made that the damages exceed available State of Ohio resources, the Governor may submit through FEMA Region V a declaration request to the President.

A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work. Not all programs, however, are activated for every disaster. The determination of which programs are authorized is based on the types of assistance specified in the Governor's request and the needs identified during the initial and subsequent PDAs. FEMA disaster assistance programs may include:

- Individual Assistance
- Public Assistance
- Hazard Mitigation

To recognize and encourage mitigation, FEMA considers the extent to which mitigation measures contributed to the reduction of disaster damages. This could be especially significant in those disasters where, because of mitigation, the estimated public assistance damages fell below the per capita indicator.

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. The MPC reviewed the historical federal disaster declarations to assist in hazard identification. The following table details Disaster Declarations for Madison County:

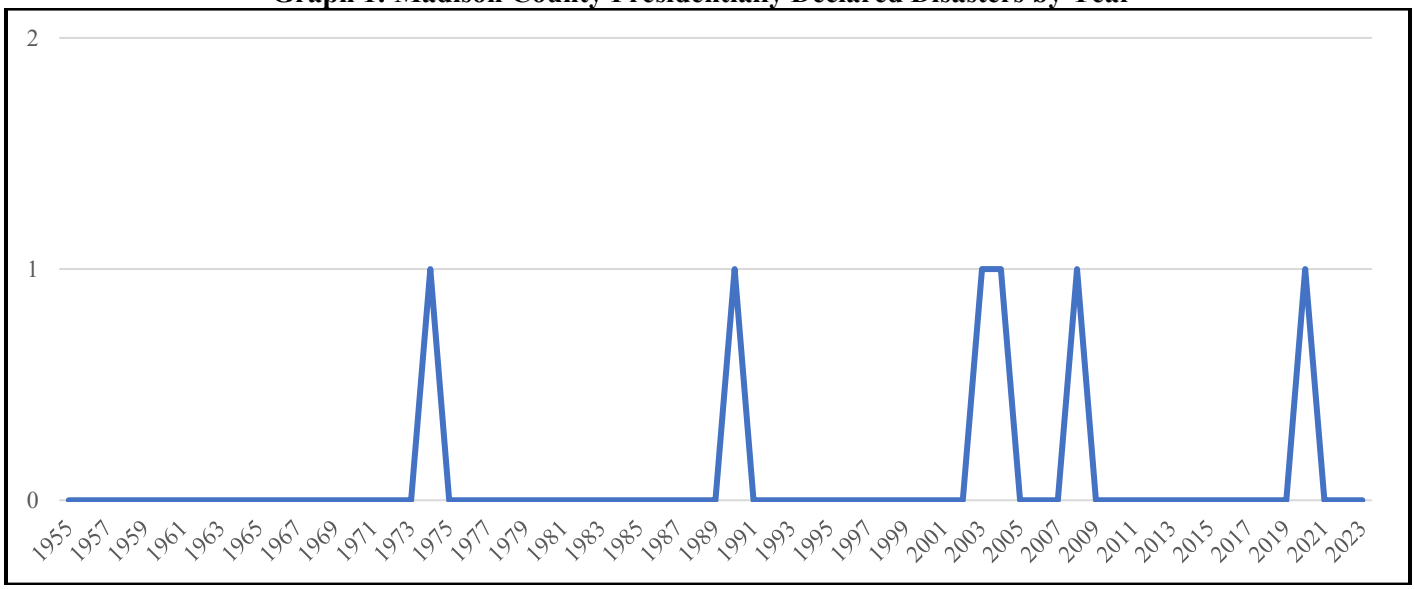
Table 30: Madison County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual Assistance	Public Assistance	Mitigation Grant Program
DR-4507-OH	03/31/2020	Ohio Covid-19 Pandemic	$147,888,450	$557,889,884	$27,297,011
DR-1805-OH	10/24/2008	Severe Windstorm (Tropical Depression Ike)	-	$38,841,922	-
DR-1556-OH	09/14/2004	Severe Storms and Flooding	$23,662,227	$25,804,256	-
DR-1453-OH	03/14/2003	Severe Winter Storm	$2,609,145	31,856,039	-
DR-870-OH	06/06/1990	Flooding, Severe Storms, Tornado	-	-	-
DR-421-OH	04/04/1974	Tornadoes	-	-	-

Source: FEMA
-: Not reported

The following graph represents Presidentially Declared Disasters in the Madison County by year, starting in 1953:

Graph 1: Madison County Presidentially Declared Disasters by Year



Source: FEMA

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local or Indian tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe. The total amount of assistance provided for in a single emergency may not exceed $5,000,000. The following types of assistance are available under an Emergency Declaration:

- Public Assistance, Categories A (debris removal) and B (emergency protective measures)
- Individual Assistance, the Individuals and Households Program

The MPC reviewed the historical federal emergency declarations to assist in hazard identification. The following table details Emergency Declarations for Madison County.

Table 31: Madison County Emergency Declarations

Designation	Declaration Date	Incident Type	Public Assistance
EM-3457-OH	3/13/2020	Ohio Covid-19 Pandemic	-
EM-3346-OH	06/30/2012	Severe Storms	-
EM-3286-OH	04/24/2008	Ohio Snow	$7,122,146
EM-3250-OH	09/13/2005	Ohio Hurricane Katrina Evacuation	$2,541,600
EM-3198-OH	01/11/2005	Ohio Snow	$8,636,638
EM-3055-OH	01/26/1978	Ohio Blizzards and Snowstorms	-

Source: FEMA
-: Not reported

The Governor, or the Governor's Authorized Representative, may submit a request for a fire management assistance declaration as required. FEMA will approve declarations for fire management assistance when it is determined that a fire or fire complex on public or private forest land or grassland threatens such destruction as would constitute a major disaster. The MPC reviewed the historical fire management declarations to assist in hazard identification. No fire management declarations were recorded for Madison County:

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. This authority allows the governor to activate resources, issue orders, and coordinate responses to protect public safety. The Emergency Management Act (NMSA 1978, Section 12-10-1 to 12-10-10) gives the governor broad authority to declare a state of emergency or disaster when there is an “occurrence or imminent threat” of widespread or severe damage, injury, or loss of life or property due to natural or human-caused disasters. The following represent State of Ohio disaster declarations for Madison County from 2019-2024.

Table 32: Governor of Ohio Madison County Disaster Declarations, 2020 - 2025

Year	Executive Order	Incident Type
2020	2020-01D	Public Health Emergency, COVID-19

Source: Ohio Governor’s Office

5.3 Identified Potential Hazards

One of the first steps in developing a hazard assessment is to identify the hazards that have a reasonable risk of occurring. Proper identification allows for appropriate and well-planned action in order to mitigate the extent and cascading impacts of an incident. Furthermore, while not all disaster contingencies can be planned for, applying an all-hazards approach to the mitigation process does yield greater awareness and better preparedness for unforeseen hazard incidents overall.

Public Comment: *The weather has been doing some different things lately.*

The MPC met to discuss previously identified hazards and deliberate on any changes or additions to the regional hazard profile. A thorough and comprehensive revision of data for each hazard was completed as part of this plan update. Additionally, this plan has worked, as per FEMA recommendations, to merge similar hazards together with the aim of both simplifying the usage of the plan and reducing duplication of effort.

The MPC confirmed the following natural hazards that may impact the Madison County:

- Drought
- Extreme Heat
- Flood
- Severe Weather
- Severe Winter Weather
- Tornadoes

The following table indicates the improvement of worsening of conditions related to the identified hazards in this LHMP since the completion of the 2020 LHMP:

Table 33: Natural Hazard Change in Conditions

Natural Hazard	Change in Conditions	Notes
Drought	Worsening	Available data indicates that the rate of drought occurrence is increasing.
Extreme Heat	Worsening	Data indicates that future conditions may exacerbate these conditions.
Flood	Worsening	Data indicates that both the average amount of rainfall and the number of heavy rainfall events have increased. Additionally, increased drought occurrences have exacerbated conditions related to flash flood events.
Severe Weather	Worsening	Data indicates that incidences of severe weather are likely to increase due changing conditions.
Severe Winter Weather	Improving	Data indicates that incidences of severe winter weather are likely to decrease due to changing conditions.
Tornado	Worsening	Data indicates that incidences of tornadoes are likely to increase due to changing conditions.

Based on discussion with the MPC, a lack of identified risk or history, and geographic improbability, numerous FEMA identified hazards such as coastal erosion and hurricane were not included in the scope of this plan. Additionally, FEMA's Local Mitigation Plan Review Guide emphasizes that hazard mitigation plans should prioritize hazards that present both a reasonable probability of occurrence and significant impacts during the planning period. As such, the following natural hazards, while recognized as potential minor hazards, did not warrant full discussion for the enumerated reasons:

- **Dam Failure:** One high hazard dam was noted in the county, Lake Choctaw Dam. Despite this classification, the probability of catastrophic failure is considered very low. This dam is owned and operated by a private entity, with an Emergency Action Plan created in 2014. A review of aerial photography for the dam indicates three potentially at-risk structures (residential homes), and three roads, West Choctaw Drive, Arbuckle Road, and Green Lane in the immediate potential inundation area. The rest of the surrounding area is largely agricultural. A review of the Emergency Action Plan from the Lake Choctaw Property Owner's Association, owners and operators of the dam, notes the same vulnerabilities. As this dam is privately owned, and with the noted limited vulnerability, the MPC has opted to focus available resources on other hazards. A such, the County/MPC has chosen to defer meeting HHPD requirements. Please note that the LHMP will be amended in coordination with OEMA and the ODNR Dam Safety Program should the dam owner and jurisdictional sponsor pursue HHPD funding.
- **Coastal Erosion:** No potential exposure to this hazard.
- **Earthquake:** Mapping from the USGS indicates an extremely low likelihood for occurrence and damage from an earthquake event. Additionally, Madison County has not been the epicenter of any earthquakes since recording began and there have been no deaths or major injuries reported.
- **Landslide:** Mapping by the Department of Natural Resources indicates no known susceptible slide areas in Madison County. Additionally, no events have been recorded.
- **Land Subsidence:** Mapping by the State of Ohio indicates no known areas of collapsible soils in Madison County. Additionally, no events have been recorded.
- **Seiche/Coastal Flooding:** No potential exposure to this hazard.
- **Wildfire:** Available data from the USDA indicates that Madison County is in the lowest category of wildfire potential areas. Additional data from the State of Ohio indicates that Madison County has had 14 recent reported incidents burning an average of 0.62 acres. Finally, the largely agricultural nature of the county does not lend itself to wildfire events as much of the acreage is maintained and irrigated by private landowners. However, due to changing conditions, this hazard has been identified as a potential future concern and will be monitored for more frequent occurrences or larger impacts.

5.4 Hazard Planning Significance

For the purposes of this plan, hazard planning significance refers to the relevance of the identified hazard to the jurisdictions of Madison County when calculating risk and vulnerability. In order to help quantify the planning significance for a hazard, data was reviewed on three levels, federal (various data sets), state (State of Ohio 2023 Hazard Mitigation plan and available state databases and GIS resources), and local (data relevant to occurrence and vulnerability on a county and local level). This allowed for a comparison between data sets for each hazard type and allowed for a summation at the county level. It is recognized that inconsistencies in methodologies and data make it difficult to make a direct comparison across all data levels. However, as possible, collected data was translated into a unified model that accounted for any variability in data and methodologies. The result of this assessment provides a larger scale snapshot of how Madison County jurisdictions view risk and allowed for integration of hazard data into the LHMP.

Augmenting state and local data, FEMA's NRI dataset and online tool was used to help determine local community risk for identified natural hazards in this LHMP. This tool is useful in that it helps provide a simple, visual method of understating local level jurisdictional vulnerability. However, like all clearinghouse databases, it is recognized to have some limitations. As such, and as mentioned above, the data was vetted by Madison County and participating jurisdictions against local and state data and analysis. Where discrepancies exist, they are noted and discussed in the relevant hazard section.

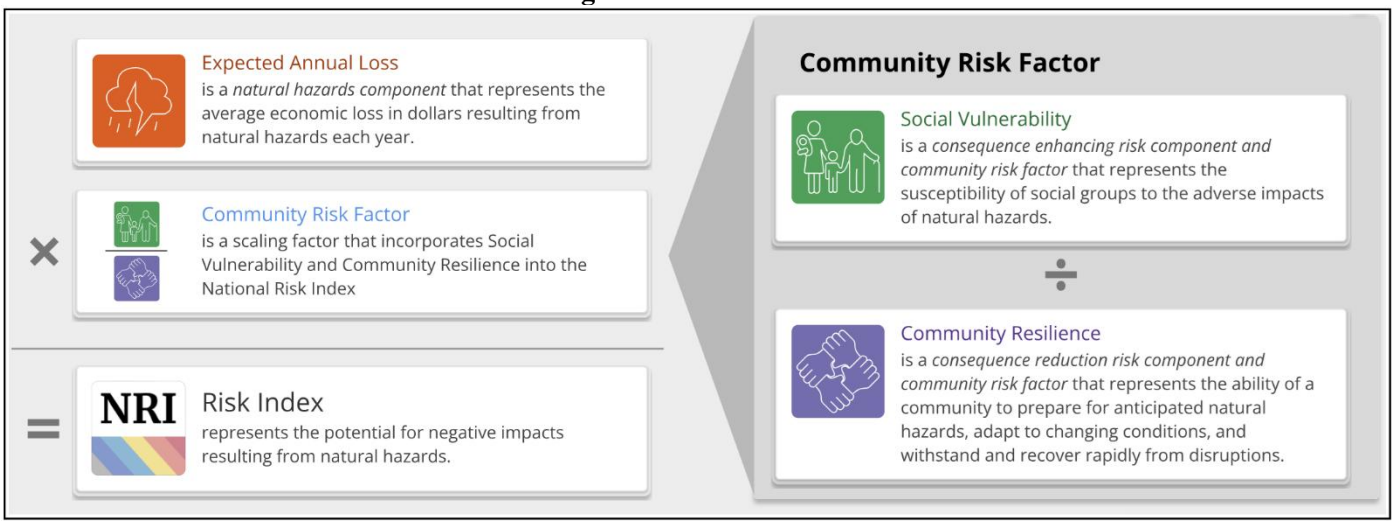
The risk equation behind the Risk Index includes three components, Expected Annual Loss (EAL), social vulnerability (previously discussed), and community resilience (previously discussed). The dataset supporting EAL provides estimates measured in 2022 U.S. dollars. The datasets supporting the social vulnerability and community resilience components have been standardized using a minimum-maximum normalization approach prior to being incorporated into the NRI risk calculation.

As part of the NRI, EAL represents the average economic loss in dollars resulting from a hazard each year. It quantifies loss for relevant consequence types, buildings, people, and agriculture. An EAL score and rating represent a community's relative level of expected losses each year when compared to all other communities at the same level. EAL is calculated using an equation that includes exposure, annualized frequency, and historic loss ratio risk factors. Exposure is a factor that measures the building value, population, and agriculture value potentially exposed to a natural hazard occurrence. Annualized frequency is a factor that measures the expected frequency or probability of a hazard occurrence per year. Historic loss ratio is a factor that measures the percentage of the exposed consequence type value (building, population, or agriculture) expected to be lost due to an occurrence. EAL represents the average economic loss in dollars resulting from natural hazards each year and is proportional to a community's risk.

To calculate Risk Index values, the NRI generates a Community Risk Adjustment to scale EAL values up or down, depending on their community risk factors, increasing with social vulnerability and decreases with community resilience. For a jurisdiction, a higher social vulnerability results in a higher Risk Index value while higher community resilience results in a lower Risk Index value.

Using these three components, Risk Index values are calculated for each jurisdiction (county and Census tract). The calculated Risk Index values form an absolute basis for measuring Risk within the NRI, and they are used to generate Risk Index percentiles and ratings across communities. The risk equation behind the NRI is as follows:

Figure 10: FEMA NRI



Source: FEMA

For both the Risk Index and EAL there is a qualitative rating that describes the nature of a community's score in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." Because all ratings are relative, there are no specific numeric values that determine the rating.

The National Risk Index provides relative Risk Index percentiles and ratings based on data for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience. Separate percentiles and ratings are also provided for each component: Expected Annual Loss, Social Vulnerability, and Community Resilience. For the Risk Index and Expected Annual Loss, percentiles and ratings can be viewed as a composite score for all hazards or individually for each of the 18 hazard types.

A community's score is represented by its percentile ranking among all other communities at the same level for Risk, Expected Annual Loss, Social Vulnerability and Community Resilience. For example, if a given Census tract's Risk Index percentile for a hazard type is 85.32 then its Risk Index value is greater than 85.32% of all US Census tracts. These scores are then assigned a qualitative rating that describes the community in comparison to all other communities at the same level, ranging from "Very Low" to "Very High." To determine Risk and Expected Annual Loss ratings, a methodology known as k-means clustering or natural breaks is applied to each value. This approach divides all communities into five groups such that the communities within each group are as similar as possible (minimized variance) while the groups are as different as possible (maximized variance). A cubed root transformation is applied to both Risk and Expected Annual Loss values before k-means clustering. Without the transformation, these values are heavily skewed by an extreme range of population and building value densities between urban and rural communities. By applying a cube root transformation, the National Risk Index controls for this characteristic and provides ratings with greater differentiation and usefulness.

Please note that the NRI is built on just two geography levels, counties and Census tracts. Because school-district boundaries do not align with these standard units (they often span multiple tracts and even cross county lines) and there is no single, authoritative national dataset that pairs district boundaries with the NRI's hazard-loss, social-vulnerability, and resilience variables.

The following table summarizes the FEMA NRI for Madison County and participating jurisdictions for all identified natural hazards. Please see Appendix D – Madison County Census Tract Map to correlate census tracts and locations:

Table 34: Participating Jurisdiction All Natural Hazard Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile
Madison County	All	Very Low	22.81
-	39097040101	Very Low	10.32
Village of Plain City	39097040102	Relatively Low	32.69

Table 34: Participating Jurisdiction All Natural Hazard Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile
-	39097040201	Very Low	6.37
-	39097040202	Very Low	13.58
-	39097040400	Relatively Low	45.48
Village of West Jefferson	39097040500	Very Low	25.38
-	39097040600	Relatively Low	38.76
City of London	39097040700	Very Low	17.69
-	39097041000	Very Low	10.12
-	39097041100	Relatively Low	31.11
Village of Mt. Sterling	39097041200	Very Low	21.04
Village of Midway and South Solon	39097041300	Very Low	9.93

Source: FEMA NRI

In order to gain an understanding of vulnerability, the following table details the estimated FEMA EAL data for Madison County and participating jurisdictions (by census tract):

Table 35: Participating Jurisdiction All Natural Hazard EAL

Jurisdiction	Census Tract	EAL	National Percentile	Building EAL	Agricultural EAL	Composite EAL
Madison County	All	Very Low	27.70	$1,910,433	$132,064	$2,875,459
-	39097040101	Very Low	10.39	$79,055	$12,996	$135,273
Village of Plain City	39097040102	Relatively Low	33.83	$213,841	$6,135	$321,954
-	39097040201	Very Low	16.73	$130,272	$3,335	$183,523
-	39097040202	Very Low	14.40	$89,580	$23,169	$165,281
-	39097040400	Relatively Low	44.12	$366,884	$5,739	$421,909
Village of West Jefferson	39097040500	Relatively Low	30.90	$199,859	$4,848	$295,559
-	39097040600	Relatively Low	41.54	$288,847	$981	$395,603
City of London	39097040700	Very Low	16.93	$117,560	$7	$185,044
-	39097041000	Very Low	9.69	$45,553	$1,469	$129,474
-	39097041100	Relatively Low	30.62	$167,654	$29,346	$293,299
Village of Mt. Sterling	39097041200	Very Low	18.34	$128,179	$14,391	$195,199
Village of Midway and South Solon	39097041300	Very Low	12.79	$83,147	$29,647	$153,341

Source: FEMA NRI

The following tables detail the FEMA NRI and EAL ratings for each FEMA evaluated natural hazard for Madison County and participating jurisdictions (by census tract):

Table 36: FEMA NRI Summary, Drought Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low

Table 36: FEMA NRI Summary, Drought Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 37: FEMA NRI Summary, Extreme Heat Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 38: FEMA NRI Summary, Flood Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 39: FEMA NRI Summary, Hail Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low

Table 39: FEMA NRI Summary, Hail Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 40: FEMA NRI Summary, Lightning Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 41: FEMA NRI Summary, Strong Wind Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 42: FEMA NRI Summary, Cold Wave Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low

Table 42: FEMA NRI Summary, Cold Wave Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 43: FEMA NRI Summary, Ice Storm Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 44: FEMA NRI Summary, Winter Weather Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Table 45: FEMA NRI Summary, Tornado Hazard

Natural Hazard	Census Tract	NRI Rating	EAL Rating
Madison County	All	Very Low	Very Low
-	39097040101	Very Low	Very Low
Village of Plain City	39097040102	Relatively Low	Relatively Low
-	39097040201	Very Low	Very Low
Village of West Jefferson	39097040202	Very Low	Very Low
Village of West Jefferson, City of London	39097040400	Relatively Low	Relatively Low
Village of West Jefferson	39097040500	Very Low	Relatively Low
City of London	39097040600	Relatively Low	Relatively Low
City of London	39097040700	Very Low	Very Low
-	39097041000	Very Low	Very Low
-	39097041100	Relatively Low	Relatively Low
Village of Mt. Sterling	39097041200	Very Low	Very Low
Village of Midway and South Solon	39097041300	Very Low	Very Low

Source: FEMA NRI

Where appropriate, differences in vulnerability to identified hazards are noted in each individual hazard section.

5.5 Hazard Occurrence and Assessment Data

NOAA's National Centers for Environmental Information (NCEI) Storm Events Database was used as the primary source of information for previous occurrences of storm events. It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or National Weather Service (NWS) office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Most of the events from NCEI are not associated with a federal emergency or disaster. If the event occurred at the same time as an event that was later determined to be a federal emergency or disaster, it is included with the NCEI data even if it occurred in a county not included in the federal declaration.

Environmental Systems Research Institute ArcGIS v10 was used to determine which critical facilities were located within the boundaries of identified hazards (when applicable, and if data was available). Data was provided by Madison Couty and participating jurisdictions, FEMA's National Flood Hazard Layer and NOAA.

Data was also obtained and utilized using Hazus-MH, Version 2.2 SP1, a program administered by the FEMA used to model losses. Modelling for hazards uses Hazus analysis to estimate losses and projected impacts from historical and annualized hazard events. Hazus default data was used in the analysis, including the 2020 Census and other State and Federal government facility databases. A level I analysis was run in Hazus for flood and earthquake, meaning the default population, building stock, and critical infrastructure data within the program was used to calculate losses and damages. Multiple hazard scenarios were run to estimate losses for the identified hazards. For the earthquake and hurricane hazards, historic event scenarios and probabilistic scenarios were run. Flood losses were analyzed using the 100 return scenarios as well as a probabilistic scenario.

Where appropriate, other utilized modeling types and systems are detailed in the relevant hazard analysis section.

5.6 Jurisdictional Critical Facilities, Assets, and Community Lifelines

Certain facilities and assets, such as infrastructure and community lifelines, have a net positive value on the community as they contribute to the public good by facilitating the basic functions of society. These facilities maintain order, public health, education, and help the economy function. Additionally, there are infrastructure and facilities integral to disaster response and recovery operations. Conversely, some infrastructure and facilities are of extreme importance due to the negative externalities created when they are impacted by a disaster. What fits these definitions will vary slightly from community to community, but the definitions remain as a guideline for identifying critical facilities and infrastructure. Madison County maintains critical facility details under separate cover for security purposes. For this LHMP, it is assumed that all critical facilities are at equal risk to non-point hazard occurrence but may have varying risk to point hazard occurrence (dam failure and flood). Data concerning critical facilities potentially impacted by these point hazards, as available, is detailed under the respective hazard section.

Each hazard section provides a discussion on potentially vulnerable community lifelines. Community lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security.

5.7 Hazard Profiles

Each identified hazard is profiled in the subsequent sections, with the level of detail varying based on available information. Sources of information are cited in the detailed hazard profiles below.

For hazards that have a higher chance of occurrence for specific jurisdictions throughout Madison County, a discussion is provided as to the differing levels of potential vulnerability. All other hazards have been determined to have an equal chance of occurrence for all participating jurisdictions.

The following hazards are presented in alphabetical order for ease of reference.

5.8 Drought

5.8.1 Hazard Description

Drought is defined as an abnormally dry period lasting months or years when an area has a deficiency of water and precipitation in its surface and or underground water supply. It is, however, a normal, seasonal, and recurrent feature of climate that occurs in virtually all climate zones—typically in late spring through early fall. The duration of drought varies widely. There are cases when drought develops relatively quickly and lasts a very short period of time, exacerbated by extreme heat and/or wind, and there are other cases when drought spans multiple years, or even decades. The hydrological imbalance can be grouped into the following non-exclusive categories:

- Agricultural: When the amount of moisture in the soil no longer meets the needs of previously grown crops
- Hydrological: When surface and subsurface water levels are significantly below their normal levels
- Meteorological: When there is a significant departure from the normal levels of precipitation
- Socio-Economic: When the water deficiency begins to significantly affect the population

When below average, little or no rain falls, soil can dry out, and plants can die. If unusually dry weather persists and water supply problems develop, the period is defined as a drought. Human activity such as over-farming, excessive irrigation, deforestation, and poor erosion controls can exacerbate a drought's effects. It can take weeks or months before the effects of below average precipitation on bodies of water are observed. Depending upon the region, droughts can happen more quickly, and be noticed sooner, or have their effects naturally mitigated. The more humid and wet an area is, the faster the effects will be realized. A naturally dry region, which typically relies more on subsurface water, will take more time to actualize its effects.

Periods of drought can have significant environmental, agricultural, health, economic, and social consequences. The effects vary depending upon vulnerability and regional characteristics. Droughts can also reduce water quality through a decreased ability for natural rivers and streams to dilute pollutants and increase contamination. The most common effects are diminished crop yield, increased erosion, dust storms, ecosystem damage, reduced electricity production due to reduced flow through hydroelectric dams, shortage of water for industrial production, and increased risk of wildland fires.

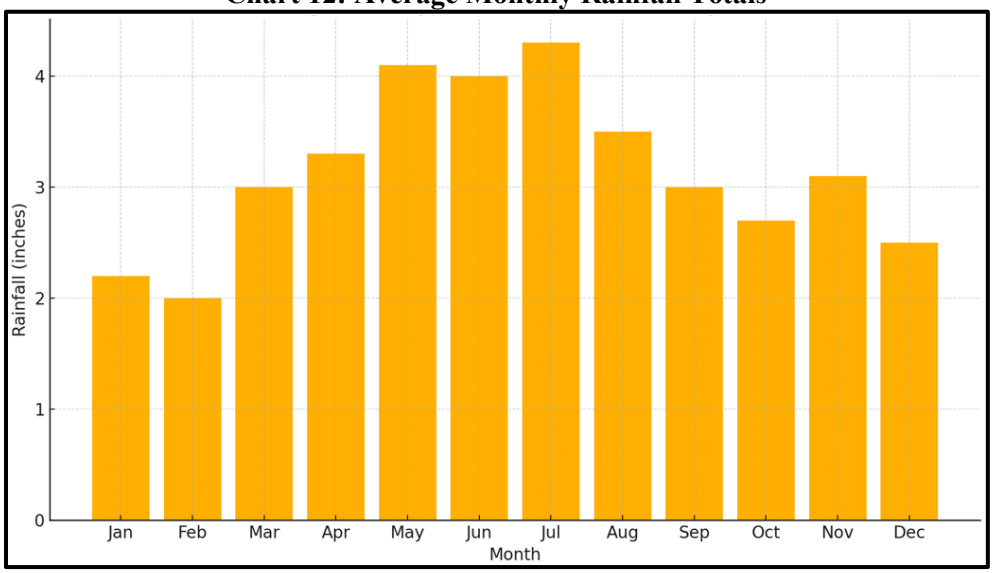
5.8.2 Location and Extent

All of Madison County, including all participating jurisdictions, is susceptible to drought conditions. However, the specific susceptibility to drought depends on various factors, including climate patterns, land use practices, and water management strategies.

Madison County, located in central Ohio, experiences a humid continental climate, defined by its distinct seasonal variations and a wide range of temperatures throughout the year. This type of climate is common in the Midwest and plays a significant role in shaping the county's agricultural economy, natural ecosystems, and daily life. Precipitation in Madison County is fairly evenly distributed throughout the year, averaging around 38 to 42 inches annually, including both rain and melted snow.

Precipitation data is collected by the NWS. The following chart indicates annual precipitation averages for Madison County:

Chart 12: Average Monthly Rainfall Totals



Source: NWS

Water use in Madison County reflects a mix of rural and urban needs, shaped by agriculture, residential demand, and municipal supply systems. The county's water use is divided primarily among three categories, domestic (residential), agricultural (irrigation and livestock), and public/municipal supply. While public water systems serve most urban centers like London, West Jefferson, and Mount Sterling, a significant portion of the population in unincorporated and rural areas relies on private wells and septic systems for both water supply and wastewater treatment.

Groundwater is the primary source of water in Madison County, accessed through both municipal wells and private residential wells. The Mid-Ohio Water and Sewer District and local municipalities draw from groundwater aquifers to supply treated water to communities. In more remote areas, individual households rely on drilled wells that tap into these same aquifers, making groundwater management and protection critical for the entire county. Unlike larger, surface water-reliant cities, Madison County's dependence on groundwater makes aquifer health, recharge rates, and contamination prevention especially important.

Agriculture, one of the county's leading economic sectors, also places significant demand on groundwater resources. Water is used primarily for livestock hydration and crop irrigation, particularly during dry periods. While Madison County does not generally face large-scale irrigation needs like western states, drought conditions can still strain agricultural water use, reduce crop yields, and increase competition between domestic and farm needs.

Droughts in Madison County are typically moderate but can have pronounced effects. Extended dry periods lower the water table, reduce well yields, and stress both municipal systems and private well users. During drought events, some residents may experience water shortages, increased drilling costs, or the need to deepen existing wells. Additionally, drought can lead to restrictions on non-essential water use, such as lawn watering or car washing, and place additional burden on agricultural producers.

Droughts are regularly monitored by multiple federal agencies using a number of different indices. One of the best indicators of historic drought periods is provided by the U.S. Drought Monitor. The U.S. Drought Monitor provides a summary of drought conditions across the United States, including Madison County. Often described as a blend of art and science, the map is updated weekly by combining a variety of data-based drought indices and indicators, along with local expert input, into a single composite drought indicator. The following table details the U.S. Drought Monitor categories:

Table 46: U.S. Drought Monitor Categories

Rating	Described Condition	Possible Impacts
None	No drought conditions	None
D0	Abnormally Dry	Short-term dryness slowing planting, growth of crops

Table 46: U.S. Drought Monitor Categories

Rating	Described Condition	Possible Impacts
		Some lingering water deficits Pastures or crops not fully recovered
D1	Moderate Drought	Some damage to crops, pastures Some water shortages developing Voluntary water-use restrictions requested
D2	Severe Drought	Crop or pasture loss likely Water shortages are common Water restrictions imposed
D3	Extreme Drought	Major crop/pasture losses Widespread water shortages or restrictions
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses Shortages of water creating water emergencies

Source: U.S. Drought Monitor

Current drought conditions, which change weekly, may be found on the U.S. Drought Monitor website.

The MPC view drought as not only a local or county hazard, but as a regional hazard as well. Discussions with the MPC and a review of all available data indicated that drought is a concern for all participating jurisdictions, with all jurisdictions having similar concerns. The following provides a narrative of the level of jurisdictional concern:

- **Madison County:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **City of London:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **Village of Midway:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **Village of Mt. Sterling:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **Village of Plain City:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **Village of South Solon:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **Village of West Jefferson:** Drought identified as a community concern as citizens, agriculture, and water supplying aquifers are vulnerable.
- **Jefferson Local:** Drought identified as a district concern as students and the supporting district economic base are vulnerable.
- **Jonathan Alder Local:** Drought identified as a district concern as students and the supporting district economic base are vulnerable.
- **London City Schools:** Drought identified as a district concern as students and the supporting district economic base are vulnerable.
- **Madison-Plains Local:** Drought identified as a district concern as students and the supporting district economic base are vulnerable.

5.8.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Madison County has experienced no Presidential Disaster Declarations related to drought.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Madison County has experienced no Emergency Declarations related to drought.

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. Madison County has experienced no state declarations of emergency related to drought.

Comprehensive data on droughts, drought impacts, and drought forecasting is extremely limited and often inaccurate. Due to the complexity of drought monitoring and the large areas droughts impact, agencies have difficulty quantifying and standardizing drought data.

One of the best indicators of historic drought periods is provided by the U.S. Drought Monitor, which lists weekly drought conditions for the Madison County. Historical data was gathered from the U.S. Drought Monitor weekly reports for the 20-year period between 2005 and 2024. This data was compiled and aggregated to provide a yearly estimate of the percentage of Madison County in each Drought Monitor category.

Table 47: Percentage Area in U.S. Drought Monitor Category, 2005 - 2024

Year	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
2024	51.3%	48.7%	38.7%	11.8%	2.3%	0.1%
2023	72.0%	28.0%	9.0%	0.0%	0.0%	0.0%
2022	77.5%	22.6%	6.7%	0.0%	0.0%	0.0%
2021	96.6%	3.4%	0.0%	0.0%	0.0%	0.0%
2020	75.9%	24.1%	7.1%	0.0%	0.0%	0.0%
2019	74.6%	25.4%	10.2%	0.0%	0.0%	0.0%
2018	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2017	99.6%	0.4%	0.0%	0.0%	0.0%	0.0%
2016	73.9%	26.1%	1.9%	0.2%	0.0%	0.0%
2015	95.0%	5.0%	0.0%	0.0%	0.0%	0.0%
2014	99.2%	0.8%	0.0%	0.0%	0.0%	0.0%
2013	94.2%	5.8%	0.8%	0.0%	0.0%	0.0%
2012	54.3%	45.7%	32.3%	4.1%	0.0%	0.0%
2011	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2010	71.4%	28.6%	6.2%	0.0%	0.0%	0.0%
2009	81.8%	18.2%	0.0%	0.0%	0.0%	0.0%
2008	67.3%	32.7%	0.0%	0.0%	0.0%	0.0%
2007	65.4%	34.6%	23.7%	0.2%	0.0%	0.0%
2006	99.1%	0.9%	0.0%	0.0%	0.0%	0.0%
2005	84.8%	15.2%	0.0%	0.0%	0.0%	0.0%

Source: U.S. Drought Monitor

The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, and there is an expedited process for drought. The following table represents the total number of Secretarial Disaster Declarations, by county, for the 10-year period of 2017 to 2024 for Madison County:

Table 48: Secretarial Drought Disaster Declarations, 2017 -2024

Jurisdiction	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015
Madison County	S5747, S5780	-	-	-	-	-		-	-	-

Source: USDA Farm Service Agency
Note: - designates no declarations

5.8.4 Probability of Future Events

Historically, drought has affected Madison County and all participating jurisdictions on a reoccurring basis. In reviewing historical data from the U.S. Drought Monitor weekly reports for Madison County from 2005 through 2024 a weekly average can be created indicating the percentage time in each Drought Monitor category. This average can be used to extrapolate the potential likelihood of future drought conditions.

Table 49 : Estimated Weekly Probability of Madison County Being in U.S. Drought Monitor Category

None	D0-D4	D1-D4	D2-D4	D3-D4	D4
81.7%	18.3%	6.8%	0.8%	0.1%	0.0%

Data: U.S. Drought Monitor

Madison County and all participating jurisdictions can experience rapid droughts, with a sudden onset of intense dry periods following a period of normal precipitation. While these conditions may last only a few months, they can result in agricultural losses, water supplies shortages, and low stream and river volume.

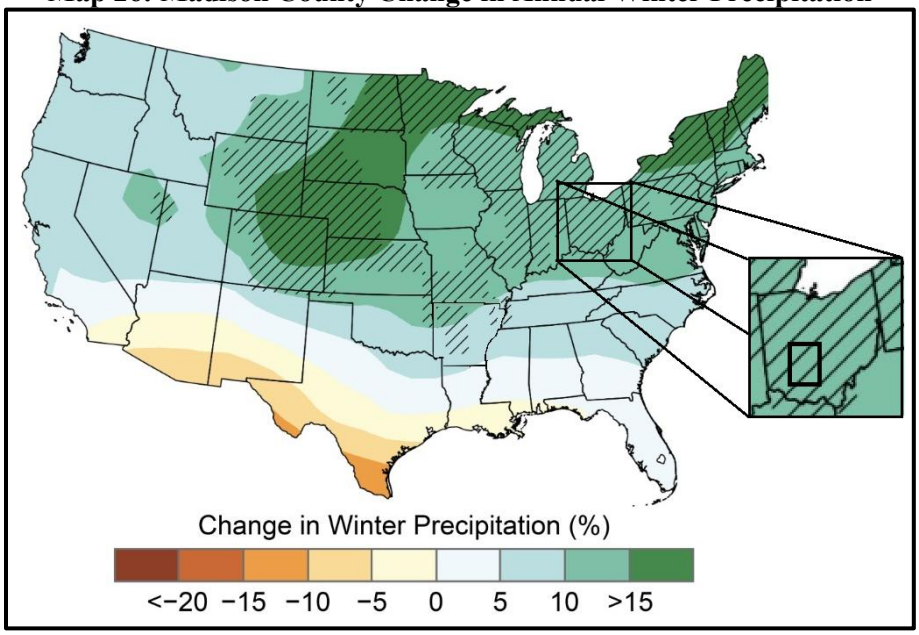
While predicting drought provides many challenges, NOAA's National Integrated Drought Information System provides the Drought Early Warning System to improve drought early warning capacity. The system is a network of regional and national partners that share information and coordinate actions to help communities in the region cope with drought. Developing and implementing the system allows Ohio and Madison County to quickly respond to emerging drought conditions. Through developing regional systems, the National Integrated Drought Information System is building the foundation for a nationwide system to improve drought forecasting.

5.8.5 Projected Changes in Hazard Location, Intensity, Frequency, and Duration

According to the National Institutes of Health National Center for Biotechnology Information publication Global Drought Trends and Future Projections "Drought is one of the most difficult natural hazards to quantify and is divided into categories (meteorological, agricultural, ecological and hydrological), which makes assessing recent changes and future scenarios extremely difficult." However, using long term data estimates of future drought conditions can be determined through a combination of climate modeling, historical data analysis, and scientific assessments. This modelling takes into account factors such as temperature, precipitation, soil moisture, and other relevant variables.

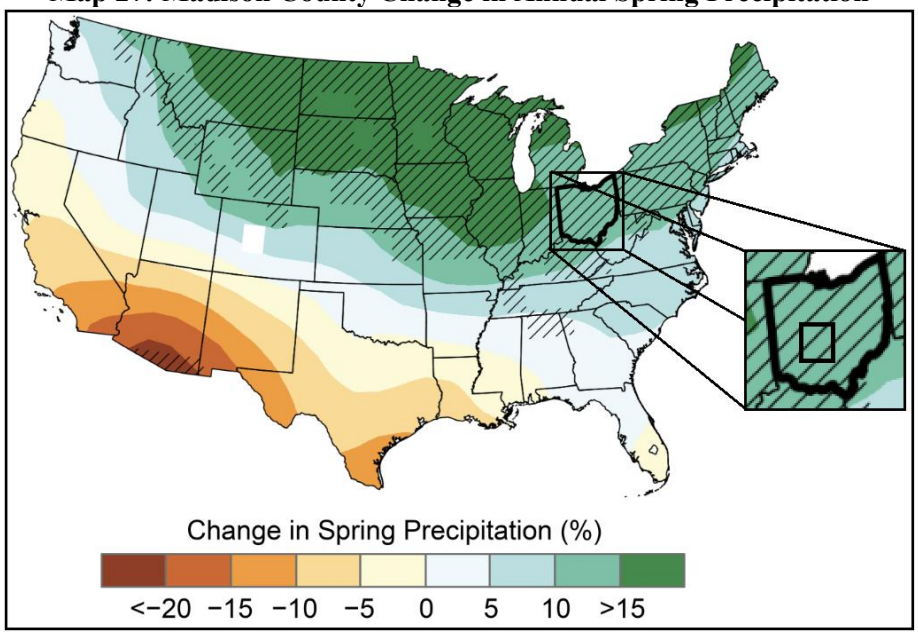
Current modelling from NOAA suggests that precipitation is projected to increase in Madison County and all participating jurisdictions in the Spring and Winter and remain relatively unchanged for the Summer. The following maps indicate these projected changes:

Map 26: Madison County Change in Annual Winter Precipitation



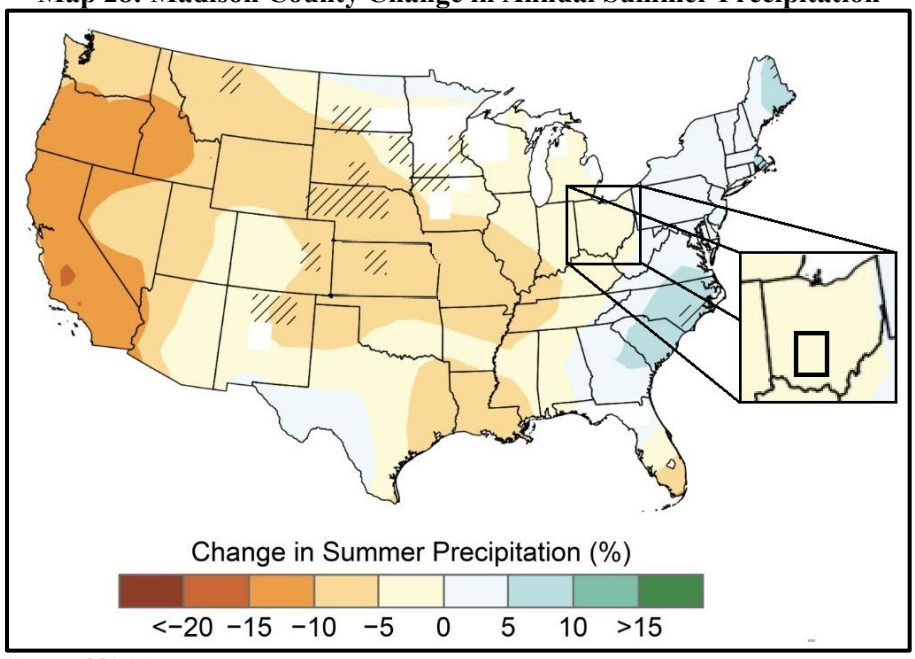
Source: NOAA

Map 27: Madison County Change in Annual Spring Precipitation



Source: NOAA

Map 28: Madison County Change in Annual Summer Precipitation



Source: NOAA

5.8.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Madison County and all participating jurisdictions from drought. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Madison County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

In order to gain an understanding of vulnerability, the following table details the estimated FEMA EAL data for Madison County and participating jurisdictions (by census tract):

Table 50: Participating Jurisdiction Drought Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	0
-	39097040101	Very Low	10.32	0
Village of Plain City	39097040102	Relatively Low	32.69	0
-	39097040201	Very Low	6.37	0
Village of West Jefferson	39097040202	Very Low	13.58	0
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	0
Village of West Jefferson	39097040500	Very Low	25.38	0
City of London	39097040600	Relatively Low	38.76	0
City of London	39097040700	Very Low	17.69	0
-	39097041000	Very Low	10.12	0
-	39097041100	Relatively Low	31.11	0
Village of Mt. Sterling	39097041200	Very Low	21.04	0
Village of Midway and South Solon	39097041300	Very Low	9.93	0

Source: FEMA NRI

Table 51: Participating Jurisdiction Drought Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	0	**0**
-	39097040101	Very Low	10.39	0
Village of Plain City	39097040102	Relatively Low	33.83	0
-	39097040201	Very Low	16.73	0
Village of West Jefferson	39097040202	Very Low	14.40	0
Village of West Jefferson, City of London	39097040400	Relatively Low	44.12	0
Village of West Jefferson	39097040500	Relatively Low	30.90	0
City of London	39097040600	Relatively Low	41.54	0
City of London	39097040700	Very Low	16.93	0
-	39097041000	Very Low	9.69	0
-	39097041100	Relatively Low	30.62	0
Village of Mt. Sterling	39097041200	Very Low	18.34	0
Village of Midway and South Solon	39097041300	Very Low	12.79	0

Source: FEMA NRI

Population

Droughts are rarely a direct cause of death, though the associated heat, dust, and stress can all contribute to increased mortality. However, drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or limited distribution system capacity may be encountered. Water supply planning is the key to minimizing the effects of drought on the population. Public water suppliers should continue to work to identify vulnerabilities and develop infrastructure, conservation plans, and partnerships to reduce the likelihood of running out of water during a drought.

Additionally, the loss of community lifelines can have a direct economic impact on the population. As an overview, the May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report indicates the following loss values for community lifelines:

Table 52: Economic Impacts of Loss of Service Per Capita Per Day (in 2022 dollars)

Category	Loss
Loss of Wastewater Services	$66
Loss of Water Services	$138

Source: May 2023 FEMA Benefit-Cost Analysis Sustainment and Enhancements Standard Economic Value Methodology Report

At greater risk may be vulnerable populations, including the young, the elderly, and those below the poverty level. Hazard occurrences can exacerbate existing vulnerabilities and create new challenges. Vulnerable populations may have pre-existing health conditions that make them more susceptible to heat-related illnesses and dehydration, both of which can be exacerbated during droughts. People on fixed incomes and with limited resources may face difficulties in adapting their homes to withstand hazard conditions or may lack financial resources to cope with the increased costs of food, water, and energy. Details concerning potentially vulnerable populations may be found in Section 3.4: Socially Vulnerable and At-Risk Populations.

Buildings and Structures

In general, buildings are not directly vulnerable to losses as a result of drought. However, there is a potential that building occupants could be impacted by power failures caused by either increased utility demand or damaged power delivery infrastructure. In addition, drinking water infrastructure may be specifically vulnerable to the impacts of drought. Any decrease in groundwater supplies would stress this infrastructure and may cause shortages or rationing.

Governmental Operations

Governmental operations and facilities will likely experience minimal impacts from drought conditions, unless there are substantial power, communications, or water outages. However, reduced water availability would likely have an immediate impact on firefighting efforts in urban and suburban areas as fire suppression equipment requires a minimum level of water pressure to activate.

Transportation and Electrical Infrastructure

Droughts can have numerous impacts on both transportation systems, often leading to challenges that require proactive management. The impacts of droughts on transportation systems may include:

- **Cracking and Shifting:** Drought conditions can cause soil to dry out and shrink, leading to cracks and shifts in roadways, especially in areas with expansive clay soil. This can result in uneven surfaces, potholes, and damage to the structural integrity of roads, making them unsafe for use.
- **Roadbed Damage:** Low moisture levels can cause subsidence and roadbed instability, requiring more frequent road repairs and maintenance.
- **Soil Subsidence:** The foundations of bridges can be compromised if the surrounding soil dries out and shifts. This can increase the stress on bridge supports, potentially leading to structural issues that require costly repairs.
- **Track Shifting and Damage:** The ground beneath railroad tracks can shift or crack during prolonged droughts, leading to track misalignment or buckling. This increases the risk of derailments and requires more frequent inspection and maintenance.
- **Runway Damage:** The same soil subsidence issues that affect roadways can also impact runways, causing cracks and instability that may need repairs.

A wide variety of data sources, from the Federal Highway Administration to state and federal Departments of Transportation, can be sourced for construction and repair costs. Average per-mile repair costs for local roads, state highways, and interstates can vary widely depending on factors such as the type of repair (resurfacing, reconstruction, or major rehabilitation), local labor and material costs, geographic conditions, and traffic volumes. The following details a range of repair costs for local, state, and interstate roadway systems:

- **Local Roads**
  - Resurfacing/Repaving: Costs generally range between $20,000 to $100,000 per mile.
  - Major Rehabilitation or Reconstruction: Costs generally range between $150,000 to $1 million per mile.
- **State Highways**

    - Resurfacing/Repaving: Costs generally range between $100,000 to $300,000 per mile.
    - Major Rehabilitation or Reconstruction: Costs generally range between $500,000 to $2,000,000 per mile.
- **Interstates**
    - Resurfacing/Repaving: Costs generally range between $250,000 to $1,000,000 per mile.
    - Major Rehabilitation or Reconstruction: Costs generally range between $2,000,000 to $5,000,00 per mile.

Factors affecting roadway construction and repair costs can include:

- **Extent of Damage:** Minor repairs such as resurfacing are cheaper than full-depth reconstruction.
- **Geography and Terrain:** Roads in mountainous or difficult terrains may cost more due to drainage and foundation issues.
- **Traffic Control and Detours:** Roads with heavy traffic may require expensive detour systems and safety measures, especially for interstates and state highways.
- **Urban vs. Rural:** Repairs in urban areas are typically more expensive due to higher labor costs, complex traffic patterns, and higher land costs.
- **Material Costs:** Prices for materials like asphalt, concrete, and steel can vary significantly based on regional supply chains.
- **Environmental and Regulatory Costs:** Permitting, environmental mitigation, and compliance with federal/state regulations can add to the cost.

Bridges crossing rivers can pose significant concerns during flooding events resulting from a dam or levee failure due to the increased risk of structural failure. Floodwater caused by a dam failure can exert powerful hydraulic forces on bridge structures, with the flow of water, debris, and floating objects impacting the bridge's substructure and foundation. Scouring, the removal of soil or sediment around bridge foundations can increase during a flood event, increasing the risk of failure. Floodwater can also cause the deformation and misalignment of bridge components. As water levels rise and fall, the structural elements may undergo stress and strain, potentially leading to long-term damage and misalignment.

A wide variety of data sources, including the Federal Highway Administration and state and federal Departments of Transportation, can be sourced for bridge construction and repair costs. The average construction and repair costs for bridges vary significantly depending on factors like the size and complexity of the bridge, its location, materials used, and the extent of the repairs or construction required. The following details a range of construction costs for bridges:

- **Small Bridge (local, 2-lane bridge over a small waterway or road):** Costs generally range between $150 to $400 per square foot.
- **Medium-Sized Bridge (state highway, spanning larger rivers or railways):** Costs generally range between $300 to $600 per square foot.
- **Large Bridge (interstate or urban multi-lane bridge, often requiring complex engineering):** Costs generally range between $500 to $1,000+ per square foot.

The following details a range of repair costs for bridges:

- **Minor Repairs (deck resurfacing, guardrail fixes, minor structural repairs):** Costs generally range between $50,000 to $500,000.
- **Medium Repairs (replacing sections of the deck, repairing piers or abutments):** Costs generally range between $500,000 to $5,000,000.
- **Major Repairs or Rehabilitation (full deck replacement, structural strengthening, or seismic retrofitting):** Costs generally range between $5,000,000 to $50,000,000.
- **Emergency Repairs (post-disaster or structural failure):** Costs generally range between $10,000,000 to $100,000,000.

Factors affecting bridge construction and repair costs can include:

- **Bridge Type and Design:** Suspension, cable-stayed, truss, arch, or simple beam bridges each have different design requirements and associated costs.
- **Location:** Urban areas or difficult terrains (e.g., over water, in mountainous regions) can significantly increase costs due to land acquisition, permitting, and construction challenges.
- **Materials:** The use of steel, concrete, or composite materials impacts the price. Specialized materials (e.g., weathering steel for durability) increase costs.
- **Traffic Management:** Bridges over busy roads or waterways may require costly traffic diversion plans or temporary structures.
- **Environmental and Regulatory Compliance:** Projects near sensitive areas (rivers, wetlands, protected lands) or those requiring special permits may face higher costs.
- **Labor and Regional Costs:** Labor costs, equipment rates, and material availability can vary widely by region.

Drought can impact both the electrical generation capacity and transmission. The impacts of droughts on electrical systems may include:

- **Thermal Power Plant (Water-Cooled) Cooling Water Shortages:** Thermal power plants (such as coal, natural gas, and nuclear plants) rely on water for cooling. Drought can reduce the availability of water for these cooling processes, forcing plants to reduce output or shut down temporarily.
- **Damage to Power Lines:** Drought increases the risk of wildfires, which can damage or destroy electrical transmission lines, substations, and other infrastructure. Wildfires can cause widespread power outages, as seen in several instances in Ohio and Australia.
- **Preemptive Power Shutoffs:** To prevent wildfires, power utilities may preemptively shut down power lines during extreme drought and dry wind conditions to avoid sparking fires. This can lead to significant disruptions for businesses and residents.
- **Transmission Line Sag:** Droughts often coincide with extreme heat, which can cause power as the wires expand. This increases the risk of contact with trees or the ground, potentially leading to power outages or safety hazards.

A wide variety of data sources, including the U.S. Energy Information Administration, Federal Energy Regulatory Commission, and the Electric Power Research Institute, can be sourced for construction and repair costs for electrical facilities. The repair costs can vary greatly depending on the type of repair, the size of the location, and the specific components that require attention. Typical repairs cost are:

- **Minor Repairs (Routine Maintenance & Component Replacement):** Costs generally range between $10,000 to $100,000.
- **Moderate Repairs (Replacing Medium-Sized Components):** Costs generally range between $100,000 to $1 million.
- **Major Repairs (Structural or Extensive Mechanical/Electrical Work):** Costs generally range between $1,000,000 to $50,000,000, depending on the scale.
- **Emergency Repairs (After Natural Disasters or Accidents):** Costs generally range between $5,000,000 to $100,000,000.

The cost to reconstruct high-capacity (voltage) power transmission lines varies significantly based on several factors, such as the voltage of the line, geographic terrain, regulatory requirements, and environmental considerations. The following present rough cost estimates for construction:

- **High-Voltage Alternating Current Transmission Lines:**
  - Overhead lines: Costs generally range between $300,000 to $1,000,000 per mile.

    - Underground lines: Costs generally range between $1,000,000 and $10,000,000 per mile.
- **High-Voltage Direct Current Transmission Lines:**
    - Overhead lines: Costs can range between $500,000 to $2 million per mile.
    - Underground lines: Costs can range between $3,000,000 to $15,000,000 per mile Key Factors Affecting Costs:

The cost to construct neighborhood power distribution lines (rather than large high-capacity transmission lines) depends on whether the lines are overhead or underground, as well as factors like geography, local labor rates, and regulatory requirements. The following present rough cost estimates for construction:

- **Overhead Neighborhood Power Distribution Lines:** Costs generally range between $150,000 to $500,000 per mile.
- **Underground Neighborhood Power Distribution Lines:** Costs generally range between $500,000 to $2,000,000 or more per mile.

The cost to repair high-capacity power transmission lines varies widely depending on the extent of the damage, the location, and the type of transmission line. Here are some general considerations:

- **High-Voltage Overhead Transmission Lines:**
    - Minor Repairs (fixing or replacing a small section of damaged wire, insulators, or hardware): Costs generally range between $10,000 and $50,000 per mile.
    - Moderate Repairs (replacing several towers or larger segments of lines): Costs generally range between $50,000 and $200,000 per mile.
    - Major Repairs (such as extensive damage from storms, fires, or other disasters requiring multiple towers, wires, and more complex restoration): Costs generally range between $200,000 to over $1,000,000 per mile.
- **High-Voltage Underground Transmission Lines:**
    - Minor Repairs: Costs generally range between $100,000 to $500,000 per mile.
    - Major Repairs: Costs generally range between $1,000,000 to $5,000,000 or more per mile.

The cost to repair neighborhood power distribution lines, which typically carry lower voltage power than high-capacity transmission lines, also depends on several factors, such as the extent of the damage, whether the lines are overhead or underground, and the location.

- **Overhead Neighborhood Distribution Lines:**
    - Minor Repairs (such as fixing downed lines, poles, or transformers): Costs generally range between $5,000 to $20,000 per mile.
    - Moderate Repairs (replacing several poles, wires, or small transformers): Costs generally range between $20,000 to $100,000 per mile.
    - Major Repairs (extensive damage from a major storm or accident affecting many poles, transformers, and lines): Costs generally range between $100,000 to $500,000 per mile.
- **Underground Neighborhood Distribution Lines:**
    - Minor Repairs (fixing small sections of cable or minor equipment malfunctions): Costs generally range between $50,000 to $150,000 per mile.
    - Moderate Repairs (replacing larger segments of underground cable): Costs generally range between $150,000 to $500,000 per mile.
    - Major Repairs (extensive damage to underground systems, possibly caused by floods, storms, or construction accidents): Costs generally range between $500,000 to $2,000,000 per mile.

Factors influencing both reconstruction and repair costs for electrical transmission lines include:

- **Terrain:** Building lines through mountainous or densely populated areas will increase costs.
- **Permitting and Land Acquisition:** Securing permits and land can add significant costs.
- **Environmental and Regulatory Costs:** Meeting environmental impact requirements and complying with local regulations can also influence the final price.
- **Voltage Level:** Higher voltage transmission lines, such as those over 500 kV, are generally more expensive than lower voltage lines.

Water and Wastewater Utilities

Water utilities are particularly vulnerable to drought conditions due to the direct impact on both water availability and supply. Water utilities can be affected by drought through:

- **Reduced Water Availability:** The reduction in water availability directly impacts the amount of water that water utilities can draw from local sources.
- **Lower Reservoir Levels**: Lower reservoir levels can affect the ability to meet water demand during periods of high usage.
- **Declining Groundwater** Levels: Lower groundwater levels make it more challenging for utilities to extract water.
- **Water Quality Challenges:** Lower water levels can lead to higher concentrations of contaminants, minerals, and sediments in the available water sources, requiring more extensive and costly treatment processes.
- **Increased Treatment Costs:** Treating water from depleted or lower-quality sources during drought conditions may require additional treatment steps, technologies, or chemicals, leading to increased operational costs for water utilities.
- **Competition for Water Resources:** During droughts, there is increased competition for limited water resources among various users, including agriculture, industry, and households. Water utilities may face challenges in securing sufficient water supplies amid this heightened competition.
- **Impact on Water Infrastructure:** Reduced water flow in rivers and streams can expose water infrastructure, such as pipelines, to the risk of corrosion.
- **Water Use Restrictions:** To conserve water during droughts, authorities may implement water use restrictions and conservation measures.

Drought can severely challenge a public water supplier through depletion of the raw water supply and greatly increased customer water demand. Even if the raw water supply remains adequate, problems due to limited treatment capacity or limited distribution system capacity may be encountered. Water supply planning is the key to minimizing the effects of drought on the population. Public water suppliers should continue to work to identify vulnerabilities and develop infrastructure, conservation plans, and partnerships to reduce the likelihood of running out of water during a drought.

Communities and citizens served by private wells rather than water supply districts may be at higher risk to drought conditions, and may see the following impacts:

- **Lowering of Water Table:** Drought conditions can lead to a lowering of the water table, which is the level at which groundwater is located. Private wells that rely on groundwater may experience reduced yields or, in extreme cases, may run dry.
- **Decreased Well Recharge:** Drought reduces the amount of precipitation, leading to decreased recharge of groundwater. Private wells depend on a sustainable recharge rate to maintain a consistent and reliable water supply.
- **Increased Competing Demands:** During a drought, increased water demand for agricultural irrigation, municipal water supply, and other uses can create competition for the available groundwater. Private wells may face challenges due to this increased demand.

- **Water Quality Concerns:** Lower groundwater levels during droughts can lead to changes in water quality. Concentrations of minerals, contaminants, and pollutants may increase, affecting the suitability of water for drinking and other uses.

Should it be required to drill a private well deeper to accommodate for drought conditions impacting the level of the water table, on average, the cost to drill a private water well in the United States can range from $15 to $45 per foot. However, it's important to note that this is a general estimate, and actual costs can vary based on geological and hydrogeological conditions and well depth.

Additionally, drought can impact wastewater treatment facilities, and operations, including:

- **Biological Treatment Efficiency:** Many wastewater treatment plants use biological processes that rely on microorganisms to break down waste. These microorganisms depend on a certain balance of water, oxygen, and waste concentration to function effectively. During droughts, changes in the wastewater's composition and flow can reduce the efficiency of biological treatment systems, requiring process adjustments or additional chemical treatments.
- **Pipe Cracking and Ground Shifts:** Drought causes soil to dry out and shrink, potentially leading to ground shifts that can crack or damage underground sewer pipes. This can result in leaks, blockages, or sewer line failures that require costly repairs.
- **Increased Infiltration and Inflow:** During drought, groundwater levels may drop, and sewer systems can experience increased infiltration of saline or contaminated water, particularly in coastal areas. This can exacerbate the corrosion of pipes and other infrastructure.

The costs to repair or reconstruct water and wastewater utility plants and distribution systems can vary significantly based on factors such as the size of the facility, the extent of the damage, local labor costs, and material availability. However, some general estimates can provide insight into the typical expenses.

- **Water Utility Plants**
  - Minor repairs: These may involve fixes to pumps, valves, or small sections of piping. On average, minor repairs for water treatment facilities can range from $10,000 to $100,000, depending on the scale of the damage and the equipment involved.
  - Moderate repairs: More substantial repairs, such as fixing filtration systems or repairing damaged tanks, can cost anywhere from $500,000 to $2,000,000. These projects often involve replacing large equipment and reconfiguring damaged systems.
  - Major repairs or partial reconstruction: For significant damage, such as structural failures, system-wide overhauls, or upgrades, the cost may rise to $10,000,000. This typically includes substantial replacement of infrastructure, new piping systems, and modernizations to meet current standards.
  - Reconstruction Costs: Complete reconstruction of a water utility plant can be very expensive, often costing between $30,000,000 and $20,000,000, depending on the capacity of the plant and the complexity of the systems involved.
- **Wastewater Treatment Plants**
  - Minor repairs (such as fixing aerators, pumps, or control systems) can cost between $50,000 and $500,000, depending on the facility's size and the severity of the issues.
  - Moderate repairs: Involves fixing critical components like clarifiers or digesters and can range from $1,000,000 to $5,000,000.
  - Major repairs or upgrades: For larger systems, like upgrading an entire section of a plant or replacing significant infrastructure, the costs can escalate to $10,000,000.
  - Reconstruction Costs: Complete reconstruction of wastewater plants typically ranges between $50,000,000 and $30,000,000, depending on the plant's capacity and required technology. Factors such as meeting modern regulatory standards can also drive costs.

- **Distribution Systems (Water and Wastewater)**
    - Water Distribution System Repair Costs: Repairing or replacing damaged pipelines, pumps, or valves in water distribution systems can cost anywhere from $50,000 to $200,000 per mile for minor repairs. More extensive pipe replacement, especially in urban areas where digging and rerouting traffic are involved, can escalate to $500,000 to $2,000,000 per mile.
    - Wastewater Distribution Repair Costs: pipelines (especially those dealing with larger sewage systems) tend to have higher repair costs due to increased complexity. These can range from $1 million to $3 million per mile, especially in densely populated regions or for large diameter pipes.
    - Water Distribution Reconstruction Costs: For water distribution system reconstruction, costs can range from $1,000,000 to $5,000,000 per mile, particularly for high-capacity urban systems with large pipe diameters or advanced technology like smart metering.
    - Wastewater Distribution Reconstruction Costs: For wastewater system reconstruction, particularly for larger pipelines, the cost per mile can range from $3,000,000 to $8,000,000, depending on the urban density, excavation challenges, and regulatory requirements.

Details concerning water and wastewater utility providers may be found in Section 3.9 - Critical Facilities and Infrastructure.

Medical and Response Facilities
In general, medical and response facilities are not directly vulnerable to losses as a result of drought. Both operations and facilities will likely experience minimal impacts from drought conditions, unless there are substantial power, communications, or water outages.

Educational Facilities
In general, educational facilities are not directly vulnerable to losses as a result of drought. Both operations and facilities will likely experience minimal impacts from drought conditions, unless there are substantial power, communications, or water outages.

Communication Systems
In general, communications systems are not directly vulnerable to losses as a result of drought, and would likely experience minimal impacts from drought conditions, unless there are substantial power outages.

Environmental and Agricultural Impacts
Drought conditions can cause significant agricultural impacts. In addition to obvious losses in yields in both crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of wildfires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Mapping from the United States Department of Agriculture details no reported total county-wide agricultural losses due to drought conditions for the period 1989 through 2023.

Although environmental losses are difficult to quantify, increasing public awareness and concern for environmental quality has forced public officials to focus greater attention and resources on these effects. Environmental losses are the result of damage to plant and animal species, wildlife habitat, and air and water quality, wildfires, degradation of landscape quality, loss of biodiversity, and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat, for example, may be degraded through the loss of wetlands, lakes, and vegetation. However, many species will eventually recover from it if it is a temporary aberration. However, the degradation of landscape quality, with increased soil erosion, may lead to a more permanent loss of biological productivity of the landscape.

Please see Section 3.14 for relevant Madison County agricultural data.

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **City of London:** Drought conditions may impact groundwater levels, impacting municipal pumping. As a smaller system, the city may experience pressure drops, reduced water availability, or the need to impose water use restrictions water use restrictions. Though agriculture is more dominant in the rural parts of the county, the city may still face economic ripple effects due to decreased production due to drought conditions. Concerning the city's population, with 8.1% of citizens living below the poverty level, drought is a concern as water prices may increase dramatically during occurrence. Finally, if the consistent population growth seen from 2000 to 2020 continues, a greater strain may be put on water resources.
- **Village of Midway:** Drought conditions may restrict impact groundwater levels, causing active water wells to run dry, necessitating new well drilling or the import of water to consumers. As a dominant part of the fabric of the community, village may face direct economic effects due to decreased agricultural production due to drought conditions. Concerning the village's population, with 5.3% of citizens living below the poverty level, drought is a concern as water prices may increase dramatically or there may be a need to drill a new well to access deleted aquifers during occurrence.
- **Village of Mt. Sterling:** Drought conditions may impact groundwater levels, impacting municipal pumping. As a smaller system, the village may experience pressure drops, reduced water availability, or the need to impose water use restrictions water use restrictions. Though agriculture is more dominant in the rural parts of the county, the village may face economic ripple effects due to decreased production due to drought conditions. Concerning the village's population, with 5.3% of citizens living below the poverty level, drought is a concern as water prices may increase dramatically during occurrence.
- **Village of Plain City:** Drought conditions may restrict impact groundwater levels, causing active water wells to run dry, necessitating new well drilling or the import of water to consumers. As a dominant part of the fabric of the community, village may face direct economic effects due to decreased agricultural production due to drought conditions. Concerning the village's population, with 11.1% of citizens living below the poverty level, drought is a concern as water prices may increase dramatically or there may be a need to drill a new well to access deleted aquifers during occurrence. Finally, if the large population growth seen from 2000 to 2020 continues, a greater strain will be put on water resources.
- **Village of South Solon:** Drought conditions may restrict impact groundwater levels, causing active water wells to run dry, necessitating new well drilling or the import of water to consumers. As a dominant part of the fabric of the community, village may face direct economic effects due to decreased agricultural production due to drought conditions. Concerning the village's population, with 11.0% of citizens living below the poverty level, drought is a concern as water prices may increase dramatically or there may be a need to drill a new well to access deleted aquifers during occurrence.
- **Village of West Jefferson:** Drought conditions may impact groundwater levels, impacting municipal pumping. As a smaller system, the village may experience pressure drops, reduced water availability, or the need to impose water use restrictions water use restrictions. Though agriculture is more dominant in the rural parts of the county, the village may face economic ripple effects due to decreased production due to drought conditions. Concerning the village's population, with 16.7% of citizens living below the poverty level, drought is a concern as water prices may increase dramatically during occurrence.
- **Jefferson Local:** Drought may impact supporting district economic base resulting in a potential drop in students or in district funding.
- **Jonathan Alder Local:** Drought may impact supporting district economic base resulting in a potential drop in students or in district funding.
- **London City Schools:** Drought may impact supporting district economic base resulting in a potential drop in students or in district funding.

- **Madison-Plains Local:** Drought may impact supporting district economic base resulting in a potential drop in students or in district funding.

Cascading Impacts
Cascading impacts often result when one hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with drought may include:

- Decrease in water quality
- Increased wildfire risk
- Land subsidence
- Decreased agricultural production
- Damage to agricultural lands

Consequence Analysis
This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Madison County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 53: Drought Consequence Analysis

Subject	Potential Impacts
Impact on the Public	If the drought coincides with warmer months, vulnerable populations may face an increased risk of dehydration, death, heat-related illness. Lower quantities of water may also increase the likelihood of contamination due to higher concentrations of bacteria. During droughts, dry soils may increase the number of airborne particles, such as pollen, which can worsen chronic respiratory illnesses.
Impact on Responders	Reduced water availability would likely complicate firefighting efforts due to water shortages. Some fire suppression equipment requires a minimum level of water pressure to activate. If the drought coincides with warm months, first responders may face increased risk of heat-related injuries or death.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. While the expectation is minimal, this threat may impact an agency's ability to operate due to power, communications, or water outages.
Delivery of Services	Droughts may impact the delivery of goods and services if there are shortages of raw materials.
Property, Facilities, and Infrastructure	Drought conditions may threaten the levels or quality of municipal public water supplies or impact small communities and/or private potable water wells.
Impact on Environment	The potential of drought-related impacts could have significant impacts on supplies of animal feed, livestock, meat and dairy products, and processed grain products, and on crop production. Drought conditions may also increase the potential for fires. Drought is also associated with insect infestations, plant disease, wind erosion of soil, and decrease in levels of water produced by natural aquifers.
Economic Conditions	The economic impacts from a drought could be significant. Droughts have the potential to drain state, and local resources, which will have a significant fiscal impact.
Public Confidence in Governance	Droughts can adversely affect the public, first responders, infrastructure, agriculture, economy, and overall operations. Direct, effective, and timely response by all levels of government is required for public confidence in governance, especially in recognizing and mitigating economic impacts of the drought.

5.8.7 Future Development
As population and housing growth continues in Madison County and participating jurisdictions the risk and potential impacts of drought may become increasingly significant. While the region does not regularly experience severe drought,

any increase of drought occurrence combined with an increased demand for water resources may elevate the vulnerability in both municipal and rural settings.

With more housing developments, especially in fast-growing areas like Plain City, London, and West Jefferson, there is a corresponding rise in domestic water use for drinking, sanitation, irrigation, and recreational purposes. This increased demand places additional pressure on groundwater supplies, which serve as the primary source of drinking water for both public systems and private wells. In drought conditions, these aquifers may not recharge quickly enough to meet elevated usage levels, leading to water shortages, restrictions, or quality concerns.

In rural and unincorporated parts of the county, many homes rely on private wells and septic systems, which are more directly impacted by falling water tables during extended dry periods. As development expands into these areas, the number of households vulnerable to drought-related water scarcity increases. New wells may need to be drilled deeper, and existing systems could experience reduced pressure or failure, resulting in increased costs for homeowners and service interruptions.

From a mitigation perspective, continued growth also affects the county's ability to balance water supply and demand during drought emergencies. More impervious surfaces from new housing developments reduce natural groundwater recharge, while landscaping and lawn irrigation further strain resources. To address this, local planners will need to incorporate drought-resilient infrastructure, promote water conservation practices, and assess the capacity of current water systems to handle projected growth.

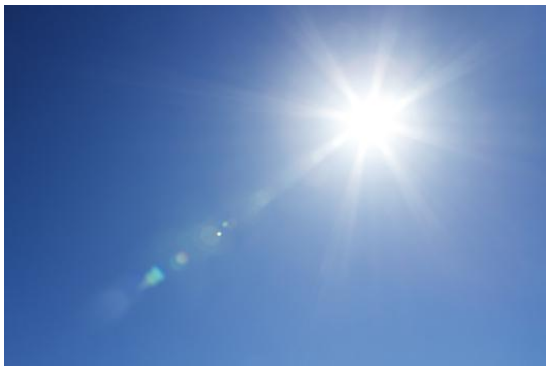
5.8.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the drought hazard.

Table 54: Example Drought Mitigation Actions

Category	Example Action
Planning and Regulation	Gather and analyze water and climate data to gain a better understanding of local climate and drought history.
	Identify available water supplies.
	Improve water supply monitoring.
	Develop a drought emergency plan.
	Develop criteria or triggers for drought-related actions.
	Develop a drought communication plan to facilitate timely communication of information.
	Establish an irrigation time/scheduling program or process so that all agricultural land gets the required amount of water.
	Develop an ordinance to restrict the use of public water resources for non-essential usage.
	Adopt ordinances to prioritize or control water use, particularly for emergency situations like fire fighting
Infrastructure	Design water delivery systems to accommodate drought events.
	Develop new or upgrading existing water delivery systems to eliminate breaks and leaks
Natural Systems	Incorporate drought tolerance practices into landscape ordinances to reduce dependence on irrigation.
	Provide incentives for xeriscaping.
	Use permeable driveways and surfaces to reduce runoff and promote groundwater recharge
Education	Provide information on installing low-flow water saving showerheads and toilets.
	Provide information on adjusting sprinklers to water the lawn and not the sidewalk or street.
	Provide information on installing rain-capturing devices for irrigation.
	Encourage the installation of graywater systems in homes to encourage water reuse

5.9 Extreme Heat



5.9.1 Hazard Description

Extreme heat events occur when climate conditions produce temperatures well outside of the predicted norm. These extremes can have severe impacts on human health and mortality, natural ecosystems, agriculture, and other economic sectors.

The Centers for Disease Control and Prevention (CDC) identifies the following six groups as being especially vulnerable to extreme heat:

- Older Adults (aged 65)
- Infants and Children
- Individuals with Chronic Conditions
- Low-income Individuals
- Athletes
- Outdoor workers

5.9.2 Location & Extent

While generally rare, all of Madison County is vulnerable to extreme heat. Extreme heat may be defined as follows.

- **Extreme Heat:** Days when the maximum temperature is above 91.4 degrees Fahrenheit.

Madison County experiences a humid continental climate characterized by four distinct seasons, each with its own temperature range. The following table, using data from the NWS, details the average high and low temperatures for Madison County:

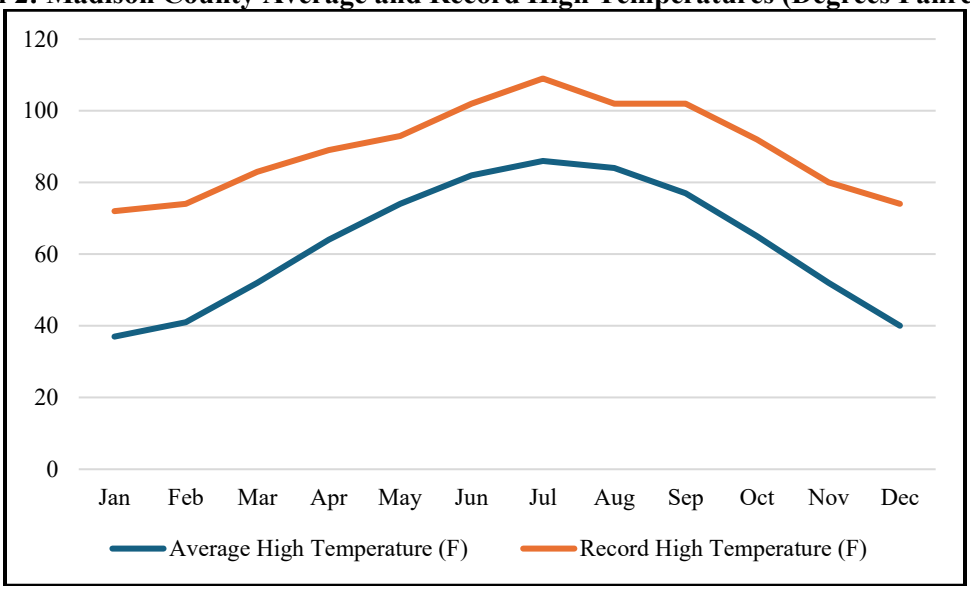
Table 55: Madison County Average and Record High Temperatures (Degrees Fahrenheit)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average High Temperature (F)	37°	41°	52°	64°	74°	82°	86°	84°	77°	65°	52°	40°
Record High Temperature (F)	72°	74°	83°	89°	93°	102°	109°	102°	102°	92°	80°	74°

Source: NWS

The following graph illustrates the above data.

Graph 2: Madison County Average and Record High Temperatures (Degrees Fahrenheit)



Source: NWS

The MPC view extreme heat as both a local and county-wide hazard. Discussions with the MPC and a review of all available data indicated that extreme heat is a growing concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Madison County:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.
- **City of London:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.
- **Village of Midway:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.
- **Village of Mt. Sterling:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.
- **Village of Plain City:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.
- **Village of South Solon:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.
- **Village of West Jefferson:** Extreme heat identified as a minor, but potentially increasing community concern as citizens, agriculture, and the environment are potentially vulnerable. Climate data shows that the frequency and intensity of heat waves are increasing in the Midwest. This can result in hotter, longer summers with fewer cooling nights which may create sustained heat stress on residents and systems.

- **Jefferson Local:** Extreme heat identified as a minor, but potentially increasing district concern as students and staff may be vulnerable.
- **Jonathan Alder Local:** Extreme heat identified as a minor, but potentially increasing district concern as students and staff may be vulnerable.
- **London City Schools:** Extreme heat identified as a minor, but potentially increasing district concern as students and staff may be vulnerable.
- **Madison-Plains Local:** Extreme heat identified as a minor, but potentially increasing district concern as students and staff may be vulnerable.

5.9.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Madison County has experienced no Presidential Disaster Declarations related to extreme heat.

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Madison County has experienced no Emergency Declarations related to extreme heat.

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. Madison County has experienced no state declarations of emergency related to extreme heat.

Data from the NCEI from 1950 through April 2025 indicates two reported extreme heat events, both in July of 2019:

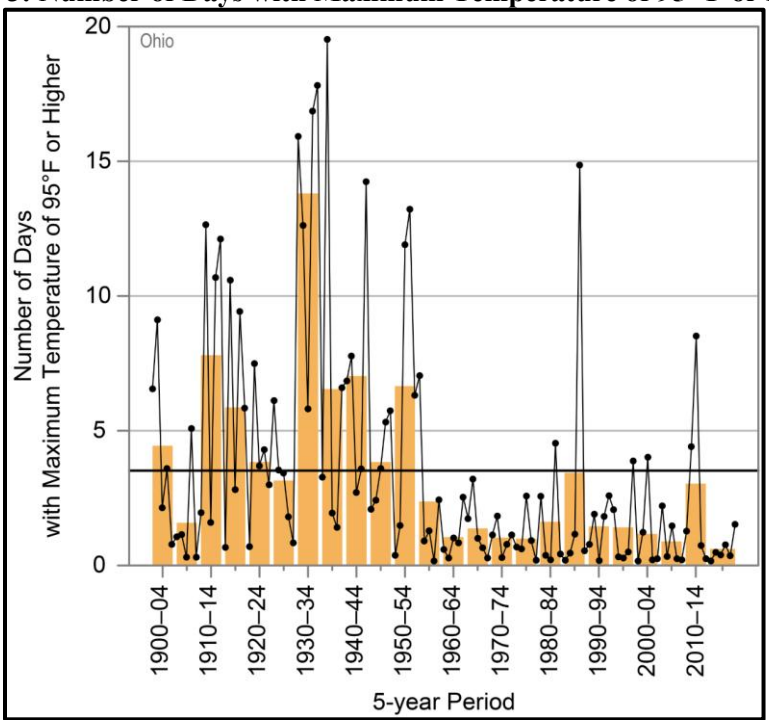
Table 56: Madison County NCEI Extreme Heat Events

Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Extreme Heat	2	$0	0

Source: NCEI

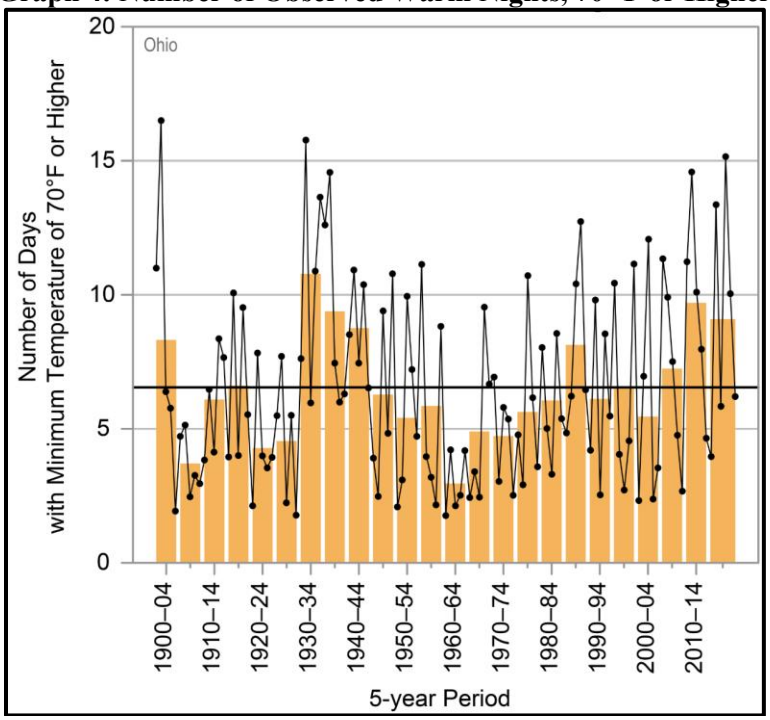
According to the NOAA NCEI State Climate Summary 2022 for Ohio, since the beginning of the 20th century, temperatures in Ohio have risen more than 1.5°F. Additionally, temperatures in the 2000s and 2010s were warmer than in any other historical period. However, the warming has not been steady, with periods of warming followed by periods of average or below average temperatures. In general periods of warming have been concentrated in the winter and spring with summer days have not warmed substantially. Based on observations through 2020, 1998 was the hottest year on record, with the second hottest year being 2012. The following graphs illustrate these trends, and detail both the number of very hot days and the number of observed warm nights:

Graph 3: Number of Days with Maximum Temperature of 95° F or Higher



Source: NOAA NCEI State Climate Summary 2022 for Ohio

Graph 4: Number of Observed Warm Nights, 70° F or Higher



Source: NOAA NCEI State Climate Summary 2022 for Ohio

5.9.4 Probability of Future Events

The following tables, using data from the NCEI, indicate the yearly probability of an extreme heat event, the number of deaths or injuries, and estimated property damage for all Madison County participating jurisdictions based on 75 years' worth of reporting data:

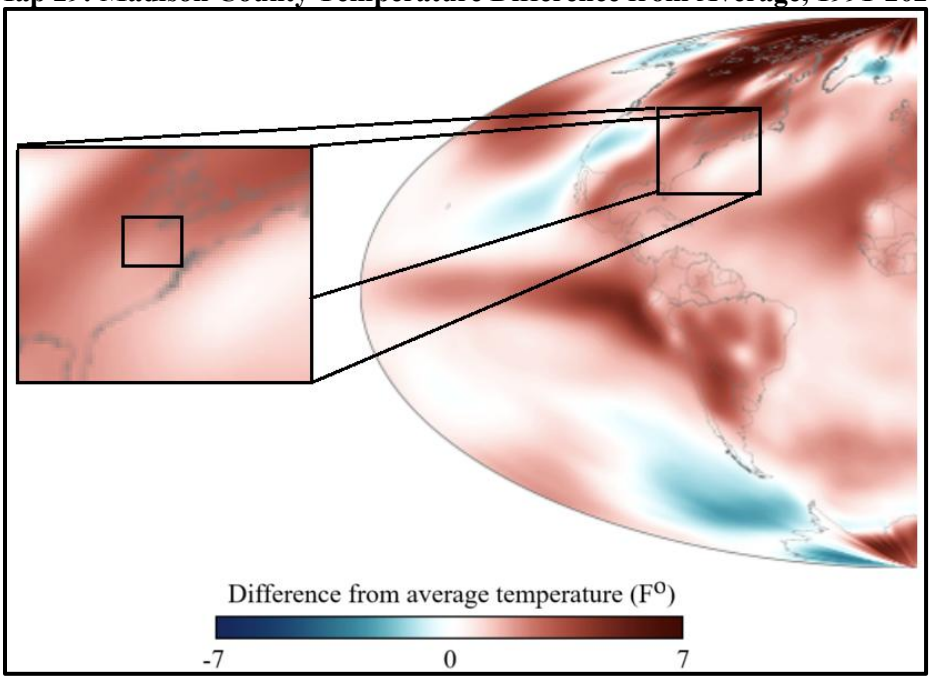
Table 57: Madison County NCEI Extreme Heat Event Probability Summary

County	Number of Events	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Madison	2	<1	0	0	$0	$0

Source: NCEI

However, available data suggests that both the average high temperatures and the record high temperature will likely continue to increase over the coming years. as indicated by the following map from NOAA indicating the temperature difference from average:

Map 29: Madison County Temperature Difference from Average, 1991-2020



Source: NOAA

5.9.5 Projected Changes in Location, Intensity, Frequency, and Duration

Data indicates a significant increase in the frequency, intensity, and duration of hot weather events in the coming decades. Historically, Madison County and much of central Ohio experience only a handful of days each year with temperatures above 90°F. However, projections suggest that by mid-century (2050), the county could see over 40 days per year with temperatures exceeding 91°F. These extreme heat events are expected to occur more often and earlier in the season, with some extending into late fall.

The intensity of heatwaves is also projected to rise. This means not only more hot days but hotter peak temperatures, especially during multi-day heat events. While temperatures may have previously hovered in the upper 80s or low 90s, future extremes may regularly reach the mid to upper 90s, with heat index values well over 100°F during humid periods. Compounding this, nighttime temperatures may stay elevated, offering little relief and increasing the cumulative health risks associated with sustained heat exposure.

The duration of extreme heat events is another growing concern. Instead of isolated hot days, Madison County is likely to experience longer stretches of consecutive hot days, sometimes lasting a week or more. This increased duration places greater strain on electric grids, cooling infrastructure, and public health systems, especially in communities where access to air conditioning is limited. Additionally, vulnerable populations such as seniors, low-income households, and people with chronic health conditions face higher risks of heat-related illness during extended heatwaves.

Although Madison County's location has historically spared it from the most extreme heat seen in southern states, the geographic spread of extreme heat events is expanding. Areas previously considered moderate in terms of heat exposure are now part of a broader region at risk.

5.9.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Madison County and all participating jurisdictions from extreme heat. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Madison County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 58: Participating Jurisdiction Extreme Heat Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	0.7
-	39097040101	Very Low	10.32	0.7
Village of Plain City	39097040102	Relatively Low	32.69	0.7
-	39097040201	Very Low	6.37	0.7
Village of West Jefferson	39097040202	Very Low	13.58	0.7
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	0.7
Village of West Jefferson	39097040500	Very Low	25.38	0.7
City of London	39097040600	Relatively Low	38.76	0.7
City of London	39097040700	Very Low	17.69	0.7
-	39097041000	Very Low	10.12	0.7
-	39097041100	Relatively Low	31.11	0.7
Village of Mt. Sterling	39097041200	Very Low	21.04	0.7
Village of Midway and South Solon	39097041300	Very Low	9.93	0.7

Source: FEMA NRI

Table 59: Participating Jurisdiction Extreme Heat Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	58.5	$108,000
-	39097040101	Very Low	45.3	$6,200
Village of Plain City	39097040102	Relatively Low	57.8	$12,000
-	39097040201	Very Low	47.1	$6,900
Village of West Jefferson	39097040202	Very Low	47.2	$7,000
Village of West Jefferson, City of London	39097040400	Relatively Low	46.1	$6,500
Village of West Jefferson	39097040500	Relatively Low	55.4	$11,000
City of London	39097040600	Relatively Low	59.7	$13,000
City of London	39097040700	Very Low	47.0	$6,900
-	39097041000	Very Low	56.2	$11,000
-	39097041100	Relatively Low	58.7	$12,000
Village of Mt. Sterling	39097041200	Very Low	49.8	$8,100
Village of Midway and South Solon	39097041300	Very Low	46.8	$6,800

Source: FEMA NRI

Population

A primary concern with this hazard is human health safety issues, as extreme heat can be a direct cause of death. Specific at-risk groups include outdoor workers, farmers, young children, and senior citizens. Impacts on human health can include:

- **Heat Exhaustion and Heat Stroke:** Prolonged exposure to high temperatures can lead to heat exhaustion, characterized by heavy sweating, weakness, and dizziness. If untreated, it can escalate to heat stroke, a life-threatening condition with symptoms like confusion, high body temperature, and loss of consciousness.
- **Respiratory Issues:** High temperatures can worsen air quality, increasing levels of ozone and allergens, which can exacerbate asthma and other respiratory conditions.
- **Cardiovascular Strain:** Extreme heat can put additional stress on the heart, increasing the risk of heart attacks and other cardiovascular problems, particularly in older adults.
- **Dehydration:** Heat can lead to increased fluid loss through sweating, which can result in dehydration, affecting bodily functions and overall health.

The following table discusses potential impacts on human health related to excessive heat by temperature range.

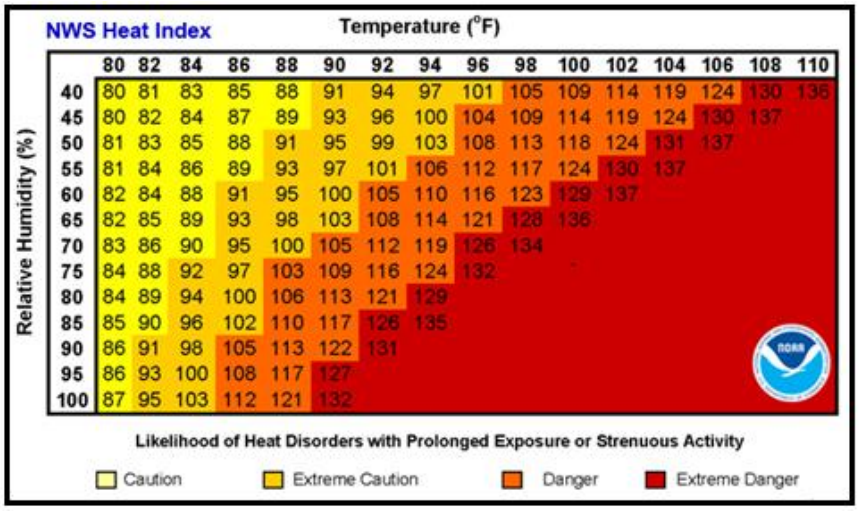
Table 60: Extreme Heat Impacts on Human Health

Heat Index Temperature	Potential Impact on Human Health
80-90° F	Fatigue possible with prolonged exposure and/or physical activity
90-105° F	Sunstroke, heat cramps, and heat exhaustion possible
105-130° F	Heatstroke/sunstroke is highly likely with continued exposure

Source: National Weather Service Heat Index Program

Exposure to direct sun can increase Heat Index values by as much as 15°F. The zone above 105°F corresponds to a Heat Index that may cause increasingly severe heat disorders with continued exposure and/or physical activity. The following chart, from the NWS, indicates Heat Index values.

Chart 13: Heat Index



Source: NWS

Extreme heat may disproportionately affect socially vulnerable populations, exacerbating pre-existing inequalities and making recovery more difficult for these groups. Extreme heat may disproportionately impact vulnerable populations in the following ways:

- **Elderly Individuals:** Older adults often have reduced physiological resilience to heat due to age-related factors and chronic health conditions, making them more susceptible to heat-related illnesses.
- **Children: Young** children are less able to regulate their body temperature and are at a higher risk for heat exhaustion and dehydration.
- **Low-Income Communities:** Those in low-income neighborhoods may lack access to air conditioning, adequate housing, or resources to stay cool, increasing their risk during heat events.

- **People with Chronic Health Conditions:** Individuals with cardiovascular, respiratory, or other chronic health issues may face heightened risks from extreme heat, as their bodies may struggle to cope with elevated temperatures.
- **Homeless Individuals:** People experiencing homelessness often have limited access to shelter and cooling facilities, making them particularly vulnerable during heat waves.

All Madison County and participating jurisdictions are vulnerable to the impacts of extreme heat. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

Buildings and Structures
In general, buildings and structures will not be impacted by short-term extreme heat events. It is possible that long-term heat events could cause impacts, including:

- **Thermal Expansion:** High temperatures can cause building materials, such as metal and concrete, to expand. This can lead to warping, cracking, and structural stress.
- **Roof Damage:** Prolonged exposure to extreme heat can deteriorate roofing materials, leading to leaks, reduced lifespan, and increased maintenance costs.
- **Foundation Issues:** Prolonged heat can affect the moisture content in the soil surrounding a building's foundation, potentially leading to shifting or settling.

Transportation and Electrical Infrastructure
Extreme heat can have numerous impacts on both transportation and electrical distribution systems, often leading to challenges that require proactive management. The impacts of extreme heat on transportation systems may include:

- **Road Surface Damage:** High temperatures can cause asphalt to soften, leading to ruts, cracks, and buckling. This can compromise road safety and require costly repairs.
- **Railway Tracks:** Steel tracks can expand in extreme heat, leading to potential warping or misalignment (known as "sun kinks"), which can disrupt train services and pose safety risks.
- **Bridges and Overpasses:** Expansion joints may be affected, and excessive heat can lead to structural stress, potentially compromising safety and necessitating inspections or repairs.
- **Traffic Signals and Signage:** Heat can affect the functionality of electronic traffic signals and signage, leading to malfunctions that could result in traffic disruptions or accidents.
- **Public Transit Systems:** Buses and trains may face increased operational challenges due to overheating engines and equipment failures, which can impact schedules and reliability.

Extreme heat can impact both the electrical generation capacity and transmission. The impacts of extreme heat on electrical systems may include:

- **Increased Demand:** High temperatures typically lead to increased use of air conditioning, resulting in a surge in electricity demand that can strain the grid.
- **Transformer Overheating:** Electrical transformers can overheat during extreme heat events, leading to failures or outages.
- **Power Lines:** Extreme heat can cause power lines to sag due to thermal expansion, increasing the risk of contact with trees or other objects, which can result in outages or fires.
- **Substation Performance:** High temperatures can impair the performance of substations, potentially leading to overloads and failures.
- **Energy Efficiency:** Excessive heat can reduce the efficiency of power generation, particularly for fossil fuel and nuclear plants, leading to decreased output during peak demand times.
- **Renewable Energy Impact:** While solar panels can generate more energy in high temperatures, their efficiency can drop significantly beyond certain heat thresholds.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
Water and wastewater utilities are vulnerable to extreme temperature events due to the potential for plant damages and distribution system damages. Impacts may include:

- **Pipe bursts and leaks:** Heat can cause soil to dry and shift, leading to cracks or bursts in aging water distribution pipes. Temperature fluctuations also lead to expansion and contraction in pipes, potentially increasing the risk of failure.
- **Reduced efficiency of equipment:** Pumps, motors, and other mechanical systems in water treatment facilities may become less efficient or experience overheating during prolonged high temperatures.
- **Reduced water availability:** In open water storage or reservoirs, high temperatures lead to greater evaporation, reducing the overall available water supply. This may lead to restrictions or necessitate sourcing from alternative supplies.
- **Changes in treatment efficiency:** Biological treatment processes in wastewater treatment plants can be disrupted due to temperature, impacting the breakdown of organic matter and nutrient removal processes.

Mapping and information concerning water and wastewater infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct water and wastewater infrastructure may be found in Section 5.8.6.

Medical and Response Facilities
While extreme temperatures may result in a temporary increase in patients, it is considered unlikely that any influx would overwhelm current medical capabilities. Depending on educational facility capability, extreme temperatures may necessitate the closure of the facility for the duration of the event. These closures are expected to have additional economic consequences as caregivers may be required to miss or modify work. First response facilities are expected to be unimpacted.

Educational Facilities
Depending on educational facility capability, extreme temperatures may necessitate the closure of the facility for the duration of the event. These closures are expected to have additional economic consequences as caregivers may be required to miss or modify work.

Communication Systems
Extreme temperatures can disrupt this vital communications system, affecting reliability and functionality. Extreme temperatures can lead to power outages due to down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. The following data, from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency, indicates cost ranges for communications system components:

Table 61: Summary of Communication System Component Costs

Components	Examples	Cost	Expected Lifespan
Infrastructure	Towers, shelters, commercial and backup power equipment,	$$$–$$$$$	20–25 years
Fixed Station Equipment	Antennas, repeaters, towers on wheels, consoles, mobile stations, servers, computers, physical and electronic security	$$-$$$	3-15 years

Table 61: Summary of Communication System Component Costs

Components	Examples	Cost	Expected Lifespan
	elements (e.g., fencing, cameras, monitors, environmental conditions)		
Devices	Handheld portable radios, cellular phones, satellite phones, mobile data devices	$-$$	2-10 years
Accessories	Holsters, chargers, speakers, lapel microphone extensions, Bluetooth, vehicle kits, air cards, intercoms	$	2-10 years
Features	Encryption to protect against security risks, ruggedization to ensure reliant services, Over-the-Air-Programming, automatic roaming	$-$$$	-
Software and Data Storage	Global information system, emergency notifications, monitoring, call answering, database access, Automatic Vehicle Locator	$-$$	-

Source: U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency

Environmental and Agricultural Impacts

Extreme heat can cause significant damage to the local environment by dehydrating vegetation and wildlife, which may result in cascading effects to the surrounding environment, such as drought, wildfires, mudslides, or landslides. Extreme temperatures may severely decrease the yield of the agricultural sector. The yield of cash crops may be reduced, livestock may be adversely impacted by extreme heat, or grazing losses may be incurred by farmers or ranchers; potentially resulting in decreased food security. In the event of significant agricultural losses caused by extreme heat or drought, some assistance may be available to impacted farms or ranches.

Extreme heat conditions can cause significant agricultural impacts. Mapping from the United States Department of Agriculture indicates no reported total county-wide agricultural losses due to extreme heat conditions from 1989 – 2023.

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **City of London:** Extreme heat can pose serious health risks, especially for vulnerable populations such as the elderly, young children, individuals with chronic illnesses, and those without access to air conditioning. In urban centers such as London, the urban heat island effect can lead to higher temperatures compared to surrounding rural areas. This effect, combined with aging infrastructure and increased energy demands for cooling, can strain public utilities and increase the risk of heat-related power outages. Infrastructure, particularly roads and water systems, can be strained by prolonged heat. Road surfaces can degrade faster under intense heat, and public water supplies may come under stress due to increased usage and potential drought conditions. As a county with significant agricultural activity, extreme heat can impact crop yields and livestock health, especially if coupled with drought, causing an economic ripple effect. Schools and local government facilities may have to adjust schedules or provide additional resources during heat waves, particularly in older buildings without modern cooling systems, causing additional economic and societal impacts.
- **Village of Midway:** Extreme heat can pose serious health risks, especially for vulnerable populations such as the elderly, young children, individuals with chronic illnesses, and those without access to air conditioning. Locally aging electrical infrastructure and increased energy demands for cooling can strain public utilities and increase the risk of heat-related power outages. Roads and water systems can be strained by prolonged heat, with road surfaces degrading faster under intense heat, and water wells coming under stress due to increased usage. Extreme heat can impact crop yields and livestock health in surrounding communities, especially if coupled with drought, causing potentially devastating economic effects for the community. Schools and local government facilities may have to adjust schedules or provide additional resources during heat waves,

particularly in older buildings without modern cooling systems, causing additional economic and societal impacts.

- **Village of Mt. Sterling:** Extreme heat can pose serious health risks, especially for vulnerable populations such as the elderly, young children, individuals with chronic illnesses, and those without access to air conditioning. Infrastructure, particularly roads and water systems, can be strained by prolonged heat. Road surfaces can degrade faster under intense heat, and public water supplies may come under stress due to increased usage and potential drought conditions. As a county with significant agricultural activity, extreme heat can impact crop yields and livestock health, especially if coupled with drought, causing an economic ripple effect. Schools and local government facilities may have to adjust schedules or provide additional resources during heat waves, particularly in older buildings without modern cooling systems, causing additional economic and societal impacts.
- **Village of Plain City:** Extreme heat can pose serious health risks, especially for vulnerable populations such as the elderly, young children, individuals with chronic illnesses, and those without access to air conditioning. Locally aging electrical infrastructure and increased energy demands for cooling can strain public utilities and increase the risk of heat-related power outages. Water systems can be strained by prolonged heat, and water wells may come under stress due to increased usage and potential drought conditions. Extreme heat can impact crop yields and livestock health in surrounding communities, especially if coupled with drought, causing potentially devastating economic effects for the community. Schools and local government facilities may have to adjust schedules or provide additional resources during heat waves, particularly in older buildings without modern cooling systems, causing additional economic and societal impacts.
- **Village of South Solon:** Extreme heat can pose serious health risks, especially for vulnerable populations such as the elderly, young children, individuals with chronic illnesses, and those without access to air conditioning. Locally aging electrical infrastructure and increased energy demands for cooling can strain public utilities and increase the risk of heat-related power outages. Roads and water systems can be strained by prolonged heat, with road surfaces degrading faster under intense heat, and water wells coming under stress due to increased usage. Extreme heat can impact crop yields and livestock health in surrounding communities, especially if coupled with drought, causing potentially devastating economic effects for the community. Schools and local government facilities may have to adjust schedules or provide additional resources during heat waves, particularly in older buildings without modern cooling systems, causing additional economic and societal impacts.
- **Village of West Jefferson:** Extreme heat can pose serious health risks, especially for vulnerable populations such as the elderly, young children, individuals with chronic illnesses, and those without access to air conditioning. Locally aging electrical infrastructure and increased energy demands for cooling can strain public utilities and increase the risk of heat-related power outages. Water systems can be strained by prolonged heat, and water wells may come under stress due to increased usage and potential drought conditions. Extreme heat can impact crop yields and livestock health in surrounding communities, especially if coupled with drought, causing potentially devastating economic effects for the community. Schools and local government facilities may have to adjust schedules or provide additional resources during heat waves, particularly in older buildings without modern cooling systems, causing additional economic and societal impacts.
- **Jefferson Local:** Extreme heat can pose serious health risks, especially for vulnerable populations such as young children. Additionally, aging school infrastructure may exacerbate the problem in the spring and fall.
- **Jonathan Alder Local:** Extreme heat can pose serious health risks, especially for vulnerable populations such as young children. Additionally, aging school infrastructure may exacerbate the problem in the spring and fall.
- **London City Schools:** Extreme heat can pose serious health risks, especially for vulnerable populations such as young children. Additionally, aging school infrastructure may exacerbate the problem in the spring and fall.
- **Madison-Plains Local:** Extreme heat can pose serious health risks, especially for vulnerable populations such as young children. Additionally, aging school infrastructure may exacerbate the problem in the spring and fall.

Cascading Impacts
Cascading impacts often result when one hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with extreme may include:

- Drought conditions, or worsening of drought conditions
- Heat-related illnesses and mortality
- Power outages
- Water shortage and/or diminished water quality
- Crop failure and reduced yields and livestock mortality
- Wildfires

Consequence Analysis
This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Madison County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 62: Extreme Temperature Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Extreme temperatures can have severe consequences for health, particularly for the elderly and young. Loss of electricity may impact heating or air conditioning leading to poorly tolerated indoor temperatures. Physical effects of extreme temperatures can cause major health problems and may lead to injury or death.
Impact on Responders	Without proper mitigation efforts, responders may be susceptible to temperature-related illness. Extreme temperatures may also damage instruments or equipment necessary for response activities. First responders may face dangerous road conditions leading to accidents and prolonged response times.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. This hazard may impact an agency's operations due to power outages, causing a lack of computer/network access.
Delivery of Services	Extreme temperatures can impact efficient delivery or inability of goods or services due to potential health impacts on workers. Equipment and vehicles may be damaged, and the delivery of services may be delayed due to poor travel conditions
Property, Facilities, and Infrastructure	Facility integrity is at risk with regards to power cables and stations being overused and limiting operations. This could lead to limits on facility heating or cooling.
Impact on Environment	Extreme temperatures can cause significant damage to the local environment and result in habitat loss, invasive species, and changes in migration. Livestock are adversely affected by extreme temperatures and may suffer medical problems or death. A significant impact on water supply caused by elevated temperatures is the increase in frequency and impact of harmful algal blooms and occurrence of cyanobacteria.
Economic Conditions	Extreme temperatures may drain local resources. Under some conditions, some of the costs can be recouped through federal grant reimbursements.
Public Confidence in Governance	Governmental response, on all levels, requires direct actions that must be immediate and effective to maintain public confidence.

5.9.7 Future Development
As Madison County continues to grow and develop, the threat of extreme heat poses increasing challenges. Future residential, commercial, and infrastructure development will need to account for the rising frequency and intensity of heatwaves, which are projected to become more common. These rising temperatures may not only affect public health and safety but also place stress on building systems, energy infrastructure, and municipal resources.

New housing developments, particularly in fast-growing areas like Plain City, London, and West Jefferson, will need to be designed with temperature resilience in mind. This includes energy-efficient building standards, passive cooling

design, and access to green spaces that reduce heat buildup. As more homes, schools, and businesses are built, demand for air conditioning and electricity will increase, placing additional strain on the electrical grid during peak heat events. Without proper mitigation, this could lead to increased outages or energy costs, especially during prolonged heatwaves.

Additionally, future development could intensify the urban heat island effect, especially in densely built environments with minimal tree cover or green infrastructure. Paved surfaces and buildings absorb and retain heat, causing localized temperatures to rise significantly higher than in surrounding rural areas. If not addressed in zoning and land use plans, this effect could heighten heat exposure for residents—particularly low-income or elderly populations who may not have access to cooling systems.

5.9.7 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

Table 63: Example Extreme Heat Mitigation Actions

Category	Example Action
Planning and Regulation	Adopt and enforce updated building code provisions to properly insulate structures.
	Support financial incentives, such as low interest loans or tax breaks, for home and business owners who retrofit their structures to mitigate heat.
	Develop an inventory of public and commercial buildings that may be used for cooling shelters.
Infrastructure	Encourage installation of green roofs, which provide shade and remove heat from the roof surface and surrounding air.
	Use cool roofing products that reflect sunlight and heat away from a building.
Natural Systems Protection	Increase tree plantings around buildings to shade parking lots and along public rights-of-way.
Education	Develop an outreach program about extreme heat risk and mitigation activities in homes, schools, and businesses.
	Educate homeowners about retrofitting homes and encouraging retrofit to mitigate heat.

5.10 Flood

5.10.1 Hazard Description

Flooding is the overflow or accumulation of water on normally dry land, often caused by heavy rainfall, snowmelt, or the failure of natural or artificial barriers. Flooding can lead to the inundation of homes, roads, farmland, and other areas, causing damage to property, disruption of daily life, and potential threats to human safety and the environment.

A floodplain is a flat or gently sloping area adjacent to a river, stream, or other water body. These areas act as a buffer during periods of heavy rainfall or snowmelt, absorbing excess water and preventing it from rushing downstream too quickly. In its common usage, a floodplain refers to areas inundated by the 100-year flood, the flood that has a 1% chance of being equaled or exceeded in any given year, and the 500-year flood, the flood that has a 0.2% chance of being equaled or exceeded in any given year. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the NFIP.

5.10.2 Location and Extent

A variety of factors affect the severity of flooding within Madison County. These include topography, weather characteristics, development, and geology. Intense flooding may create extreme damage and disruption in any jurisdiction affected.

Flash Flooding

Flash flooding occurs during heavy or extended periods of rain, generally when the ground is unable to rapidly absorb the water. Most flash flooding in Madison County is caused by intense and stationary storm events and atmospheric rivers. Heavy sustained rain can create rapid flooding very quickly, and flooding can occur miles away from where the rain fell. Factors that can contribute to the severity of flash flooding include rainfall intensity, duration, drainage condition, and ground conditions (paved or unpaved). Flash floods are particularly dangerous to people and property, as six inches of moving water can knock a person down and two feet can lift a vehicle. As there is often little warning of a flash flood event, they are the cause of most flood fatalities.

Riverine Flooding

Riverine flooding refers to the overflow of water from a river or a stream onto adjacent land areas. This type of flooding occurs when the water level in a river or stream rises significantly and exceeds its banks, inundating the surrounding areas. The severity of riverine flooding can be influenced by the amount and intensity of rainfall in the watershed, the size, shape, and slope of the river or stream channel, and the presence of dams on the river system.

Urban Flooding

FEMA defines urban flooding as ‘the inundation of property in a built environment, particularly in more densely populated areas, caused by rain falling on increased amounts of impervious surfaces and overwhelming the capacity of drainage systems.” In Madison County, urban flooding has consistently increased due to a number of factors, including the filling for development of natural wetlands and waterways, the reduction of permeable surfaces, and the aging and insufficient capacity of stormwater systems.

To establish floodplains, FEMA adopted the Base Flood Elevation (BFE), which is the computed elevation that floodwater is anticipated to rise during a flood that has a 1% chance of occurring in any given year. The BFE establishes the regulatory requirement for the elevation or floodproofing of structures, and the relationship between the BFE and a given structure’s elevation determines the flood insurance premium through the NFIP.

FEMA, through the Risk Mapping, Assessment, and Planning (Risk MAP) program, works with partners to assess and map these flood risks producing Flood Insurance Rate Maps (FIRMs). As an additional benefit, the FIRMs serve as the basis for NFIP regulations and flood insurance purchase requirements.

SFHAs are defined as the area that will be inundated by the flood event having a 1% chance of being equaled or exceeded in any given year. The 1% annual chance flood is also referred to as the base flood or 100-year flood. The FIRM depicts the SFHA, including the 1%-annual-chance flood. These areas are labeled on the map as zone, as explained in the following table:

The following table details FEMA's FIRM flood zone classifications.

Table 64: Flood Zone Classifications

Zone	Description
A	The 1%-annual-chance or base floodplain. There are six (6) types of A Zones.
AE	The base floodplain where base flood elevations are provided.
AH	Shallow flooding base floodplain. BFEs are provided.
AO	The base floodplain with sheet flow, ponding, or shallow flooding. Base flood depths (feet above ground) are provided.
AR	The base floodplain that results from the decertification of a previously accredited flood protection system that is in the process of being restored to provide a 1%-annual-chance or greater level of flood protection.
A99	Area to be protected from base flood by levees or Federal Flood Protection Systems under construction. BFEs are not determined.
B or Shaded X	Areas between the limits of the base flood and the 0.2% annual-chance (or 500-year) flood.
C or Unshaded X	Areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2% annual-chance flood

Source: FEMA

The following map uses FEMA FIRM data to depict available mapping for Madison County.

Map 30: Madison County FEMA FIRM Panels

Source: FEMA

The following maps for all participating jurisdictions (with the exception of school districts which are not individually mapped) are FEMA FIRMettes, small, customized sections of a larger FIRM. FIRMettes are typically used to identify flood zones and assess flood risks for a specific area, and they offer:

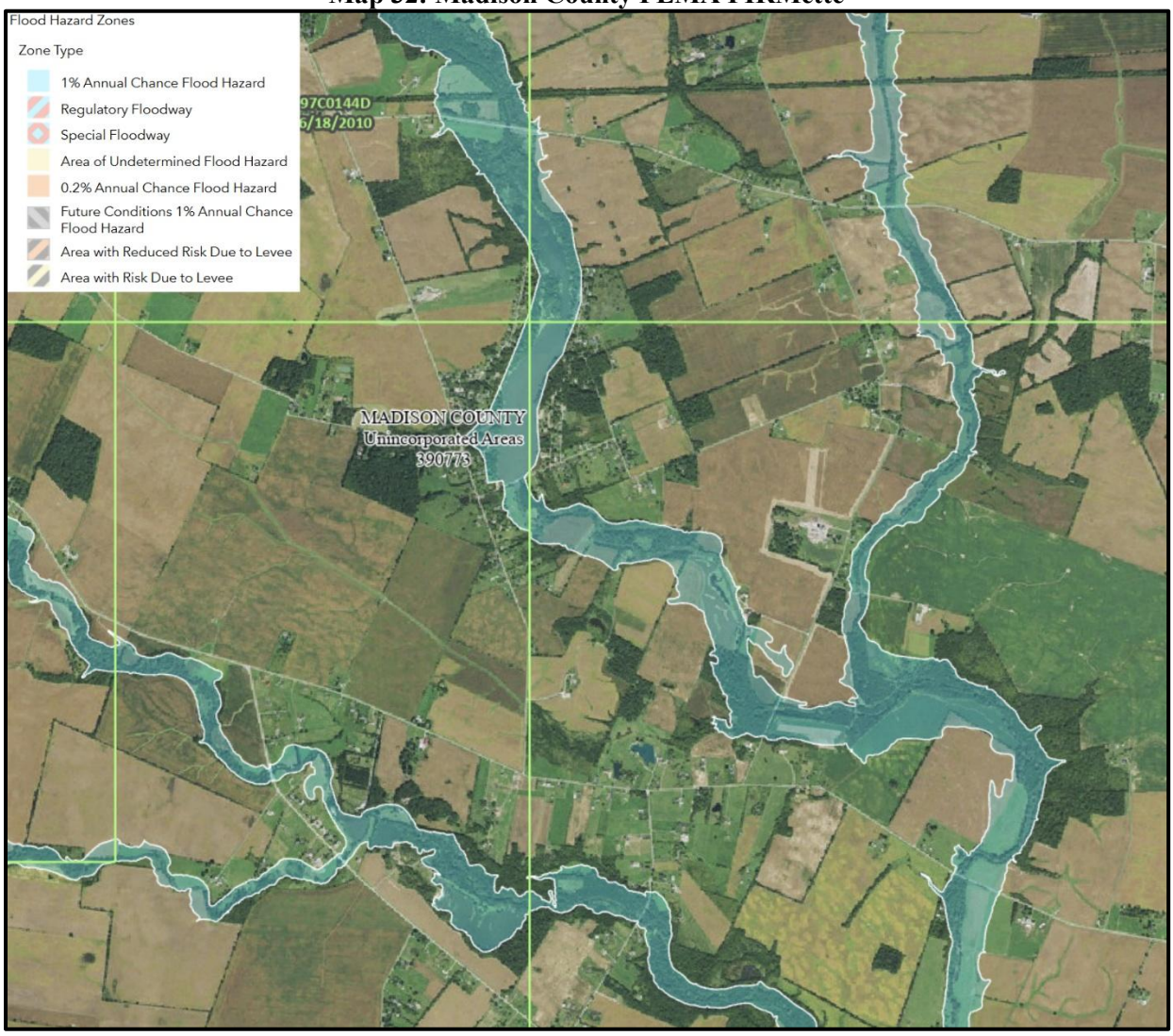
- **Customized Area:** Unlike full FIRMs, which cover large areas, a FIRMette is a focused, zoomed-in version of the map for a smaller, specific location.
- **Flood Zones:** It shows the flood zones for the selected area.
- **Elevation Information:** It may include BFEs, which help determine flood risks and insurance requirements.

- **Official Use:** FIRMettes are legally recognized and used in flood insurance determinations and community planning.

Map 31: Madison County FEMA FIRMette

Source: FEMA

Map 32: Madison County FEMA FIRMette



Source: FEMA

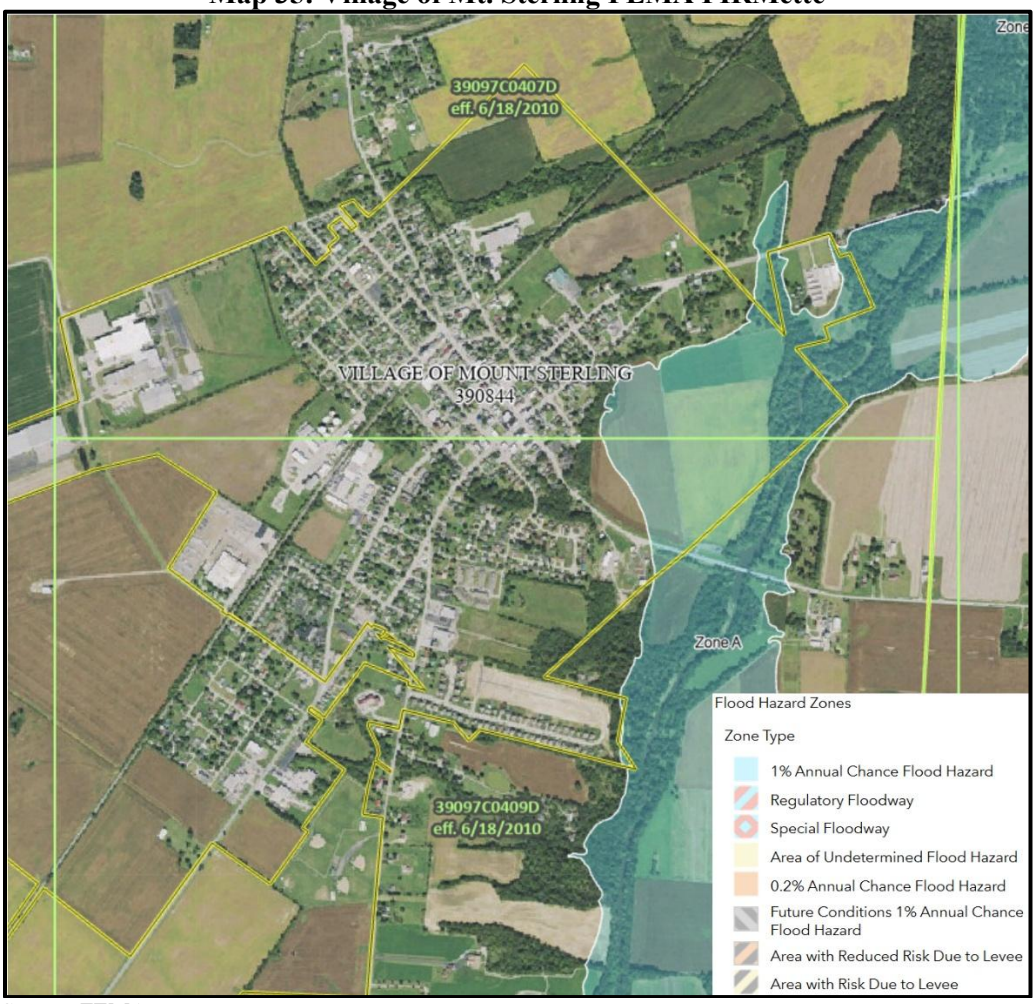
Map 33: City of London FEMA FIRMette

Source: FEMA

Map 34: Village of Midway FEMA FIRMette

Source: FEMA

Map 35: Village of Mt. Sterling FEMA FIRMette



Source: FEMA

Map 36: Village of Plain City FEMA FIRMette

Source: FEMA

Map 37: Village of South Solon FEMA FIRMette

Source: FEMA

Map 38: Village of West Jefferson FEMA FIRMette

Source: FEMA

Flooding in Madison County typically occurs due to a combination of meteorological and hydrological conditions, most commonly during the late winter and spring months. The county is traversed by several rivers and streams, including the Big Darby Creek, Little Darby Creek, and Deer Creek, which are all prone to overflowing during periods of heavy rainfall or rapid snowmelt. Flooding can also be the result of prolonged rain events, thunderstorms that produce intense rainfall in short periods, or snowmelt that occurs when warm temperatures or rainfall follow a heavy snowpack. These events can quickly saturate the soil and cause runoff into local waterways, exceeding their capacity and leading to overbank flooding.

One of the most common types of flooding in the region is riverine flooding, particularly along the Darby Creek and its tributaries. When these waterways exceed their banks, low-lying areas, including farmland, rural roads, and communities in floodplain zones, can become inundated. Flooding may also occur in urban and suburban areas due to inadequate stormwater drainage systems, especially in the villages and smaller towns within the county. Flash flooding can occur as well, particularly when high-intensity rainfall overwhelms natural and built drainage systems. Though less frequent than riverine flooding, flash floods can be particularly dangerous due to their rapid onset and potential to catch residents off guard.

Discussions with the MPC and a review of all available data indicated that while flooding is a concern for all participating jurisdictions, levels of concern may vary. The following provides a narrative of the level of jurisdictional concern:

- **Madison County:** Both flood and flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **City of London:** Flood is identified as a community concern, as indicated by the above referenced FEMA FIRM. Additionally, flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.

- **Village of Midway:** No flood hazard areas were identified with village boundaries. However, flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of Mt. Sterling:** Flood is identified as a community concern, as indicated by the above referenced FEMA FIRM. Additionally, flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of Plain City:** Flood is identified as a community concern, as indicated by the above referenced FEMA FIRM. Additionally, flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of South Solon:** No flood hazard areas were identified with village boundaries. However, flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of West Jefferson:** Flood is identified as a community concern, as indicated by the above referenced FEMA FIRM. Additionally, flash flood identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Jefferson Local:** Flash flood identified as a district concern.
- **Jonathan Alder Local:** Flash flood identified as a district concern.
- **London City Schools:** Flash flood identified as a district concern.
- **Madison-Plains Local:** Flash flood identified as a district concern.

5.10.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. The following table details flood Disaster Declarations for Madison County:

Table 65: Madison County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual Assistance	Public Assistance	Mitigation Grant Program
DR-1556-OH	09/14/2004	Severe Storms and Flooding	$23,662,227	$25,804,256	-
DR-870-OH	06/06/1990	Flooding, Severe Storms, Tornado	-	-	-

Source: FEMA
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local or Indian tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe. There have been no Emergency Declarations for flood for Madison County.

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. This authority allows the governor to activate resources, issue orders, and coordinate responses to protect public safety. There have been no state declarations of emergency for flooding for Madison County from 2019-2024.

In addition to the above, the following table presents NCEI identified flood events in Madison County from 1950 to 2024:

Table 66: Madison County NCEI Flood and Flash Flood Events

Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Flood	20	$38,250	0
Flash Flood	9	$322,000	0

Source: NCEI

Recent events of note include:

- **March 3, 2023:** Showers and scattered thunderstorms developed during the afternoon hours ahead of a strong low-pressure system moving through the Ohio Valley. High water was reported along several roads across the county.
- **February 18, 2022:** Rain overspread the region through the day ahead of a low-pressure system moving through the Ohio Valley. Rainfall amounts of 1.5 to 2.5 inches produced widespread flooding. Numerous roads were closed throughout the county due to high water.
- **March 20, 2020:** Showers and thunderstorms developed through the early morning hours as a low-pressure system moved through the Ohio Valley. Some of the storms produced locally heavy rainfall amounts of 2 to 3 inches. High water near Choctaw Lake caused a portion of a road to wash out.
- **April 3, 2018:** Severe thunderstorms and tornadoes developed ahead of a strong cold front. Between one to three inches of rain fell across the region. Water was reported on several roadways.
- **June 2, 1997:** Heavy rainfall fell for the third day in a row causing most county creeks and streams to rise further out of their banks. Numerous roads were closed due to the flooding. Damages were reported at $200,000.

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages.

The Secretary of Agriculture is authorized to designate counties as disaster areas to make emergency loans available to producers suffering losses in those counties and in counties that are contiguous to a designated county. USDA Secretarial disaster designations must be requested of the Secretary of Agriculture by a governor or the governor's authorized representative, and there is an expedited process for flooding. The following table represents the total number of Secretarial Disaster Declarations for the 10-year period of 2017 to 2024 for Madison County:

Table 67: Secretarial Flood Disaster Declarations, 2017 -2024

Jurisdiction	2024	2023	2022	2021	2020	2019	2018	2017	2016	2015
Madison County	-	-	-	-	-	S4511, S4532, S4539		-	-	S3934

Source: USDA Farm Service Agency
Note: - designates no declarations

5.10.4 Probability of Future Incidents

Based on historical occurrences, Madison County will continue to experience flood events on an annual basis. The definition of each flood zone's classification is used for the purpose of calculating the yearly probability of a riverine flood. Jurisdictions with property in a 100-year floodplain can expect a 1% annual chance of flooding within the designated areas. Jurisdictions with property in a 500-year floodplain can expect a 0.2% annual chance of flooding within the designated areas. FEMA FIRMs can be consulted to provide assistance in determining flooding probability for jurisdictions within Madison County.

The following tables, using data from the NCEI, indicate the yearly probability of a flood or flash flood event, the number of deaths or injuries, and estimated property damage for Madison County based on 75 years' worth of reporting data:

Table 68: Madison County NCEI Flood and Flash Flood Event Probability Summary

Event Type	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Flood	20	<1	0	0	$38,250	$510
Flash Flood	9	<1	0	0	$322,000	$4,293

Source: NCEI

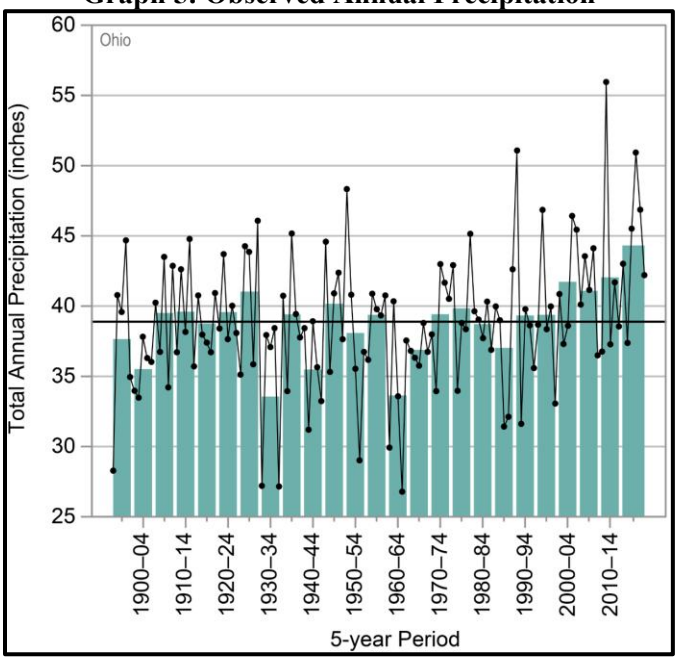
5.11.5 Projected Changes in Location, Intensity, Frequency, and Duration

The location, intensity, frequency, and duration of flooding are influenced by a combination of natural and human-induced factors. Continued urbanization, deforestation, and changes in land use can alter natural drainage patterns. The

conversion of natural landscapes to impervious surfaces, such as roads and buildings, reduces the ability of the land to absorb water, leading to increased runoff and the potential for urban flooding. Alterations to river channels, including channelization and dam construction, can influence the flow of water. Modifications may lead to changes in river behavior, affecting the potential for both upstream and downstream flooding. Poorly planned infrastructure, inadequate stormwater management, and the lack of effective drainage systems in urban areas can contribute to localized flooding. The increase in impervious surfaces reduces natural infiltration, leading to more runoff during rainfall events.

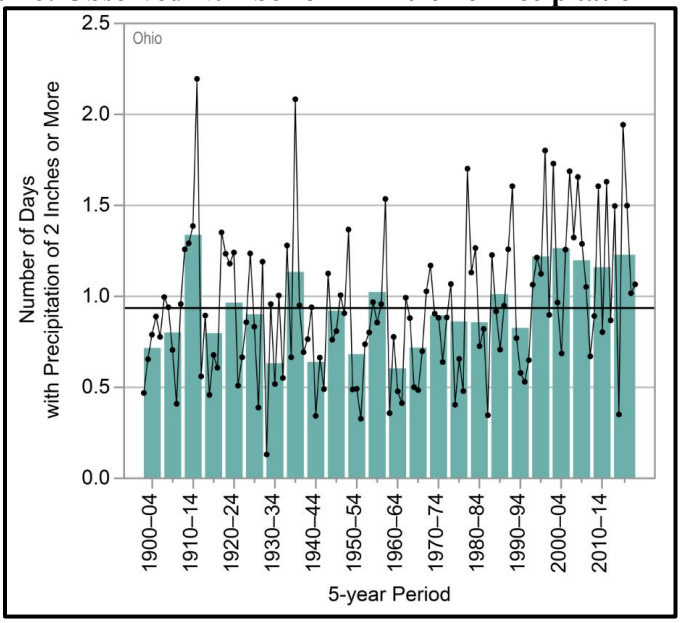
The NOAA NCEI State Climate Summary 2022 for Ohio indicates that annual precipitation in southern Ohio averages 42 inches each year. Both annual and seasonal (winter and summer) precipitation amounts have been above the long-term average since 1990. Additionally, Ohio has experienced a substantial increase in the number of heavy rain events, with the past 26 years having the some of the highest levels on record since the historic peak from 1910 to 1914. The following graphs, from the NOAA NCEI State Climate Summary 2022 for Ohio, detail precipitation patterns:

Graph 5: Observed Annual Precipitation



Source: NOAA NCEI Summary 2022 for Ohio

Graph 6: Observed Number of 2” Extreme Precipitation Events



Source: NOAA NCEI Summary 2022 for Ohio

5.10.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Madison County and all participating jurisdictions from riverine flooding. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Madison County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 69: Participating Jurisdiction Riverine Flood Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	1
-	39097040101	Very Low	10.32	1
Village of Plain City	39097040102	Relatively Low	32.69	1
-	39097040201	Very Low	6.37	1
Village of West Jefferson	39097040202	Very Low	13.58	1
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	1
Village of West Jefferson	39097040500	Very Low	25.38	1
City of London	39097040600	Relatively Low	38.76	1
City of London	39097040700	Very Low	17.69	1
-	39097041000	Very Low	10.12	1
-	39097041100	Relatively Low	31.11	1
Village of Mt. Sterling	39097041200	Very Low	21.04	1
Village of Midway and South Solon	39097041300	Very Low	9.93	1

Source: FEMA NRI

Table 70: Participating Jurisdiction Riverine Flood Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	30.5	$136,000
-	39097040101	Very Low	51.0	$7,400
Village of Plain City	39097040102	Relatively Low	59.9	$15,000
-	39097040201	Very Low	38.2	$2,100
Village of West Jefferson	39097040202	Very Low	66.1	$22,000
Village of West Jefferson, City of London	39097040400	Relatively Low	45.8	$4,800
Village of West Jefferson	39097040500	Relatively Low	47.3	$5,400
City of London	39097040600	Relatively Low	48.3	$5,900
City of London	39097040700	Very Low	60.4	$15,000
-	39097041000	Very Low	37.4	$1,900
-	39097041100	Relatively Low	71.6	$32,000
Village of Mt. Sterling	39097041200	Very Low	55.2	$10,000
Village of Midway and South Solon	39097041300	Very Low	60.2	$15,000

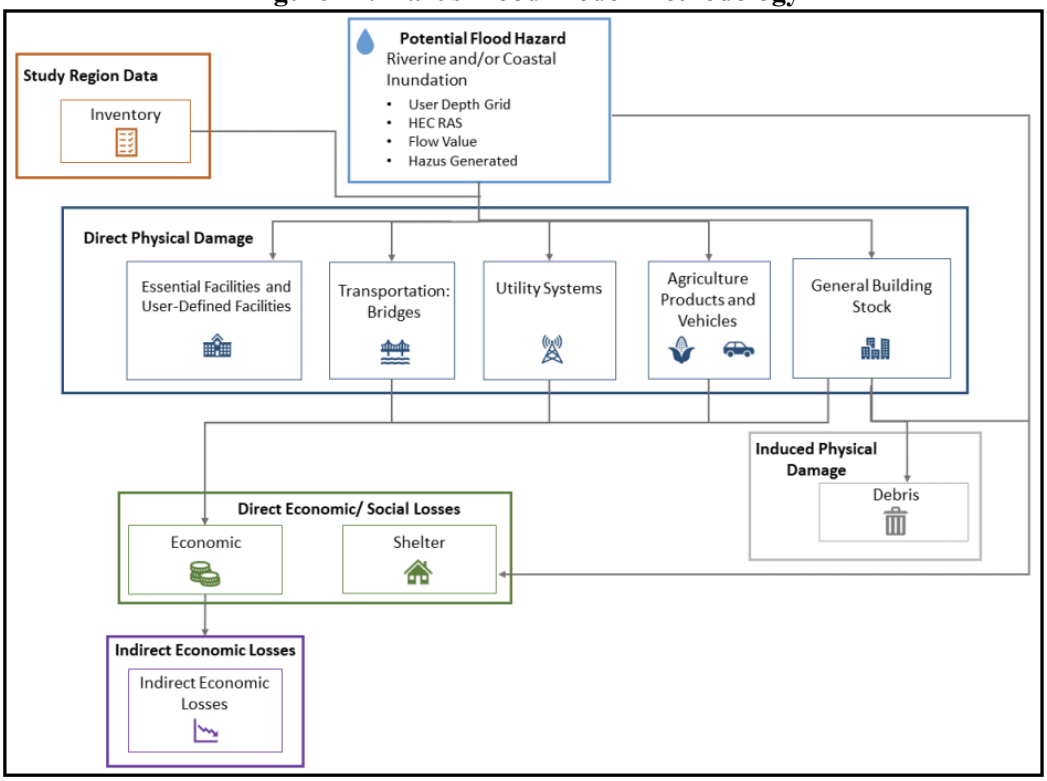
Source: FEMA NRI

FEMA Hazus

For purposes of this plan, a Hazus Flood Model was generated to provide an estimate of the consequences to a flood. The resulting loss estimate generally describes the scale and extent of damage and disruption that may result from the modeled flood event. The Hazus software uses GIS technologies for performing analyses with inventory data and displaying losses and consequences on applicable tables and maps. The following figure provides a graphic

representation of the modules that the Hazus Flood Model Methodology is comprised of, and their interrelation in deriving estimates.

Figure 11: Hazus Flood Model Methodology



Source: FEMA

The results of the Hazus analysis were utilized to estimate potential losses for flooding. The intent of this analysis was to enable Madison County to estimate where flood losses could occur and the degree of severity using a consistent methodology. The Hazus model helps quantify risk along known flood-hazard corridors as well as lesser streams and rivers that have a drainage area of ten square miles or more.

Hazus determines the displaced population based on the inundation area, not necessarily impacted buildings. As a result, there may be a population vulnerable to displacement even if the structure is not vulnerable to damage. Individuals and households will be displaced from their homes even when the home has suffered little or no damage either because they were evacuated or there was no physical access to the property because of flooded roadways.

Flood sheltering needs are based on the displaced population, not the damage level of the structure. Hazus determines the number of individuals likely to use government-provided short-term shelters through determining the number of displaced households as a result of the flooding. To determine how many of those households and the corresponding number of individuals will seek shelter in government-provided shelters, the number is modified by factors accounting for income and age. Displaced people using shelters will most likely be individuals with lower incomes and those who do not have family or friends within the immediate area. Since the income and age factors are taken into account, the proportion of displaced population and those seeking shelter will vary from county to county.

Additionally, Hazus takes into account flood depth when modeling damage (based on FEMA's depth-damage functions). Generated reports capture damage by occupancy class (in terms of square footage impacted) by damage percent classes. Occupancy classes include agriculture, commercial, education, government, industrial, religion, and residential. Damage percentage classes are grouped by 10% increments up to 50%. Buildings that sustain more than 50% damage are considered to be substantially damaged.

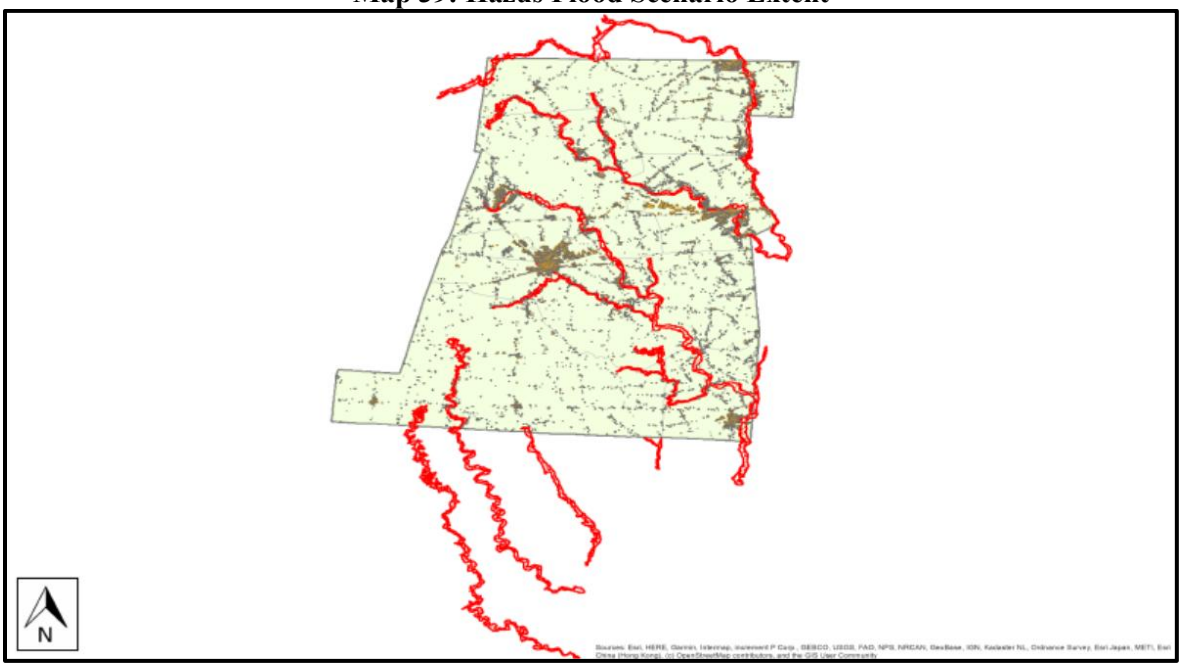
The Hazus analysis also provides an estimate of the repair costs for impacted buildings as well as the associated loss of building contents and business inventory. Building damage can also cause additional losses to a community by

restricting a building's ability to function properly. Income loss data accounts for losses such as business interruption and rental income losses as well as the resources associated with damage repair and job and housing losses. These losses are calculated by Hazus using a methodology based on the building damage estimates.

The damaged building counts generated by Hazus are susceptible to rounding errors and are likely the weakest output of the model due to the use of census blocks for analysis. Generated reports include this disclaimer: "Unlike the earthquake and hurricane models, the flood model performs its analysis at the census block level. This means that the analysis starts with a small number of buildings within each census block and applies a series of distributions necessary for analyzing the potential damage. The application of these distributions and the small number of buildings make the flood model more sensitive to rounding errors that introduces uncertainty into the building count results." Additionally, losses are not calculated for individual buildings, but instead are based on the performances of entire classes of buildings obtained from the general building stock data. In the flood model, the number of grid cells (pixels) at each flood depth value is divided by the total number of grid cells in the census block. The result is used to weigh the flood depths applied to each specific occupancy type in the general building stock. First floor heights are then applied to determine the damage depths to analyze damages and losses.

The following map illustrates the extent of the Hazus scenario:

Map 39: Hazus Flood Scenario Extent



Source: FEMA Hazus

Data derived from Hazus is present in the relevant following sections.

Population

A primary concern with this hazard is human health safety issues, as flooding can be a direct cause of death. Specific at-risk groups include outdoor workers, farmers, young children, and senior citizens. Impacts on human health can include:

- **Loss of Life**: Flooding is one of the leading causes of weather-related fatalities worldwide. Fast-rising floodwaters can lead to drowning and other water-related accidents, resulting in the tragic loss of lives.
- **Injuries:** Floods can cause injuries due to waterborne diseases, contaminated floodwaters, debris, and accidents during evacuation or rescue operations.
- **Displacement:** Many people may be forced to evacuate their homes during floods and will require emergency shelter or temporary housing. Prolonged displacement can be emotionally and economically challenging.

- **Health Risks:** Floodwaters often contain pollutants, sewage, and hazardous materials. Exposure to contaminated water can lead to waterborne diseases, infections, and other health risks.
- **Mental Health Effects:** Survivors of floods may experience a range of emotional and psychological challenges, including post-traumatic stress disorder, anxiety, depression, and grief.
- **Food and Water Shortages:** Floods can contaminate water supplies and disrupt the distribution of food. This can lead to shortages of clean drinking water and essential food items.
- **Impact on Vulnerable Populations:** Vulnerable populations, including the elderly, children, people with disabilities, and those living in poverty, are often disproportionately affected by floods due to limited resources and mobility challenges.

Especially critical is timely evacuation orders, and adherence to those orders. If evacuation is not heeded, or flood waters rise quickly enough, citizens could drown or become trapped for extended periods of time with no access to services or medical care. Of special concern are long-term care and medical facilities where it can take longer to evacuate, or evacuation may be impossible. Additionally, lower income citizens may not have the means to relocate, whether it be lack of transportation or lack of resources to afford temporary shelter.

Using available GIS data and census data concerning occupants per structure (average household size 2.56), the following table indicates the number of people in both 100 and 500-year floodplains for each participating jurisdiction and county township:

Table 71: Population in 100- and 500-Year Floodplains

Jurisdiction	100-Year Floodplain	500-Year Floodplain
Madison County	1,006	1,257
City of London	64	174
Village of Midway	0	0
Village of Mt. Sterling	0	0
Village of Plain City	0	5
Village of South Solon	0	0
Village of West Jefferson	77	0
Township of Canaan	33	33
Township of Darby	28	56
Township of Deer Creek	166	184
Township of Fairfield	0	0
Township of Jefferson	120	138
Township of Monroe	38	44
Township of Oak Run	41	41
Township of Paint	0	5
Township of Pike	18	33
Township of Pleasant	33	41
Township of Range	0	0
Township of Somerford	366	389
Township of Stokes	13	13
Township of Union	84	105

Source: FEMA NRI and Janey Camp GIS

The following table provides the Hazus results for displaced households, person seeking shelter, and the total displaced population for Madison County:

Table 72: Madison County Hazus Flood Scenario Displaced Population

Displaced Households	Persons Seeking Shelter	Displaced Population
93	63	280

Source: FEMA Hazus

Buildings and Structures

Floods can have significant and often costly impacts on buildings and structures. These impacts can disrupt essential services, damage infrastructure, and pose safety risks. The extent of the impact depends on factors such as the severity of the flood, the preparedness of the infrastructure, and the effectiveness of flood management measures. Here are some of the common impacts of floods on facilities and critical infrastructure:

- **Foundation Damage:** Floodwaters can erode the soil supporting the foundation, leading to settling, cracks, or even collapse. Scouring and soil liquefaction during floods may undermine the stability of buildings, especially those on weak soils.
- **Wall and Floor Damage:** High water pressure, especially from fast-moving floods, can crack walls, warp floors, and cause floors to collapse.
- **Building Collapse:** If the foundation is significantly compromised, or if water levels rise too quickly, entire buildings may collapse, especially older structures or those not designed for flood resilience.
- **Water Seepage:** Even shallow flooding can cause water to seep into the building's structure, leading to rotting of wooden frames, mold growth, and damage to insulation and electrical systems.
- **Interior Damage:** Drywall, carpets, furniture, and appliances may all be ruined by prolonged exposure to floodwater, which often carries contaminants like sewage and chemicals.
- **Electrical Short Circuits and Fire:** Floodwaters can cause electrical systems to short-circuit, posing risks of fire or electrocution.
- **HVAC and Plumbing System Damage:** Heating, ventilation, and air conditioning systems, as well as plumbing systems, are vulnerable to water damage, potentially leading to the loss of potable water and proper sanitation in the building.
- **Mold:** After the floodwaters recede, mold and mildew can quickly develop in damp environments. This can lead to respiratory problems for occupants and further deterioration of the building materials.
- **Wood Rot and Corrosion:** Prolonged exposure to water can cause wooden materials to rot and metal components, like steel reinforcements, to corrode, weakening the building over time.

Using available GIS data, the following table indicates the number of buildings in both 100 and 500-year floodplains for each participating jurisdiction and county township:

Table 73: Buildings in 100- and 500-Year Floodplains

Jurisdiction	100-Year Floodplain	500-Year Floodplain
Madison County	393	491
City of London	25	68
Village of Midway	0	0
Village of Mt. Sterling	0	0
Village of Plain City	0	2
Village of South Solon	0	0
Village of West Jefferson	30	0
Township of Canaan	13	13
Township of Darby	11	22
Township of Deer Creek	65	72
Township of Fairfield	0	0
Township of Jefferson	47	54
Township of Monroe	15	17
Township of Oak Run	16	16
Township of Paint	0	2
Township of Pike	7	13
Township of Pleasant	13	16
Township of Range	0	0

Table 73: Buildings in 100- and 500-Year Floodplains

Jurisdiction	100-Year Floodplain	500-Year Floodplain
Township of Somerford	143	152
Township of Stokes	5	5
Township of Union	33	41

Source: FEMA NRI and Janey Camp GIS

The following table provides the Hazus results for damaged building, destroyed buildings, total economic loss, and debris generated for Madison County:

Table 74: Madison County Hazus Flood Scenario Building and Economic Impacts

Damaged Buildings	Destroyed Buildings	Total Economic Loss	Debris Generation (tons)
27	0	$8,190,000	365

Source: FEMA Hazus

Transportation and Electrical Infrastructure

Flooding can have numerous impacts on both transportation and electrical distribution systems. The impacts of flooding on transportation systems may include:

- **Scour and Erosion:** Floodwaters can wash away the supporting soil around and beneath roads, a process known as scour. This can lead to the collapse of the roadbed and destabilization of bridges and overpasses.
- **Undermining of Pavement:** Prolonged exposure to floodwaters can weaken the pavement structure, leading to cracks, potholes, and eventual failure of the roadway. Roads not designed for water drainage are especially susceptible to being washed out.
- **Potholes and Cracks:** Water penetrates cracks in the pavement, weakening the sublayers. Once the floodwaters recede and the weight of vehicles passes over, potholes can quickly form, creating hazards for drivers.
- **Surface Damage:** Asphalt roads, in particular, can become brittle after repeated water exposure, resulting in chunks of road surface breaking off.
- **Bridge Collapse:** Flooding can damage the support structures of bridges, particularly if water levels rise to exert pressure on the bridge's piers. Debris carried by floodwaters can accumulate around bridge structures, further stressing them.
- **Blocked or Collapsed Culverts:** Culverts, which allow water to pass beneath roads, can become blocked by flood debris, leading to water pooling on roads or forcing water to erode the roadbed around the culvert.
- **Road Inundation:** Flash floods or slow-rising waters can make roads impassable, either because of deep standing water or swift currents.
- **Landslides:** In hilly or mountainous regions, flooding increases the risk of mudslides and landslides, which can bury roads and highways under tons of debris, blocking transportation routes and requiring significant cleanup.
- **Debris Flows:** Heavy rains can wash debris, rocks, and soil onto roads, making them impassable and causing further damage to the road surface.
- **Foundation Weakening:** Repeated flooding over time can weaken the structural foundation of roads, even if the damage isn’t immediately apparent. This could lead to long-term deterioration of highways and bridges, requiring expensive repairs or reconstruction.

Flooding can impact both the electrical generation capacity and transmission. The impacts of extreme heat on electrical systems may include:

- **Flooding of Substations:** Electrical substations, particularly those located in low-lying or flood-prone areas, are vulnerable to flooding. Water ingress into substations can cause short circuits and failures of critical equipment such as transformers, circuit breakers, and switchgear. If a substation is taken offline, large areas could lose power.
- **Transformer Damage:** Floodwaters can compromise oil-insulated transformers by causing leaks or mixing with the oil leading to transformer failures and extended outages.

- **Downed Power Lines:** Strong flood currents, debris, or trees falling due to saturated soil can bring down power lines, leading to localized or widespread outages.
- **Foundation Erosion:** Transmission towers and utility poles are susceptible to soil erosion during floods, which can undermine their foundations and cause structural instability or collapse.
- **Corrosion of Equipment:** Prolonged exposure to floodwaters can lead to the corrosion of metal components in transmission and distribution systems, shortening the lifespan of equipment and increasing the risk of failure.
- **Water Infiltration:** Electrical equipment, including power meters, transformers, and underground cabling, can experience short circuits if water infiltrates, leading to power outages and potential safety hazards. For example, underground electrical vaults can flood, damaging cables and transformers, and posing fire and electrocution risks.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Facilities

Water and wastewater utilities are vulnerable to flood events due to the potential for plant damages and distribution system damages. Impacts may include:

- **Damage to Water Treatment Plants:** Floodwaters can inundate water treatment plants, damaging pumps, electrical systems, and filtration equipment. This can prevent the proper treatment of drinking water, leading to unsafe water supplies.
- **Damage to Wastewater Treatment Plants:** Wastewater facilities may experience flooding that overwhelms the capacity to treat sewage, leading to raw or partially treated sewage being discharged into nearby water bodies, contaminating them.
- **Damage to Pumping Stations:** Flooded pumping stations can fail, leading to service interruptions in both water distribution and sewage removal. These failures may require costly repairs or replacements.
- **Drinking Water Contamination:** Floodwaters often carry contaminants such as chemicals, sewage, and industrial waste. If this water infiltrates drinking water systems through broken pipes or overwhelmed treatment systems, it can lead to widespread contamination.
- **Backflow of Sewage:** In severe flooding, sewage can backflow into homes, streets, and businesses through overwhelmed or broken sewer systems. This not only poses health risks but also results in costly cleanup.
- **Increased Flow in Sewer Systems:** During floods, combined sewer systems (which handle both stormwater and sewage) can be overwhelmed by the sheer volume of water. This leads to combined sewer overflows where untreated sewage is discharged directly into rivers, harming the environment and public health.
- **Overwhelmed Stormwater Systems:** Flooding can overwhelm stormwater management systems, causing backups that flood streets and neighborhoods. In older urban areas, this may also overwhelm the sewer system, as stormwater and sewage often share the same infrastructure.

Information concerning the costs to repair or reconstruct water and wastewater infrastructure may be found in Section 5.8.6.

Medical and Response Facilities

A FEMA Hazus and GIS analysis of medical and response facilities within the 100-year floodplain indicates the following:

Table 75: Participating Jurisdiction Medical, Fire, and Response Facilities in 100-Year Floodplain

Jurisdiction	Medical Facilities	Fire Facilities	Police Facilities
Madison County	0	0	0
City of London	0	0	0
Village of Midway	0	0	0

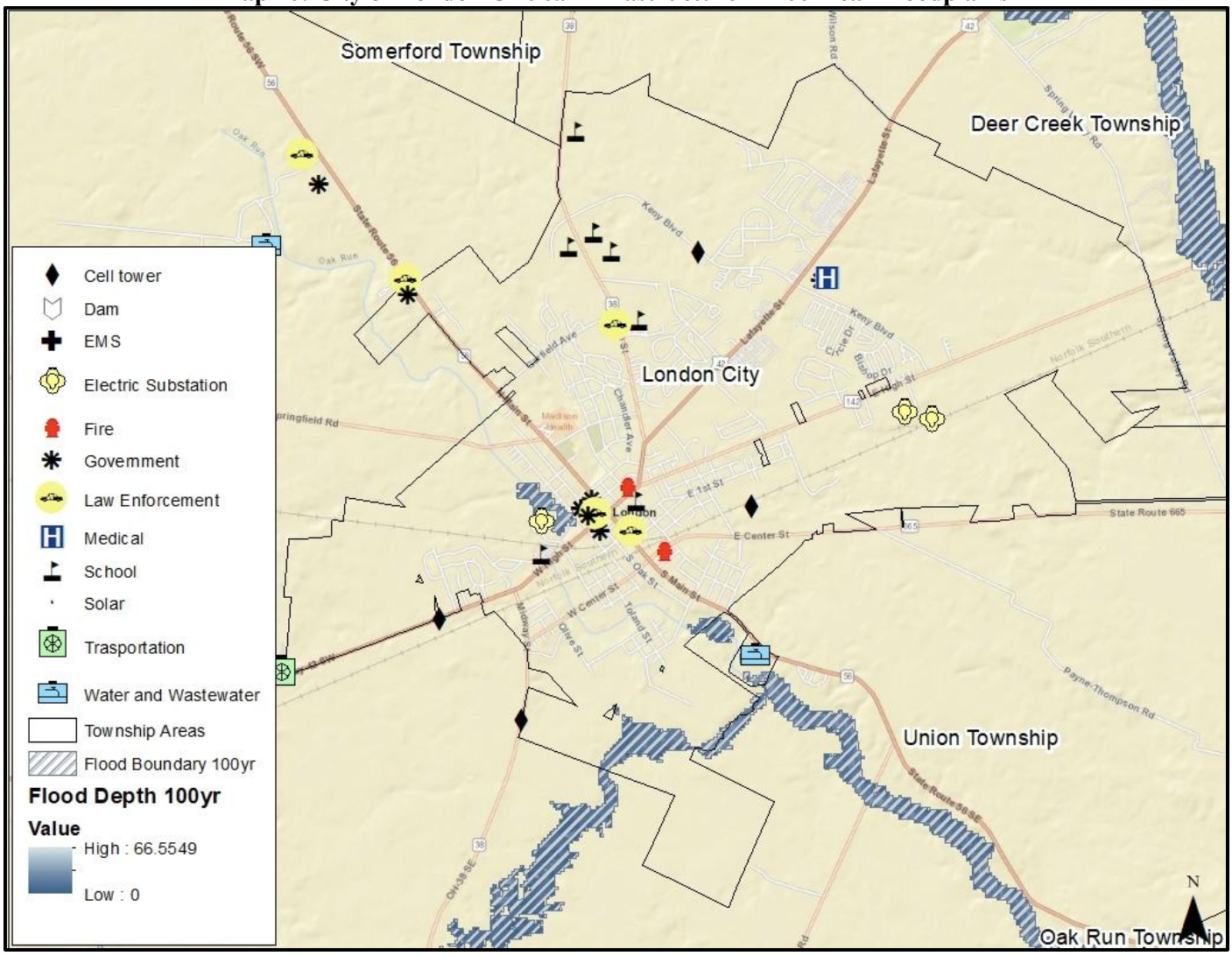
Table 75: Participating Jurisdiction Medical, Fire, and Response Facilities in 100-Year Floodplain

Jurisdiction	Medical Facilities	Fire Facilities	Police Facilities
Village of Mt. Sterling	0	0	0
Village of Plain City	0	0	0
Village of South Solon	0	0	0
Village of West Jefferson	0	0	0

Source: FEMA Hazus and Janey Camp GIS

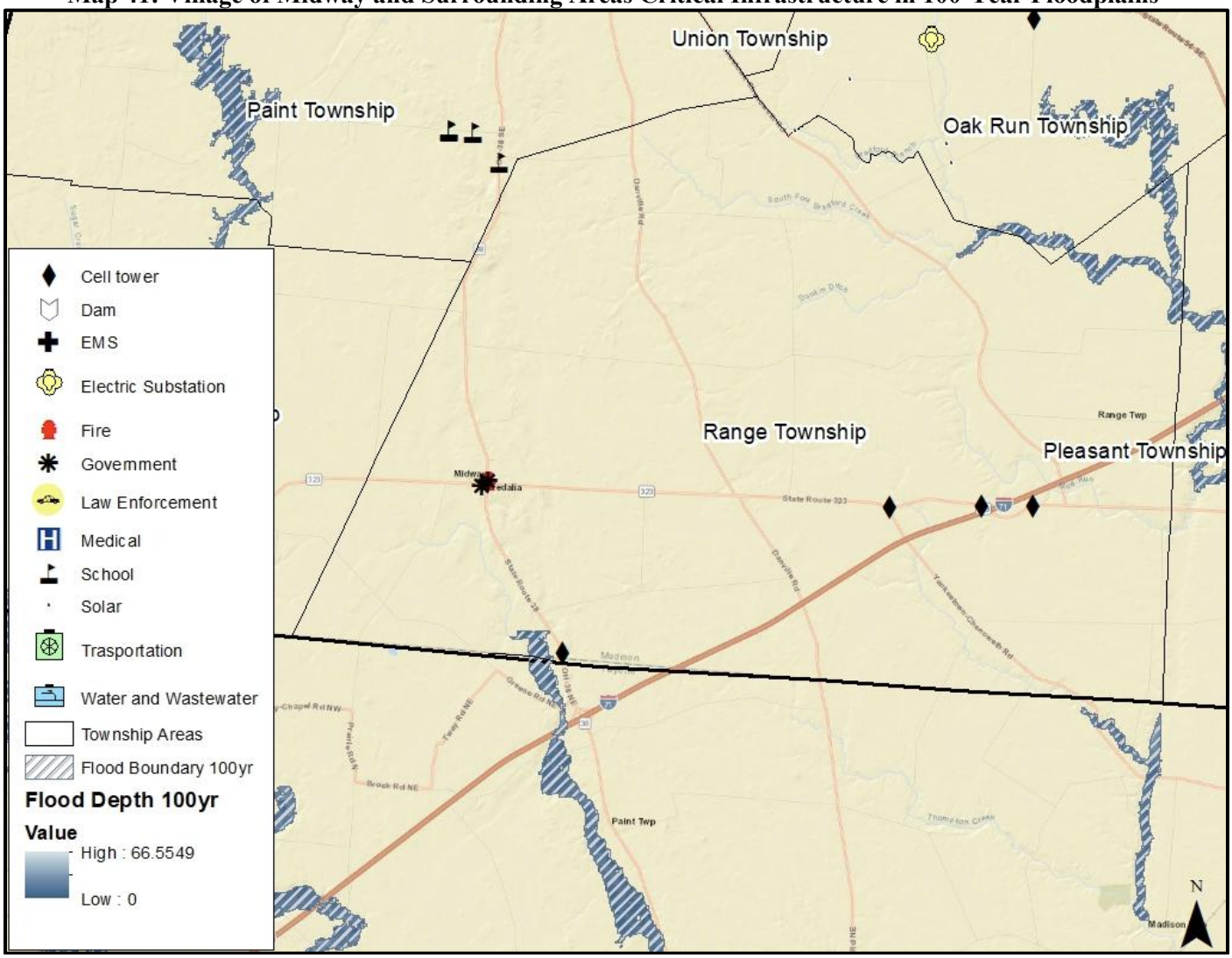
The following jurisdictional maps indicate the location of critical facilities in relation to identified floodplains:

Map 40: City of London Critical Infrastructure in 100-Year Floodplains



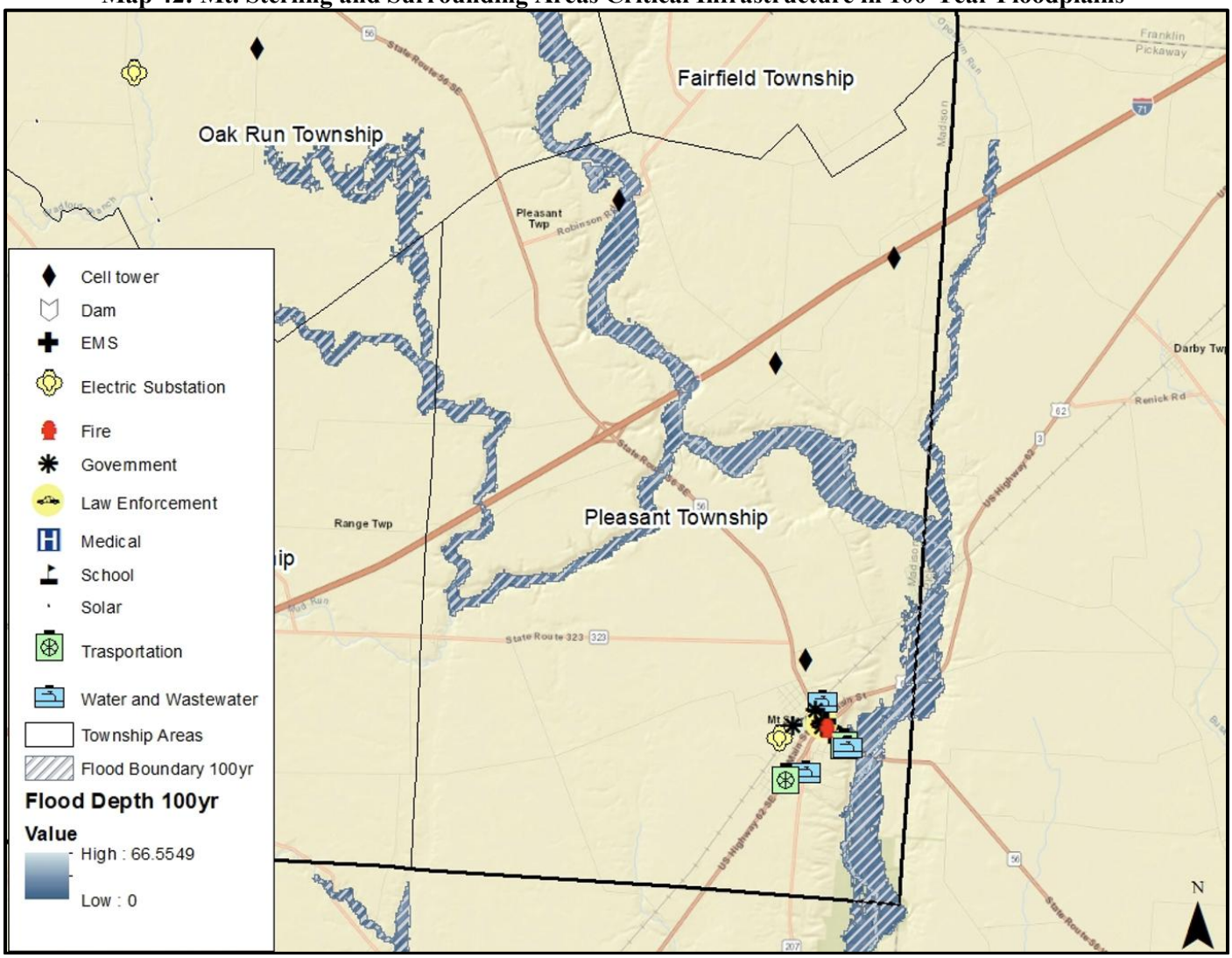
Source: Madison County, FEMA and Janey Camp GIS

Map 41: Village of Midway and Surrounding Areas Critical Infrastructure in 100-Year Floodplains



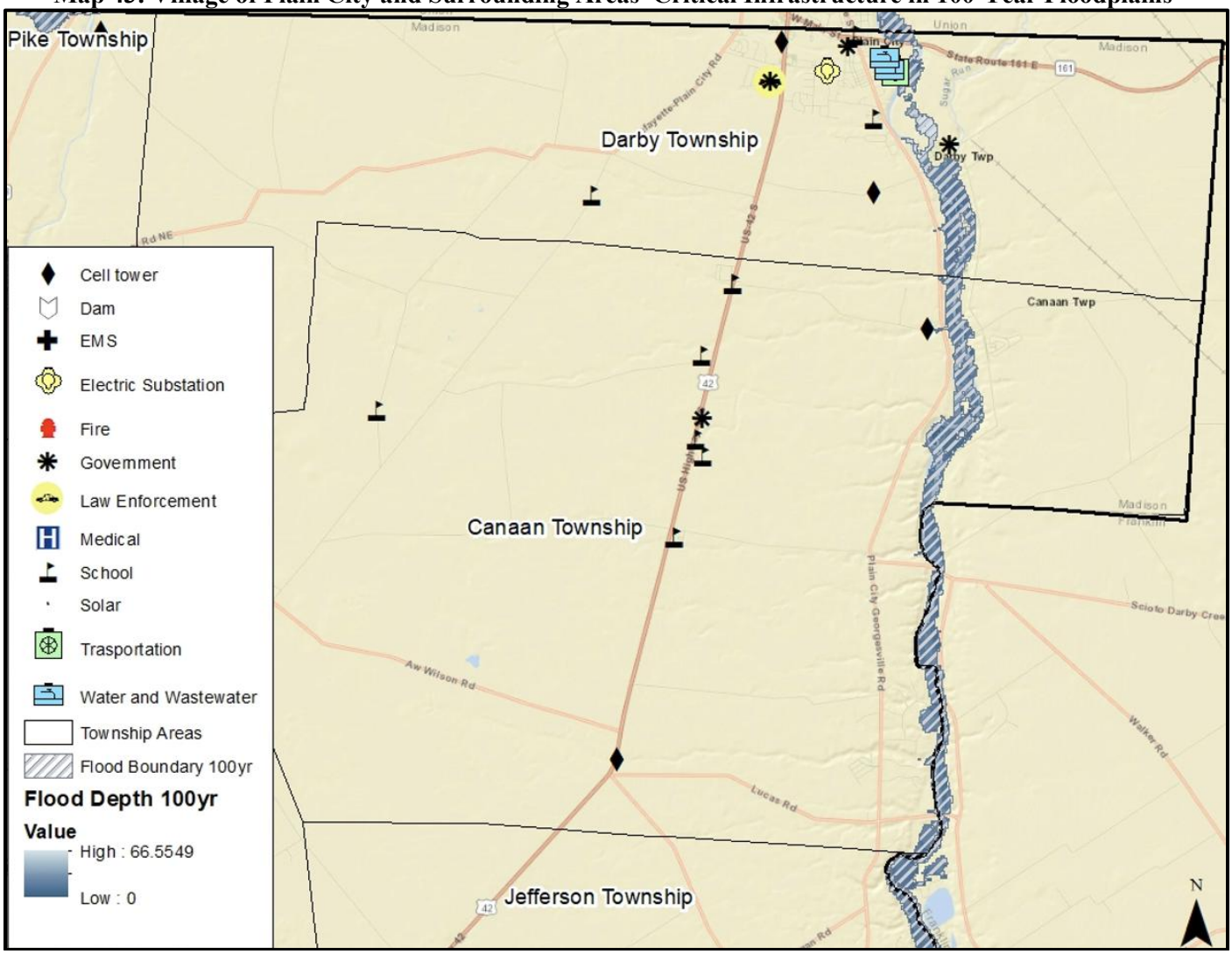
Source: Madison County, FEMA and Janey Camp GIS

Map 42: Mt. Sterling and Surrounding Areas Critical Infrastructure in 100-Year Floodplains



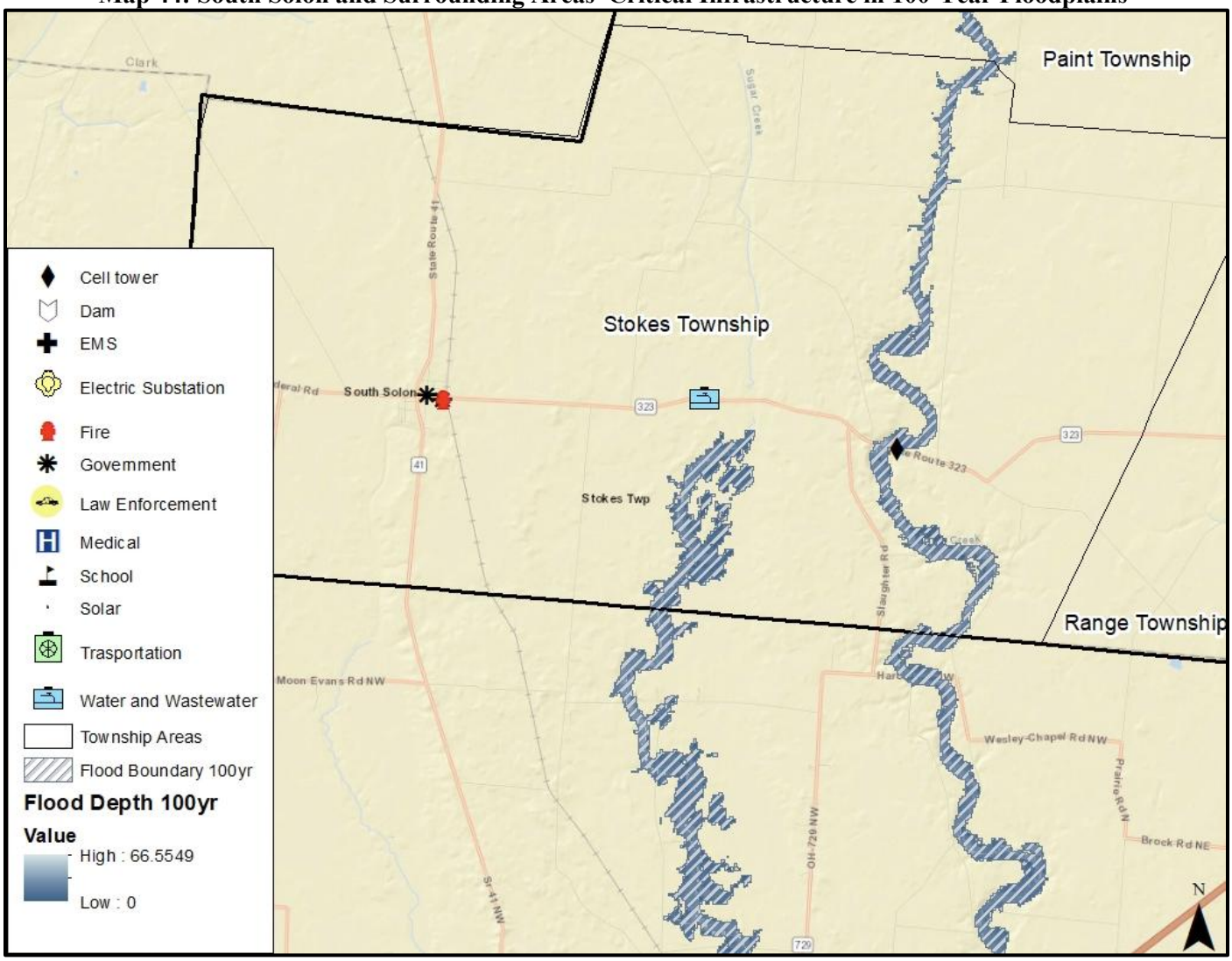
Source: Madison County, FEMA and Janey Camp GIS

Map 43: Village of Plain City and Surrounding Areas Critical Infrastructure in 100-Year Floodplains



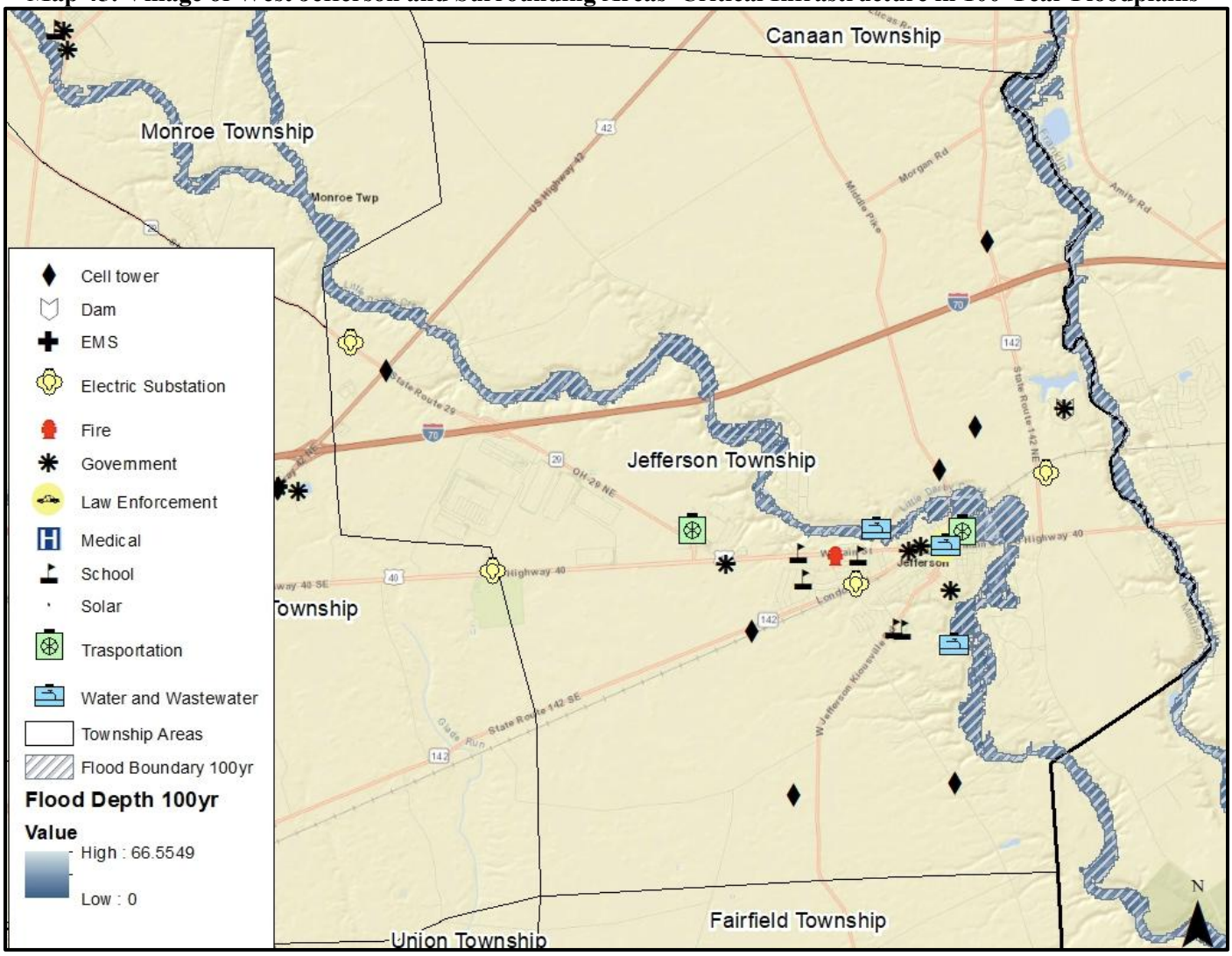
Source: Madison County, FEMA and Janey Camp GIS

Map 44: South Solon and Surrounding Areas Critical Infrastructure in 100-Year Floodplains



Source: Madison County, FEMA and Janey Camp GIS

Map 45: Village of West Jefferson and Surrounding Areas Critical Infrastructure in 100-Year Floodplains



Source: Madison County, FEMA and Janey Camp GIS

While flooding may result in a temporary increase in patients, it is considered unlikely that any influx would overwhelm current medical capabilities.

Depending on response facility capability and location, flooding may necessitate the closure of the facility for the duration of the event due to damage or lack of access. These closures are expected to have additional consequences through the disruption of emergency response capabilities.

The following table provides the Hazus results for the number of critical facilities estimated to be damaged or suffer loss of use from the flood scenario:

Table 76: Madison County Hazus Flood Scenario Number of Critical Facilities Damaged or Impacted

Emergency Operations Centers	Fire Stations	Hospitals	Police Stations	Schools
0	0	0	0	0

Source: FEMA Hazus

Educational Facilities

A FEMA Hazus and GIS analysis of educational facilities within the 100-year floodplain indicates the following:

Table 77: Participating Jurisdiction Educational Facilities in 100-Year Floodplain

Jurisdiction	Educational Facilities
Madison County	0
City of London	0
Village of Midway	0
Village of Mt. Sterling	0
Village of Plain City	0
Village of South Solon	0
Village of West Jefferson	0

Source: FEMA Hazus and Janey Camp GIS

Results for the number of schools estimated to be damaged or suffer loss of use from the Hazus flood scenario indicate no schools are expected to be impacted.

Communication Systems

No comprehensive mapping of communications systems was available for review to compare against known flood hazard areas. However, it is assumed that communications lines and towers are in known hazard areas. Flooding can disrupt this vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Damage to Infrastructure:** Flood waters can cause physical damage to communication infrastructure such as cell towers, antennas, satellite dishes, and power lines. This damage can result in interruptions or complete failure of communication services.
- **Power Outages:** Flood waters can lead to power outages by knocking down power lines or damaging electrical substations. Communication systems that rely on electricity, such as landline phones, internet routers, and cellular towers, may cease to function during power outages.
- **Structural Instability:** Flood waters can cause structural instability in communication towers and buildings housing communication equipment. If these structures are not properly reinforced, they may collapse or sustain damage, disrupting communication services.

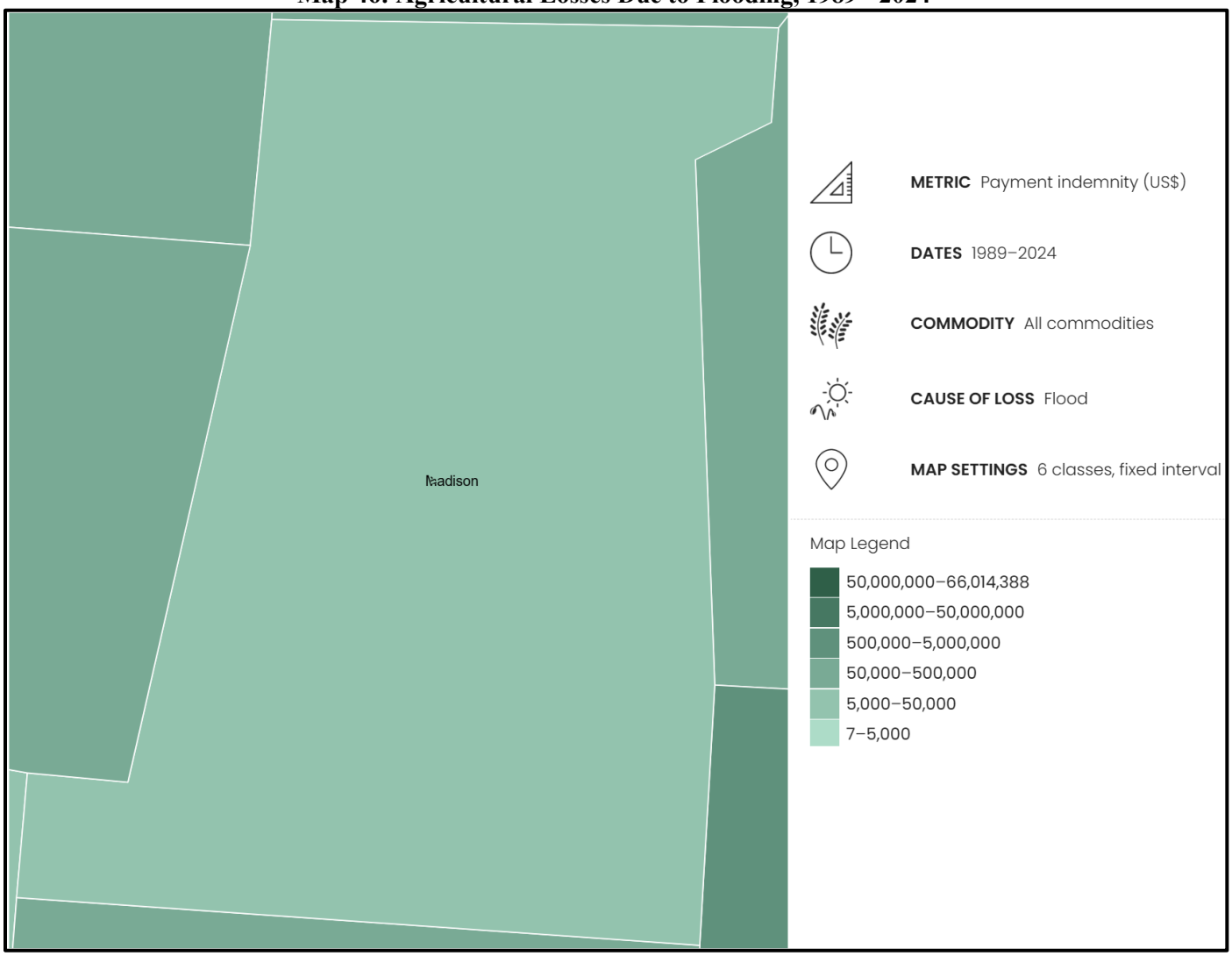
The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.9.6.

Environmental and Agricultural Impacts

Environmental impacts from flooding can be far reaching. Of particular concern is flood related runoff, potentially carrying sewage, pesticides, or hazardous chemicals, which can cause long lasting environmental harm. Expected negative outcomes could include changes in habitat, a decrease of available food, and an increase in the spread of vector-associated disease due to standing water.

Flooding can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to flooding from 1989 - 2024:

Map 46: Agricultural Losses Due to Flooding, 1989 - 2024



Source: United States Department of Agriculture

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **City of London:** London has areas classified as SFHAs, which are susceptible to periodic inundation. These flood-prone zones pose risks such as loss of life, property damage, health and safety hazards, disruption of commerce and governmental services, and significant public expenditures for flood protection and relief. To mitigate flood risks, the city enforces zoning and building regulations that restrict development within the 100-year floodplain unless specific variances are granted. These measures aim to preserve the natural benefits of floodplains and reduce potential damage from flooding events. The city's Building & Zoning Department oversees these regulations, ensuring that new developments comply with established standards. 25 structures and 65 people have been identified in SHFAs within city limits.
- **Village of Midway:** Midway has no SHFAs within village limits. Midway is situated in a predominantly rural area with limited stormwater infrastructure. The village's aging drainage systems may not adequately handle heavy rainfall events, leading to localized flooding. Additionally, the surrounding topography and soil composition can contribute to poor water absorption, exacerbating runoff issues during storms.

- **Village of Mt. Sterling:** Mt. Sterling has SFHAs in the western portion of village limits, however no structures are located in these areas. The village's infrastructure, particularly its stormwater management systems, plays a critical role in mitigating flood risks. Aging or inadequate drainage systems can exacerbate flooding during heavy rainfall events.
- **Village of Plain City:** Plain City faces several flooding concerns due to its geographic location and proximity to significant waterways, including Big Darby Creek, a waterway known for its susceptibility to flooding. The village's aging infrastructure, particularly its stormwater management systems, plays a critical role in mitigating flood risks. This aging system can exacerbate flooding during heavy rainfall events.
- **Village of South Solon:** South Solon has no SHFAs within village limits. However, the village is situated in a predominantly rural area with limited stormwater infrastructure. The village's aging drainage systems may not adequately handle heavy rainfall events, leading to localized flooding. Additionally, the surrounding topography and soil composition can contribute to poor water absorption, exacerbating runoff issues during storms.
- **Village of West Jefferson:** West Jefferson faces several flooding concerns due to its proximity to significant waterways and the challenges posed by urban development. West Jefferson is situated near both Big Darby Creek and Little Darby Creek, which are known to overflow during heavy rainfall events. Numerous areas of the village are identified within SFHAs, particularly along these creeks. Additionally, the expansion of impervious surfaces, such as roads and buildings, in West Jefferson has increased stormwater runoff, reducing natural infiltration and elevating flood risks. Urbanization can lead to larger and more frequent flooding events, especially when stormwater infrastructure is inadequate or outdated. 30 structures and 77 people have been identified in SHFAs within city limits.
- **Jefferson Local:** No district buildings have been identified within SHFAs. However, all district buildings have large areas of impermeable parking areas that are susceptible to flash flooding. Additionally, any flooding in district areas will impact the operations of local schools and make transportation of student a challenge.
- **Jonathan Alder Local:** No district buildings have been identified within SHFAs. However, all district buildings have large areas of impermeable parking areas that are susceptible to flash flooding. Additionally, any flooding in district areas will impact the operations of local schools and make transportation of student a challenge.
- **London City Schools:** No district buildings have been identified within SHFAs. However, all district buildings have large areas of impermeable parking areas that are susceptible to flash flooding. Additionally, any flooding in district areas will impact the operations of local schools and make transportation of student a challenge.
- **Madison-Plains Local:** No district buildings have been identified within SHFAs. However, all district buildings have large areas of impermeable parking areas that are susceptible to flash flooding. Additionally, any flooding in district areas will impact the operations of local schools and make transportation of student a challenge.

Cascading Impacts

Cascading impacts often result when one hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with extreme may include:

- Infrastructure and utility failure
- Economic disruption
- Flood related illnesses and mortality
- Power outages
- Population displacement
- Environmental degradation

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Madison

County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 78: Flood Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Significant flooding events can lead to the damage and loss of homes, property, and businesses. Flash flooding and excessive rainfall may lead to dangerous conditions on roadways. Closures of medical facilities is a major public health concern if flooding damages those facilities. Water sources may become contaminated, and water or sewer systems may be disrupted. Vector-associated disease may increase.
Impact on Responders	Fire, police, and emergency responders may be called on to evacuate people from impacted areas, as well as close roads, attend to the injured, and direct traffic away from the flooded area and roads. First responders may face challenges with transportation and access to a location. Flash floods and mudslides due to heavy rainfall can also injure first responders, as well as delay response operations.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Floods which create power outages, debris damage, and road closures are not uncommon. This threat may impact an agency's ability to maintain operations based on the incidents impact on power, communications and the potential to damage equipment and records within primary and alternate facilities.
Delivery of Services	Flooding can cause road and bridge closures, as well as disrupt transit services, impacting the ability to deliver goods and services. Exposure to flood waters may also damage or destroy physical goods such as food, clothing, and hygiene products.
Property, Facilities, and Infrastructure	Flooding can cause significant property destruction. Floods can disrupt normal daily activities due to the potential impact on schools, hospitals, and other public infrastructure. Transportation infrastructure can be damaged which could impact the freedom of movement or provision of utilities. Water sources can become contaminated. Water and sewer systems may be disrupted. Solid-waste collection and disposal may also be impacted, causing dangerous public health risks.
Impact on Environment	Rising waters from flooding impact the environment by spreading pollution, inundating water and wastewater treatment plants, and disrupting wildlife. Standing water following a flood event can facilitate the spread of vector-associated diseases.
Economic Conditions	Significant and repeated flooding can lower property value throughout the state, which can have a deleterious effect on the tax base. Furthermore, flooding drains response resources, which can be costly during a large flooding event for disaster reimbursement
Public Confidence in Governance	Ineffective flooding response can decrease the public's confidence in the ability to respond and govern. Multi-level government response requires direct actions that must be immediate and effective to maintain public confidence. Efficiency in response and recovery operations is critical in keeping public confidence high.

5.10.7 Future Development

As Madison County experiences growth in residential, commercial, and industrial sectors, the proliferation of impervious surfaces, such as roads, parking lots, and rooftops, will continue to grow. These surfaces hinder natural water infiltration into the soil, leading to higher volumes of stormwater runoff. Consequently, during heavy rainfall events, the excess runoff can overwhelm existing drainage systems, resulting in more frequent and severe flooding incidents.

Many of Madison County's stormwater management systems were designed based on historical land use and precipitation patterns. The rapid pace of development, coupled with changing conditions, has outpaced the capacity of these systems. Without significant upgrades, the existing infrastructure may be insufficient to manage the increased runoff, leading to more frequent urban flooding events.

Recognizing these challenges, Madison County has implemented several measures to mitigate future flood impacts. The county's flood damage reduction resolution (Resolution Number 167.23, 2023) outlines regulations to manage

development in flood-prone areas, aiming to minimize potential damages. Additionally, the county participates in the NFIP, which encourages communities to adopt and enforce floodplain management regulations. These efforts are complemented by public education initiatives and infrastructure improvement projects designed to enhance the county's resilience to flooding.

5.10.8 National Flood Insurance Program Communities

The NFIP is a federal program, managed by FEMA, which exists to provide flood insurance for property owners in participating communities, to improve floodplain management practices, and to develop maps of flood hazard areas. The following table presents NFIP participating communities.

Table 79: Madison County NFIP Communities

Community	Initial Flood Hazard Boundary Map Identified	Initial Flood Insurance Rate Map Identified	Current Effective Map Date
Madison County	01/27/1978	02/06/1991	11/16/2023
City of London	05/10/1974	07/02/1987	06/18/2010
Village of Plain City	07/25/1975	12/15/1983	06/18/2010
Village of West Jefferson	07/25/1975	06/18/2010	11/16/2023

Source: FEMA NFIP

The Community Rating System (CRS) is a voluntary program within the NFIP that provides insurance premium discounts to policy holders based on a jurisdiction's adherence to floodplain management activities that exceed minimum NFIP requirements. As of this plan, no participating jurisdictions within Madison County are CRS participants.

5.10.9 FEMA Flood Policy and Loss Data

Madison County flood policy information was sourced from FEMA's Flood Insurance Data and Analytics. The number of flood insurance policies in effect may not include all structures at risk of flooding, and it is likely that some properties are under-insured. The flood insurance purchase requirement is for flood insurance in the amount of federally backed mortgages, not the entire value of the structure. Additionally, contents coverage is not required. The following table shows the details of NFIP policy statistics for Madison County:

Table 80: Madison County NFIP Coverage

Jurisdiction	Number of Policies in Force	Total Coverage
Madison County	16	$3,774,000
City of London	22	$3,799,000
Village of Plain City	4	$1,056,000
Village of West Jefferson	2	$700,000

Source: FEMA Flood Insurance Data and Analytics

Due to the data not being present in the previous LHMP, a comparison of coverage changes cannot be completed for Madison County:

5.10.10 Repetitive Loss Structures

The NFIP defines a Repetitive Loss property as:

- Any insurable building for which two or more claims of more than $1,000 were paid by the NFIP within any rolling 10-year period, since 1978. At least two of the claims must be more than 10 days apart.

The definition of severe repetitive loss as applied to this program was established in section 1361A of the National Flood Insurance Act, as amended, 42 U.S.C. 4102a. A Severe Repetitive Loss property is defined as a residential property that is covered under an NFIP flood insurance policy and:

- That has at least four NFIP claim payments (including building and contents) over $5,000 each, and the cumulative amount of such claims payments exceeds $20,000; or

- For which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

For both of the above, at least two of the referenced claims must have occurred within any ten-year period and must be greater than ten days apart.

The following table details information concerning RL and SRL identified properties in Madison County:

Table 81: Madison County Repetitive Loss Properties

Community Name	Repetitive Loss Properties	Severe Repetitive Loss Properties	Occupancy	Losses	Total Paid
London	1	0	Single Family	2	$15,633.85

Source: Ohio EMA

5.10.11 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the flood hazard.

Table 82: Example Flood Mitigation Actions

Category	Example Action
Planning and Regulation	Determine and enforcing acceptable land uses to alleviate the risk of damage by limiting exposure in flood hazard areas.
	Develop a floodplain management plan and update it regularly.
	Establish a green infrastructure program to link, manage, and expand existing parks, preserves, greenways, etc.
	Prohibit or limit floodplain development through regulatory or incentive-based measures.
	Limit the percentage of allowable impervious surface within developed parcels.
	Encourage the use of porous pavement, vegetative buffers, and islands in large parking areas.
	Complete a stormwater drainage study for known problem areas.
	Develop engineering guidelines for drainage from new development.
	Design a “natural runoff” or “zero discharge” policy for stormwater in subdivision design.
	Regularly calculate the amount of flood-prone property preserved as open space.
	Revise the floodplain ordinance to incorporate cumulative substantial damage requirements.
Infrastructure	Install, re-route, or increase the capacity of a storm drainage system.
	Increase capacity of stormwater detention and retention basins.
	Require developers to construct on-site retention basins for excessive stormwater.
	Routinely clean debris from support bracing underneath low-lying bridges.
	Elevate structures so that the lowest floor is raised above the base flood elevation.
	Raise utilities or other mechanical devices above expected flood levels.
	Elevate roads and bridges above the base flood elevation to maintain dry access.
	Floodproof water and wastewater treatment facilities located in flood hazard areas.
	Require that all critical facilities including emergency operations centers, police stations, and fire department facilities be located outside of flood-prone areas.
Natural Systems	Establish and manage riparian buffers along rivers and streams.
	Protect and preserve wetlands to help prevent flooding in other areas.
	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.
	Protect and enhance landforms that serve as natural mitigation features
Education	Encourage homeowners to purchase flood insurance.
	Distribute flood protection safety pamphlets to the owners of flood-prone property.
	Educate citizens about safety during flood conditions.
	Encourage homeowners to install backflow valves to prevent reverse-flow flood damages.
	Conduct NFIP community workshops to provide information for property owners.

5.11 Severe Weather

5.11.1 Hazard Description

Severe weather comprises the hazardous and damaging weather effects often found in violent storm fronts and severe winter storms. They can occur together or separate, they are common and usually not hazardous, but on occasion they can pose a threat to life and property.

This plan defines severe weather as a combination of the following as defined by the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS):

- **Hail:** Precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud.
- **Lightning:** A visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground or between the ground and a cloud.
- **Thunderstorm Winds:** The same classification as high or strong winds but accompanies a thunderstorm. It is also referred to as a straight-line wind to differentiate from rotating or tornado associated wind. Additionally, these winds can rapidly create dust storms that severely impact visibility.

Severe weather has been so consistent throughout modern history that much of the vulnerability is mitigated. However, this section is not concerned with everyday wind, lightning, or mild precipitation. This section is concerned with common storm elements when they behave such that they pose a threat to property and life.

5.11.2 – Location and Extent

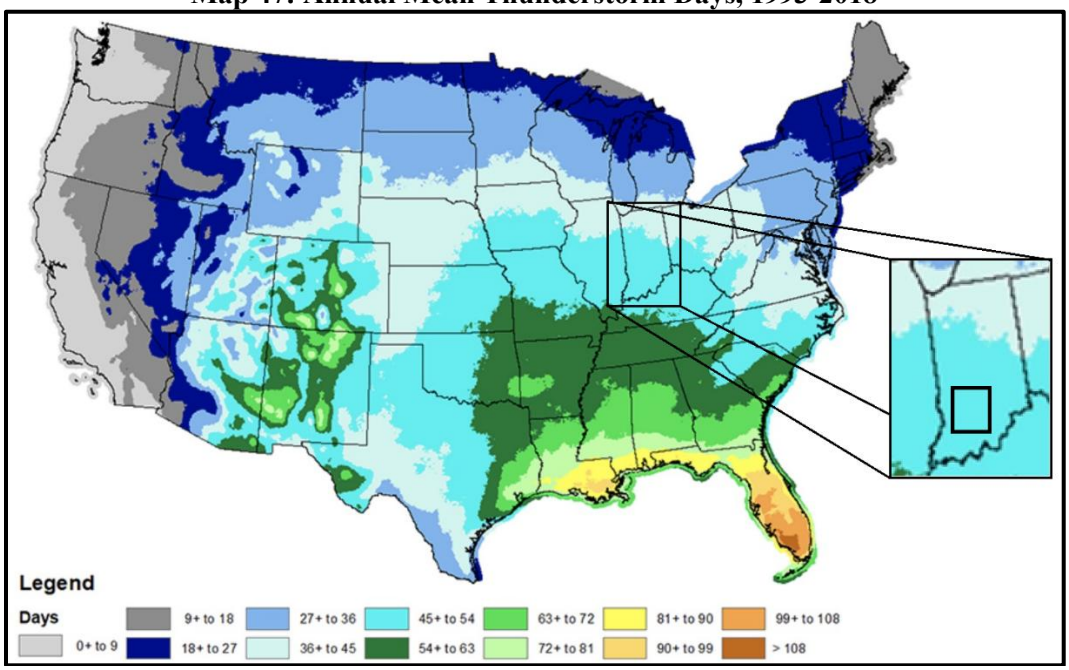
Severe weather can rapidly descend on an area, but in many cases it is predictable. Most weather forecasts focus on changing conditions that may lead to the onset of severe storms. All of Madison County is susceptible to severe weather in the form of thunderstorm events, but occurrence is infrequent.

The NWS classifies thunderstorms, often the generator of hail, lightning and high winds, using the following categories.

- **Marginal:** Isolated severe weather, limited in duration and/or coverage and/or intensity
- **Slight:** Scattered severe storms possible, short-lived and/or not widespread, isolated intense storms possible
- **Enhanced:** Numerous severe storms possible, more persistent and/or widespread, a few intense
- **Moderate:** Widespread severe storms likely, long-lived, widespread and intense
- **High:** Widespread severe storms expected, long-lived, very widespread and particularly intense

The frequent nature of thunderstorms makes hail, lightning, and high wind a relatively common occurrence for Madison County. The following map, from NOAA, indicates annual mean thunderstorm days from 1993 to 2018.

Map 47: Annual Mean Thunderstorm Days, 1993-2018



Source: NOAA

The NWS classifies thunderstorms primarily by hail size and wind speed. Lightning, though not part of the NWS classification, is a universal hazard with every thunderstorm and represents one of the most consistent life-safety threats. The following represent NWS classifications:

- **Severe Thunderstorm (Baseline Criteria):** Hail at least 1.0 inch in diameter (quarter-sized) or wind gusts of 58 mph or greater.
- **Considerable Severe Thunderstorm:** Hail at least 1.75 inches in diameter (golf ball-sized) or wind gusts of 70 mph or greater.
- **Destructive Severe Thunderstorm:** Hail at least 2.75 inches in diameter (baseball-sized) or wind gusts of 80 mph or greater.

Madison County experiences thunderstorms ranging from general to severe as classified by the NWS. Severe events can bring straight-line winds exceeding 58 mph, hail from 1.0 to 2.0 inches in diameter, and frequent lightning strikes. While most storms remain in the lower range, organized severe systems are capable of producing widespread impacts across the county.

Based on information provided by the National Weather Service concerning size, the following table describes potential damage impacts of the various sizes of hail.

Table 83: Hail Size Comparison and Damage Descriptions

Diameter (inches)	Size Description	Potential Damage Impacts
1/4	Pea Size	No damage
1/2	Mothball, peanut, USB Plug	Slight damage to vegetation
3/4	Penny Size	Increased damage to crops and vegetation
7/8	Nickel Size	Severe damage to crops and vegetation, damage begins to glass and plastic
1	Quarter Size	Increased glass damage, damage begins to bodies of vehicles
1 1/4	Half Dollar Size	Large scale glass damage, begin roof damage, risk of injury to exposed persons

Table 83: Hail Size Comparison and Damage Descriptions

Diameter (inches)	Size Description	Potential Damage Impacts
1 1/2	Ping Pong Ball Size	Large scale glass damage, begin roof damage, increased risk of injury to exposed persons
1 3/4	Golf Ball Size	Severe roof damage, risk of serious injuries to exposed persons
2	Lime or Medium Sized Hen Egg	Potential structural damage, risk of very severe injuries to exposed persons
2 1/2	Tennis Ball Size	Extensive structural damage, risk of very severe injuries or death to exposed persons

Source: National Weather Service

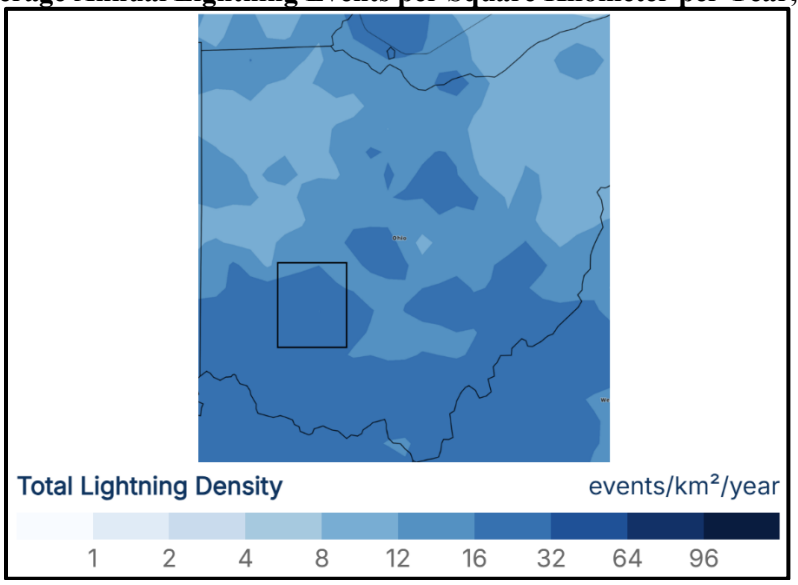
The most frequent hail in Madison County falls in the 1.0–1.5 inch range (quarter to ping pong ball–sized). These storms occur in most severe weather seasons and often cause crop losses, denting of vehicles, and minor roof damage. Hail measuring 1.75–2.5 inches (golf ball to tennis ball–sized) is less common but has been documented multiple times in the county's storm history, producing more serious impacts such as broken windows, siding damage, and widespread agricultural losses. Hail larger than 2.75 inches (baseball-sized or greater) is rare in Madison County, though several such events have been recorded across central Ohio. When these high-end hailstorms occur, they can cause significant property damage, disrupt transportation, and devastate farm fields during the growing season.

Two widely used systems describe the extent and frequency of lightning activity. The Lightning Activity Level scale is primarily used by the U.S. Forest Service and fire weather forecasters to measure lightning frequency and potential fire danger. It ranges from 1 (no thunderstorms) to 6 (dry lightning, frequent strikes with little or no rainfall, posing extreme wildfire risk). Intermediate values reflect increasing lightning frequency, from isolated strikes (Level 2) to numerous strikes exceeding 25 per 15-minute period (Level 5).

Meteorological agencies and research groups (e.g., NOAA, NASA, Vaisala) measure lightning in terms of flash density, expressed as the number of cloud-to-ground strikes per square kilometer per year. This provides a climatological perspective on lightning exposure.

The following map, from Vaisala, indicates the average annual light events per square kilometer per year for Madison County and participating jurisdictions. In Madison County, lightning density averages 12-32 flashes per km² annually.

Map 48: Average Annual Lightning Events per Square Kilometer per Year, 2016 - 2023



Source: Vaisala

To measure wind speed and its correlating potential for damage, experts use the Beaufort scale as shown below.

Table 84: Beaufort Scale

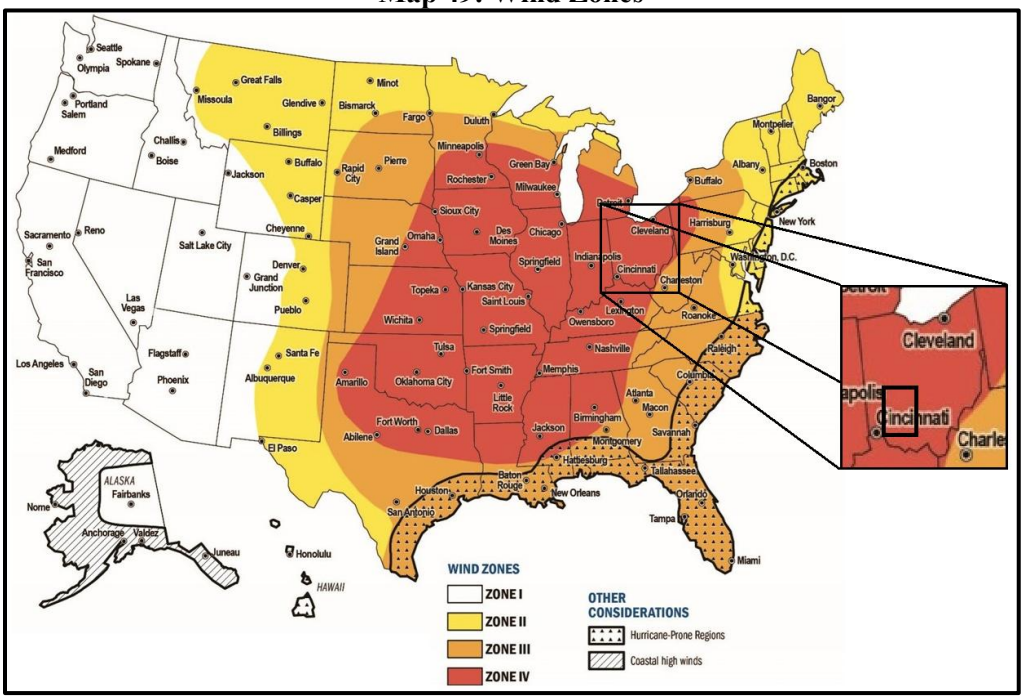
Beaufort Number	Wind Speed (mph)	Effects on Land
0	Under 1	Calm, smoke rises vertically
1	1-3	Smoke drift indicates wind direction, vanes do not move
2	4-7	Wind felt on face, leaves rustle, vanes begin to move
3	8-12	Leaves, small twigs in constant motion. Light flags extended.
4	13-18	Dust, leaves and loose paper raised up; small branches move
5	19-24	Small trees begin to sway
6	25-31	Large branches of trees in motion, whistling heard in wires
7	32-38	While trees in motion, resistance felt in walking against the wind
8	39-46	Twigs and small branches broken off trees
9	47-54	Slight structural damage occurs, slate blown from roofs
10	55-63	Seldom experienced on land, trees broken, structural damage occurs
11	64-72	Very rarely experienced on land, usually with widespread damage
12	73 or higher	Violence and destruction

Source: NOAA

Madison County most frequently experiences wind hazards in the Beaufort 5–9 range (19–54 mph), with severe wind events of 58+ mph reported almost every year. These winds are typically associated with strong thunderstorms, derechos, or frontal systems and can cause tree damage, power outages, and minor structural impacts. While hurricane-force winds exceeding 74 mph are rare in Madison County, they remain a credible low-probability, high-impact hazard during the most intense convective outbreaks.

The following maps from FEMA indicate the highest possible expected wind speeds for Madison County.

Map 49: Wind Zones



Source: FEMA

The MPC views severe weather as both a local and county-wide hazard. Discussions with the MPC and a review of all available data indicated severe weather is a community concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Madison County:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **City of London:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of Midway:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of Mt. Sterling:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of Plain City:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of South Solon:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of West Jefferson:** Severe weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Jefferson Local:** Severe weather identified as a district concern as students, structures, and infrastructure are vulnerable.
- **Jonathan Alder Local:** Severe weather identified as a district concern as students, structures, and infrastructure are vulnerable.
- **London City Schools:** Severe weather identified as a district concern as students, structures, and infrastructure are vulnerable.
- **Madison-Plains Local:** Severe weather identified as a district concern as students, structures, and infrastructure are vulnerable.

5.11.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Madison County has experienced six Presidential Disaster Declarations related to severe weather events, reflected in the following table:

Table 85: Madison County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual Assistance	Public Assistance	Mitigation Grant Program
DR-1805-OH	10/24/2008	Severe Windstorm (Tropical Depression Ike)	-	$38,841,922	-
DR-1556-OH	09/14/2004	Severe Storms and Flooding	$23,662,227	$25,804,256	-
DR-870-OH	06/06/1990	Flooding, Severe Storms, Tornado	-	-	-

Source: FEMA
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Madison County has experienced the following Emergency Declarations related to severe weather events:

Table 86: Madison County Emergency Declarations

Designation	Declaration Date	Incident Type	Public Assistance
EM-3346-OH	06/30/2012	Severe Storms	-

Source: FEMA
-: Not reported

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. No state declarations of emergency have been declared related to severe weather events for Madison County

Additionally, the following table presents NCEI identifies severe weather and severe winter weather events and the resulting damage totals in Madison County from 1950 to 2024:

Table 87: NCEI Madison County Severe Weather Events

Jurisdiction	Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Madison County	Hail	51	$43,000	0
	Lightning	1	$220,000	0
	Thunderstorm Winds	136	$969,000	3

Source: NCEI

Recent notable events include:

- **August 21, 2022:** Showers and thunderstorms developed ahead of a low-pressure system moving through the Ohio Valley. Several trees and power poles were downed. Numerous power outages were reported in West Jefferson. Damages were reported at $20,000.
- **August 12, 2021:** Isolated thunderstorms developed along a slow-moving boundary in central Ohio. A tree fell onto a vehicle near the intersection of Spring Valley Road and State Route 665, leading to one injury.
- **May 15, 2001:** A barn fire in Oak Run Township was started by a lightning strike. The barn was destroyed. Damages were reported at $220,000

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

5.11.4 Probability of Future Events

Predicting the probability of severe weather occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Data and mapping from NOAA indicate that Madison County can expect between 45 - 81 severe weather events per year.

Based on historical occurrences, Madison County will continue to experience severe weather events on an annual basis. The following tables, using data from the NCEI, indicate the yearly probability of a severe weather component events, the number of deaths or injuries, and estimated property damage :

Table 88: Madison County NCEI Severe Weather Event Probability Summary

Event	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Hail	51	1	0	0	$43,000	$573
Lightning	1	<1	0	0	$220,000	$2,933
Thunderstorm Winds	136	2	3	<1	$969,000	$12,920

Source: NCEI

5.11.5 Projected Changes in Location, Intensity, Frequency, and Duration

Projected changes in severe weather patterns, including hail, lightning, and strong winds, are anticipated to impact Madison County in the coming decades. These changes are influenced by broader climatic shifts and regional atmospheric dynamics.

Available studies suggest a nuanced future for hail events. While the overall frequency of smaller hailstones may decrease by approximately 25%, the occurrence of larger hailstones is projected to increase by 15–75%, depending

future conditions . This implies that while hailstorms might become less frequent, the potential for significant damage from larger hailstones could rise, posing increased risks to property and agriculture

Warmer temperatures and increased atmospheric moisture contribute to more unstable atmospheric conditions, which can enhance thunderstorm development and, consequently, lightning activity. Although specific projections for lightning frequency in Madison County are limited, the general trend indicates a potential uptick in lightning occurrences, elevating risks of wildfires and infrastructure damage .

The intensity and frequency of strong wind events, including those associated with severe thunderstorms and derechos, are projected to increase in the Midwest. Enhanced atmospheric instability and changing jet stream patterns contribute to this trend. Such wind events can lead to widespread power outages, structural damage, and pose threats to public safety.

5.11.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Madison County and all participating jurisdictions from severe weather. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Madison County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 89: Participating Jurisdiction Hail Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	3.7
-	39097040101	Very Low	10.32	3.8
Village of Plain City	39097040102	Relatively Low	32.69	3.8
-	39097040201	Very Low	6.37	3.7
Village of West Jefferson	39097040202	Very Low	13.58	3.7
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	3.7
Village of West Jefferson	39097040500	Very Low	25.38	3.7
City of London	39097040600	Relatively Low	38.76	3.7
City of London	39097040700	Very Low	17.69	3.7
-	39097041000	Very Low	10.12	3.7
-	39097041100	Relatively Low	31.11	3.7
Village of Mt. Sterling	39097041200	Very Low	21.04	3.6
Village of Midway and South Solon	39097041300	Very Low	9.93	3.7

Source: FEMA NRI

Table 90: Participating Jurisdiction Hail Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	32.6	$36,000
-	39097040101	Very Low	60.3	$3,200
Village of Plain City	39097040102	Relatively Low	58.2	$2,700
-	39097040201	Very Low	53.2	$1,900
Village of West Jefferson	39097040202	Very Low	62.3	$3,700
Village of West Jefferson, City of London	39097040400	Relatively Low	62.4	$3,800
Village of West Jefferson	39097040500	Relatively Low	56.6	$2,500
City of London	39097040600	Relatively Low	56.9	$2,500
City of London	39097040700	Very Low	41.8	$906
-	39097041000	Very Low	39.6	$754

Table 90: Participating Jurisdiction Hail Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
-	39097041100	Relatively Low	67.7	$5,900
Village of Mt. Sterling	39097041200	Very Low	57.2	$2,600
Village of Midway and South Solon	39097041300	Very Low	67.6	$5,800

Source: FEMA NRI

Table 91: Participating Jurisdiction Lightning Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	66.6
-	39097040101	Very Low	10.32	60.5
Village of Plain City	39097040102	Relatively Low	32.69	66.7
-	39097040201	Very Low	6.37	64.7
Village of West Jefferson	39097040202	Very Low	13.58	66.9
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	72.1
Village of West Jefferson	39097040500	Very Low	25.38	68.8
City of London	39097040600	Relatively Low	38.76	70.2
City of London	39097040700	Very Low	17.69	68
-	39097041000	Very Low	10.12	64.9
-	39097041100	Relatively Low	31.11	70.4
Village of Mt. Sterling	39097041200	Very Low	21.04	64.9
Village of Midway and South Solon	39097041300	Very Low	9.93	68.5

Source: FEMA NRI

Table 92: Participating Jurisdiction Lightning Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	61.1	$124,000
-	39097040101	Very Low	51.7	$6,000
Village of Plain City	39097040102	Relatively Low	74.1	$12,000
-	39097040201	Very Low	61.3	$8,200
Village of West Jefferson	39097040202	Very Low	56.7	$7,100
Village of West Jefferson, City of London	39097040400	Relatively Low	63.5	$8,800
Village of West Jefferson	39097040500	Relatively Low	76.5	$14,000
City of London	39097040600	Relatively Low	82.6	$17,000
City of London	39097040700	Very Low	63.7	$8,900
-	39097041000	Very Low	75.6	$13,000
-	39097041100	Relatively Low	78.0	$14,000
Village of Mt. Sterling	39097041200	Very Low	62.3	$8,500
Village of Midway and South Solon	39097041300	Very Low	53.2	$6,300

Source: FEMA NRI

Table 93: Participating Jurisdiction Strong Wind Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	2.3
-	39097040101	Very Low	10.32	2.4
Village of Plain City	39097040102	Relatively Low	32.69	57.9
-	39097040201	Very Low	6.37	2.3
Village of West Jefferson	39097040202	Very Low	13.58	2.3
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	2.3
Village of West Jefferson	39097040500	Very Low	25.38	2.3

Table 93: Participating Jurisdiction Strong Wind Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
City of London	39097040600	Relatively Low	38.76	2.3
City of London	39097040700	Very Low	17.69	2.3
-	39097041000	Very Low	10.12	2.3
-	39097041100	Relatively Low	31.11	2.3
Village of Mt. Sterling	39097041200	Very Low	21.04	2.2
Village of Midway and South Solon	39097041300	Very Low	9.93	2.3

Source: FEMA NRI

Table 94: Participating Jurisdiction Strong Wind Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	60.9	$441,000
-	39097040101	Very Low	68.9	$21,000
Village of Plain City	39097040102	Relatively Low	86.9	$53,000
-	39097040201	Very Low	77.4	$31,000
Village of West Jefferson	39097040202	Very Low	69.9	$22,000
Village of West Jefferson, City of London	39097040400	Relatively Low	90.5	$69,000
Village of West Jefferson	39097040500	Relatively Low	84.8	$46,000
City of London	39097040600	Relatively Low	89.2	$63,000
City of London	39097040700	Very Low	74.1	$27,000
-	39097041000	Very Low	67.8	$20,000
-	39097041100	Relatively Low	82.6	$41,000
Village of Mt. Sterling	39097041200	Very Low	75.7	$29,000
Village of Midway and South Solon	39097041300	Very Low	53.2	$20,000

Source: FEMA NRI

Population

Severe weather can have a wide range of effects on people, often posing significant risks to life, property, and general well-being. In the absence of proper shelter, hail, lightning, and high winds can cause serious injury. In general, if potentially exposed persons take shelter in a solid, well-constructed structure protection from these severe weather components would be provided. However, old or poorly constructed facilities may be more prone to damage, potentially increasing the impact on economically disadvantaged populations. Some of the potential effects of severe weather on people may include:

- **Death and Injury:** Severe weather can produce lightning and strong winds driving debris. Both of these elements can cause injuries or fatalities.
- **Power Outages:** Lightning strikes, strong winds, and falling trees can lead to power outages, disrupting daily life, and potentially affecting essential services, such as medical equipment and refrigeration.
- **Mental Health Impact:** Severe weather can be frightening and stressful, leading to anxiety and post-traumatic stress disorder in some individuals. The emotional toll of property damage and loss can also be significant.
- **Displacement:** People may need to evacuate their homes or be temporarily displaced due to storm damage, requiring emergency shelter and support.
- **Economic Costs:** Severe weather results in economic costs, including repair and recovery expenses, insurance claims, and potential loss of income due to property damage or work disruptions.
- **Public Safety Response:** Severe weather can strain public safety resources, including emergency services, law enforcement, and medical facilities.

At greater risk may be vulnerable populations, including the young, the elderly, and those below the poverty level. Hazard occurrences can exacerbate existing vulnerabilities and create new challenges.

All Madison County and participating jurisdiction populations are vulnerable to the impacts of severe weather. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

Buildings and Structures
All buildings and structures within Madison County and participating jurisdictions can be impacted by severe weather. However, the location and construction of the facility will have a significant impact on the vulnerability. In general, older structures would be at higher risk of negative impacts. Some of the potential impacts include:

- **Electrical Infrastructure Damage:** Severe weather can damage electrical infrastructure, including power lines, transformers, and substations. This can result in widespread power outages, affecting homes, businesses, hospitals, and other critical facilities.
- **Communication Disruptions:** Severe weather can disrupt telecommunications infrastructure, including cell towers, data centers, and communication networks. This can impact emergency communication and coordination efforts.
- **Safety Risks:** Damage to infrastructure can pose safety risks to workers and the public. Fallen power lines, damaged buildings, and debris can be hazardous.
- **Building Damage:** High winds, large hail, and lightning strikes can cause damage to the building.

Governmental Operations
Severe weather can pose various risks to government operations. These risks can have significant economic and operational consequences, and can include:

- **Power Outages:** Severe weather can lead to power outages by damaging electrical infrastructure such as power lines and substations. Government buildings may lose power, affecting critical operations and services.
- **Flooding:** Heavy rainfall during severe weather can lead to flooding, which can damage government buildings and disrupt operations. Flood damage may require extensive repairs and cleanup.
- **Communication Disruptions:** Severe weather can damage communication equipment, including telephone lines and computer systems. This can hinder communication between government agencies and the public.
- **Transportation Disruptions:** Severe weather can make roads impassable due to flooding or debris. This can impact the ability of government employees to commute to work.
- **Budgetary Impact:** The costs associated with repairing and restoring government buildings and infrastructure after severe weather can strain budgets.

Transportation and Electrical Infrastructure
In general, severe weather components do not have a large impact on transportation infrastructure, with the exception of power loss disrupting signaling and poor conditions impacting driving conditions.

Severe weather can have significant impacts on electrical utilities, leading to disruptions in power supply and potential damage to infrastructure. Severe weather can affect electrical utilities in the following ways:

- **Lightning Strikes:** Lightning is a common occurrence during severe weather and poses a substantial risk to electrical infrastructure. Lightning strikes can damage power lines, transformers, substations, and other critical components, leading to power outages.
- **Wind Damage:** High winds associated with severe weather can cause trees, branches, and other debris to fall onto power lines. This can result in downed power lines, structural damage to utility poles, and disruptions in electrical service.
- **Hailstorms:** Severe weather may produce hail, which can damage power lines, transformers, and other equipment. Hailstones can also lead to short circuits and insulation damage on electrical components.
- **Power Surges:** Lightning strikes, strong winds, and other storm-related events can lead to power surges in the electrical grid. These surges can damage electronic devices, appliances, and utility equipment connected to the power supply.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
In general, severe weather components do not have a large impact on water and wastewater infrastructure and operations. However, the cascading impacts from an event such as power loss disrupting pumping and treatment capabilities or localized flooding from heavy overwhelming drainage systems may cause disruptions to operations.

Medical and Response Facilities
Severe weather can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of severe weather events. Severe weather can impact emergency response through:

- **Transportation Disruptions:** Debris on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- **Communication Disruptions:** Severe weather can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- **Power Outages:** Severe weather can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- **Exposure:** Emergency responders face increased health and safety risks in severe weather conditions. Exposure to hail, high winds, and lightning can impact the well-being of responders and affect their ability to provide effective assistance.
- **Resource Allocation Challenges:** Severe weather often requires the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- **Increased Demand for Services:** Severe weather can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously.

Educational Facilities
Depending on the educational facility capability and location, severe weather may necessitate the closure of the facility for the duration of the event due to damages or lack of access. These closures are expected to have additional economic consequences as caregivers may be required to miss or modify work.

- **School Closures:** Severe weather can lead to the closure of schools due to hazardous conditions. This can strain caregivers and result in lower work attendance.

Communication Systems
All communication systems within Madison County are at risk to severe weather, which can disrupt vital communications system affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Infrastructure Damage:** High winds, heavy rainfall, and other severe weather conditions can cause physical damage to communication infrastructure such as cell towers, antennas, cables, and data centers. This damage can result in network outages and disruptions.
- **Power Outages:** Severe storms often lead to power outages, which can affect the operation of communication networks. Without a stable power supply, cell towers, data centers, and other critical components may become non-functional, leading to service interruptions.
- **Lightning Strikes:** Lightning poses a threat to communication infrastructure. Direct strikes or induced surges can damage electronic equipment, leading to the need for repairs or replacements and causing downtime.

- **Signal Interference:** Severe storms can create electromagnetic interference that disrupts radio signals used in wireless communication. This interference can lead to poor signal quality, dropped calls, and slower data speeds.
- **Loss of Backhaul Connectivity:** Severe weather events can damage the backhaul infrastructure that connects various communication nodes. This backbone infrastructure is crucial for transmitting data between local and regional networks, and any disruption can impact overall network performance.
- **Communication Tower Instability:** High winds and extreme weather conditions can compromise the stability of communication towers. If towers are not designed to withstand severe weather, they may collapse, leading to network outages.
- **Network Congestion:** In the event of a disaster, communication networks may experience a surge in usage as people attempt to contact emergency services, friends, and family. This increased demand can lead to network congestion, making it difficult for users to connect.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.9.6.

Environmental and Agricultural Impacts

Hail events can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to hail events from 1989 - 2024:

Map 50: Agricultural Losses Due to Hail Events, 1989 - 2024

Source: USDA

Severe weather can pose various risks to the environment. These risks can have both short-term and long-term impacts on natural ecosystems. Severe weather can produce heavy rainfall over a short period of time, leading to flash floods and riverine flooding. This can result in soil erosion, damage to aquatic habitats, and the displacement of aquatic organisms. Large hailstones can damage crops, vegetation, and natural habitats. Hail can strip leaves from trees and plants, reducing their ability to photosynthesize and grow. It can also damage wildlife habitats. Severe weather often produces strong straight-line winds. These winds can uproot trees, damage forests, and disrupt animal habitats. They

can also scatter debris and cause structural damage to buildings, which can lead to further environmental issues if hazardous materials are released. Lightning is a common occurrence during severe weather and can spark wildfires. These wildfires can have significant ecological impacts, including habitat destruction, loss of wildlife, and changes in the local ecosystem.

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **City of London:** With 8.1% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism, lowering potential community revenue.
- **Village of Midway:** With 5.6% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. With limited access and services, severe weather may cut the community off from necessary services due to limited road access. With limited response services, severe weather may affect overall community response and recovery.
- **Village of Mt. Sterling:** With 5.3% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. With limited access and services, severe weather may cut the community off from necessary services due to limited road access. With limited response services, severe weather may affect overall community response and recovery.
- **Village of Plain City:** With 11.1% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. With limited access and services, severe weather may cut the community off from necessary services due to limited road access. With limited response services, severe weather may affect overall community response and recovery.
- **Village of South Solon:** With 11.0% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. With limited access and services, severe weather may cut the community off from necessary services due to limited road access. With limited response services, severe weather may affect overall community response and recovery.
- **Village of West Jefferson:** With 16.7% of citizens living in poverty, severe weather and the associated property damage may disproportionately impact them due to underinsurance. Additionally, severe weather may impact tourism, lowering potential community revenue.
- **Jefferson Local**: Students in transit during a severe weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **Jonathan Alder Local:** Students in transit during a severe weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **London City Schools:** Students in transit during a severe weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **Madison-Plains Local:** Students in transit during a severe weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.

Cascading Impacts

Cascading impacts often result when one hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with severe weather may include:

- Direct physical damage to buildings and structures:
- Transportation infrastructure disruption
- Power outages and electrical grid disruption
- Communication system disruption

- Transportation and supply chain disruptions
- Environmental and ecological damage
- Economic impacts and business closures
- Emergency services overload

Consequence Analysis
This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Madison County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 95: Severe Weather Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Severe weather can cause extensive property damage, loss of utility service, and injury. Those most at-risk are low-income and homeless individuals without shelter.
Impact on Responders	First responders may be unable to access roadways due to flooding, trees, or debris. Exposure to lightning, flooding, and high winds may cause injuries to first responders. Vehicles and resources may be damaged, leading to impaired response activities. In addition, road conditions may become hazardous as a result of the by-products
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Severe Weather may impact an agency's ability to maintain operations due to power outages, flooding, and wind damage. If the activation of alternate facilities was required, travel may be difficult as well as computer/network access due to long-term power outages caused by severe weather.
Delivery of Services	Delivery of services may be impaired by flooding, obstruction, and damage to roadways and resources. The ability to deliver goods and services will be impacted locally, regionally, or statewide depending on the magnitude of the event. Goods, equipment, and vehicles may become damaged during transport.
Property, Facilities, and Infrastructure	Power lines and power generators are most at risk from severe weather and impacts could result in isolated power outages or full-scale blackouts. Building and vehicle damage can occur from hail and other debris created by severe weather. Properties and critical facilities also may face foundational and physical damage due to flooding, lightning strike, or excessive winds, delaying response and recovery operations.
Impact on Environment	Waste and debris from damaged treatment infrastructure or hazardous materials facilities could contaminate sources of water and food. Debris can impact and contaminate wildlife and natural areas. Lightning strikes may also ignite fires, leading to destruction of agricultural crops, critical ecosystems, and natural habitats.
Economic Conditions	Flooding, high winds, lightning, and hail can stress local resources. Even if some of the costs can be recouped through federal reimbursements (federal disaster declaration), there is a fiscal impact on the local government.
Public Confidence in Governance	Ineffective response can decrease the public's confidence in the ability to respond and govern. Governmental response across local, state, regional, and federal levels require direct actions that must be immediate and effective to maintain public confidence.

5.11.7 Future Development
As the county experiences urban expansion, the proliferation of impervious surfaces like roads and buildings reduces natural land cover. This alteration can exacerbate the effects of hailstorms, as there are fewer natural barriers to absorb or deflect hailstones, potentially leading to increased property damage. Moreover, the concentration of structures and vehicles provides more targets for hail, amplifying the potential for economic losses.

Population growth also leads to a higher density of electrical infrastructure to meet increased energy demands. This expansion raises the risk of lightning-related incidents, as more power lines and transformers become susceptible to strikes. Additionally, the increased number of residents heightens the potential for human exposure to lightning hazards, necessitating enhanced public education and preparedness measures.

The development of new residential and commercial areas often involves the removal of trees and other natural windbreaks. This deforestation can leave communities more vulnerable to strong winds, which may result in greater structural damage during severe storms. Furthermore, the construction of taller buildings can alter local wind patterns, potentially intensifying wind speeds at ground level and increasing the risk to pedestrians and low-rise structures.

5.11.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

Table 96: Example Severe Weather Mitigation Actions

Category	Example Action
Planning and Regulation	Review building codes and structural policies to ensure they are adequate to protect older structures from wind damage.
	Require tie-downs with anchors and ground anchors appropriate for the soil type for manufactured homes.
	Incorporate passive ventilation in the site design, which uses a series of vents in exterior walls or at exterior windows to allow outdoor air to enter the home in a controlled way.
	Establish standards for all utilities regarding tree pruning around lines.
	Inspect utility poles to ensure they meet specifications and are wind resistant.
	Ensure the development and enforcement of building codes.
Infrastructure	Install lightning protection devices and methods, such as lightning rods and grounding, on communications infrastructure and other critical facilities.
	Install and maintain surge protection on critical electronic equipment.
	Retrofit buildings with load-path connectors to strengthen the structural frames.
	Avoid placing flag poles or antennas near buildings.
	Protect traffic lights and other traffic controls from high winds.
	Add building insulation to walls and attics.
Natural Systems	Properly maintain stream and river channels to ensure flow.
	Use living fences (e.g., rows of trees or other vegetation) to limit blowing dust and debris.
Education	Develop a lightning brochure for distribution by recreation equipment retailers or outfitters in mountainous areas.
	Educate design professionals to include wind mitigation during building design.
	Instruct property owners on how to properly install temporary window coverings.
	Produce and distribute family and traveler emergency preparedness information.
	Organize outreach to vulnerable populations, including establishing and promoting accessible shelters in the community.

5.12 Severe Winter Weather

5.12.1 Hazard Description

Severe winter weather encompasses multiple effects caused by winter storms and conditions. Included are strong winds, ice storms, heavy or prolonged snow, sleet, and extreme temperatures. Winter storms can be increasingly hazardous in areas and regions that only see winter storms intermittently.

This plan defines severe winter weather as a combination of the following effects as defined by NOAA and the NWS.

- **Ice Storm:** An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication and can make travel extremely dangerous. Significant ice accumulations are usually accumulations of ¼" or greater.
- **Heavy Snow:** This generally means snowfall accumulating to 4" or more in depth in 12 hours or less; or snowfall accumulating to 6" or more in depth in 24 hours or less.
- **Winter Storm:** Hazardous winter weather in the form of heavy snow, freezing rain, or heavy sleet. It may also include extremely low temperatures and increased wind.
- **Cold Wave/Extreme Cold:** As described by NWS, a cold wave is a rapid fall in temperature within a 24-hour period requiring substantially increased protection to agriculture, industry, commerce, and social activities. As evidenced by past incidents across the U.S., extreme cold can cause impact to human life and property.

5.12.2 – Location and Extent

Severe winter weather occurs regularly throughout Madison County. These events occur on a large geographic scale, often affecting multiple counties, regions, and states. Winter storms typically form with some warning and are often anticipated. Like other large storm fronts, the severity of a storm is not as easily predicted due to myriad factors that can influence its impact. Although meteorologists estimate the amount of snowfall a winter storm will drop, it is not known exactly how much snow will fall, whether or not it will form an ice storm, or how powerful the winds will be until the storm is already affecting a community.

Madison County, located in central Ohio, is vulnerable to disruptive winter weather. While average snowfall totals are moderate compared to northern Great Lakes states, the county regularly experiences snow and ice events that create hazardous travel conditions, power outages, and public safety concerns. Two scales commonly used to evaluate these threats are the Snowfall Impact Scale and the Sperry-Piltz Ice Accumulation Index.

The Northeast Snowfall Impact Scale is a scale used to assess and rank the impact of snowfall events in the northeastern United States, but allows for an idea of intensity for Madison County. It was developed by NOAA to provide a standardized way of measuring the societal and economic impacts of snowstorms. The scale takes into account factors such as snowfall amount, population density, and the area affected by the storm to determine its impact. The scale has five categories, each with its own associated impacts:

Table 97: Snowfall Impact Scale

Category	Description	Impacts
1	Notable	Light to moderate snowfall. Limited impacts on transportation and daily life. Typically localized to small areas.
2	Significant	Moderate to heavy snowfall. Widespread impacts on transportation, including delays and disruptions. Some school and business closures. Widespread power outages are rare.
3	Major	Heavy snowfall, often exceeding one foot or more.

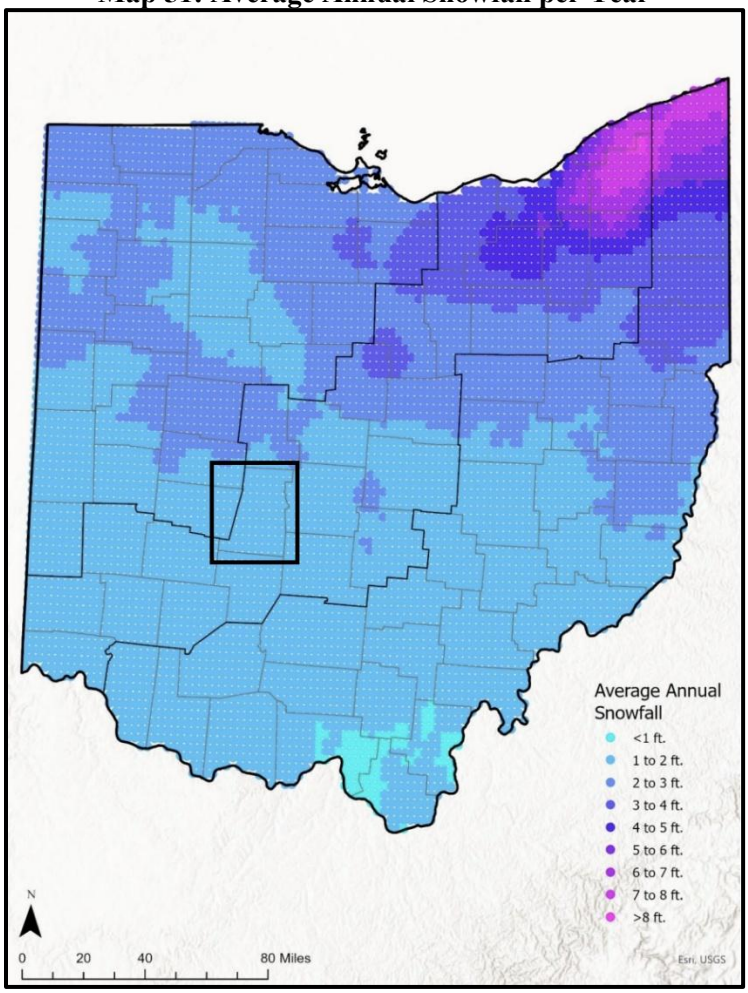
Table 97: Snowfall Impact Scale

Category	Description	Impacts
		Significant transportation disruptions, including major highway closures. Widespread school and business closures. Power outages may occur, especially in areas with wet, heavy snow.
4	Crippling	Extreme snowfall, often exceeding two feet or more. Severe and prolonged transportation disruptions, including highway closures. Widespread school and business closures for an extended period. Widespread and prolonged power outages, especially in areas with ice accumulation.
5	Extreme	Exceptional snowfall, often exceeding three feet or more. Complete paralysis of transportation systems, including major highways and airports. Extended school and business closures. Widespread and prolonged power outages with significant damage to the electrical infrastructure.

Source: NOAA

For Madison County and all participating jurisdictions, most snow events fall into the Nuisance to Minor categories, typically involving one to four inches of accumulation. These storms often create hazardous driving conditions and lead to temporary school or business closures. Less frequently, storms producing six inches or more reach the Moderate to Major categories, disrupting travel, delaying commerce, and increasing demands on emergency services. While "Extreme" snowstorms are uncommon in Madison County, the region's rural roads and reliance on commuter travel mean that even moderate snowfall can cause significant disruption. The following map from NOAA indicates the average annual snowfall for Madison County from 2017 - 2022:

Map 51: Average Annual Snowfall per Year



Source: NOAA

Ice storms are characterized by the accumulation of freezing rain or freezing drizzle, which coats surfaces with a layer of ice. These storms can have significant impacts on transportation, infrastructure, and the environment. Ice storms occur when there's a layer of warm air above a layer of cold air near the surface. Precipitation falls as rain in the warm layer and then freezes upon contact with surfaces at or below freezing temperatures in the cold layer. The most common type of precipitation during an ice storm is freezing rain. This is rain that falls as a liquid but freezes upon contact with cold surfaces, forming a layer of ice.

The Sperry–Piltz Ice Accumulation Index is an ice accumulation and ice damage prediction index that, when combined with NWS data, predicts the projected footprint, total ice accumulation, and resulting potential damage from approaching ice storms.

Figure 12: Sperry–Piltz Ice Accumulation Index

ICE DAMAGE INDEX	DAMAGE AND IMPACT DESCRIPTIONS
0	Minimal risk of damage to exposed utility systems; no alerts or advisories needed for crews, few outages.
1	Some isolated or localized utility interruptions are possible, typically lasting only a few hours. Roads and bridges may become slick and hazardous.
2	Scattered utility interruptions expected, typically lasting 12 to 24 hours. Roads and travel conditions may be extremely hazardous due to ice accumulation.
3	Numerous utility interruptions with some damage to main feeder lines and equipment expected. Tree limb damage is excessive. Outages lasting 1 – 5 days.
4	Prolonged & widespread utility interruptions with extensive damage to main distribution feeder lines & some high voltage transmission lines/structures. Outages lasting 5 – 10 days.
5	Catastrophic damage to entire exposed utility systems, including both distribution and transmission networks. Outages could last several weeks in some areas. Shelters needed.

Source: Sperry–Piltz Ice Accumulation Index

Madison County's location in central Ohio makes it vulnerable to ice storms, as shallow Arctic air interacting with moist systems from the south or west often produces freezing rain. Historical events show that accumulations of 0.25–0.50 inches of ice (SPIA levels 2–3) occur periodically, resulting in downed tree limbs, power outages, and hazardous travel conditions. More severe ice storms with accumulations exceeding 0.75 inches (SPIA level 4 or higher) are less frequent but remain possible, with the potential to cause widespread power grid failures, multi-day outages, and major disruptions to transportation and emergency response operations.

Extreme cold is also a recurring hazard in Madison County, typically associated with Arctic air masses pushing south from Canada through the Midwest. While prolonged subzero conditions are less common than in the upper Midwest or Great Lakes states, short-duration cold waves occur most winters, producing dangerous wind chills and stressing critical infrastructure.

During these events, air temperatures in Madison County often fall into the single digits to low teens (°F), with wind chills commonly reaching -10°F to -20°F. These conditions are sufficient to trigger NWS Wind Chill Advisories and Warnings. Although less frequent, historic Arctic outbreaks have produced subzero temperatures in the county.

The MPC views severe winter weather as both a local and county-wide hazard. Discussions with the MPC and a review of all available data indicated severe winter weather is a community concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Madison County:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **City of London:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of Midway:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of Mt. Sterling:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of Plain City:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of South Solon:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Village of West Jefferson:** Severe winter weather identified as a community concern as citizens, structures, infrastructure, and agriculture are vulnerable.
- **Jefferson Local:** Severe winter weather identified as a district concern as students, structures, and infrastructure are vulnerable.
- **Jonathan Alder Local:** Severe winter weather identified as a district concern as students, structures, and infrastructure are vulnerable.
- **London City Schools:** Severe winter weather identified as a district concern as students, structures, and infrastructure are vulnerable.
- **Madison-Plains Local:** Severe winter weather identified as a district concern as students, structures, and infrastructure are vulnerable.

5.12.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Madison County has experienced one Presidential Disaster Declaration related to severe winter weather events, reflected in the following table:

Table 98: Madison County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual Assistance	Public Assistance	Mitigation Grant Program
DR-1453-OH	03/14/2003	Severe Winter Storm	$2,609,145	31,856,039	-

Source: FEMA
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. The following emergency declarations for severe winter weather have been declared for Madison County:

Table 99: Madison County Emergency Declarations

Designation	Declaration Date	Incident Type	Public Assistance
EM-3286-OH	04/24/2008	Ohio Snow	$7,122,146
EM-3198-OH	01/11/2005	Ohio Snow	$8,636,638
EM-3055-OH	01/26/1978	Ohio Blizzards and Snowstorms	-

Source: FEMA
-: Not reported

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. This authority allows the governor to activate resources, issue orders, and coordinate responses to protect public safety. There have been no state declarations of emergency for severe winter weather for Madison County from 2019-2024.

Additionally, the following table presents NCEI identifies severe weather and severe winter weather events and the resulting damage totals in Madison County from 1950 to 2025:

Table 100: NCEI Madison County Severe Weather Events

Jurisdiction	Event Type	Number of Days with Events	Property Damage	Deaths and Injuries
Madison County	Blizzard/Winter Storm	25	$525,000	0
	Extreme Cold	2	$0	0
	Ice Storm	6	$0	0

Source: NCEI

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event, the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

Recent notable events include:

- **December 24, 2022:** A cold front crossed the Ohio Valley Thursday evening, with plummeting temperatures and strong winds. The sustained 20 to 30 mph winds had higher gusts of 35 to 45 mph. Wind chills fell below 25 below zero.
- **November 14, 2018:** An upper-level low pressure center tracked northeast into the region. Warm air aloft and cold air at the surface combined with the low to create a significant freezing rain event over much of the region. Large limbs were downed across the county.
- **January 6, 1996:** The Blizzard of '96 developed near the Gulf Coast and moved up the East Coast. This massive system produced the greatest total and 24-hour snowfall at Greater Cincinnati\Northern Kentucky airport. This one storm brought 14.3 inches of snowfall to the airport which normally receives 23 inches for an entire season. The heaviest snow fell near the Ohio river in the extreme south. The worst blizzard conditions occurred over West Central areas as dry and powdery snow was blown around by high winds causing whiteouts. Some areas had more than 30 continuous hours of snowfall, and many people in Southern Ohio felt this was the worst winter storm since the Blizzard of '78.

5.12.4 Probability of Future Events

Predicting the probability of severe weather occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Data and mapping from NOAA indicate that Madison County can expect, depending on location within the county, one to three feet of snow per year.

Based on historical occurrences, Madison County will continue to experience severe weather events on an annual basis. The following tables, using data from the NCEI, indicate the yearly probability of a severe weather component events, the number of deaths or injuries, and estimated property damage :

Table 101: Madison County NCEI Severe Weather Event Probability Summary

Event	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Blizzard/Winter Storm	25	<1	0	0	$520,000	$7,000
Extreme Cold	2	<1	0	0	$0	$0
Ice Storm	6	<1	0	0	$0	$0

Source: NCEI

5.12.5 Projected Changes in Location, Intensity, Frequency, and Duration

While overall winter temperatures in Ohio are projected to rise, the state may still experience intense snowstorms. Warmer air can hold more moisture, potentially leading to heavier snowfall during cold periods. This means that, although snow events might become less frequent, their intensity could increase, resulting in significant disruptions to transportation and infrastructure.

The frequency of ice storms in Ohio is expected to rise due to more frequent temperature fluctuations around the freezing point. Such conditions are conducive to freezing rain, leading to hazardous ice accumulations on roads, power lines, and trees. These events can cause widespread power outages and pose significant risks to public safety.

Despite a general warming trend, Ohio remains susceptible to extreme cold events, particularly those associated with disruptions in the polar vortex. These disruptions can allow frigid Arctic air to plunge southward, leading to sudden and severe cold snaps. Such events can strain energy systems and pose health risks, especially to vulnerable populations.

5.12.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Madison County and all participating jurisdictions from severe weather. In order to gain an understanding of vulnerability, the second table details the estimated annual loss data for Madison County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 102: Participating Jurisdiction Cold Wave Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	0.7
-	39097040101	Very Low	10.32	0.7
Village of Plain City	39097040102	Relatively Low	32.69	0.7
-	39097040201	Very Low	6.37	0.7
Village of West Jefferson	39097040202	Very Low	13.58	0.7
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	0.7
Village of West Jefferson	39097040500	Very Low	25.38	0.7
City of London	39097040600	Relatively Low	38.76	0.7
City of London	39097040700	Very Low	17.69	0.7
-	39097041000	Very Low	10.12	0.7
-	39097041100	Relatively Low	31.11	0.7
Village of Mt. Sterling	39097041200	Very Low	21.04	0.7
Village of Midway and South Solon	39097041300	Very Low	9.93	0.7

Source: FEMA NRI

Table 103: Participating Jurisdiction Cold Wave Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	46.6	$38,000
-	39097040101	Very Low	66.2	$3,900
Village of Plain City	39097040102	Relatively Low	59.1	$2,200
-	39097040201	Very Low	56.4	$1,800
Village of West Jefferson	39097040202	Very Low	68.7	$4,800
Village of West Jefferson, City of London	39097040400	Relatively Low	59.9	$2,400
Village of West Jefferson	39097040500	Relatively Low	57.8	$2,000
City of London	39097040600	Relatively Low	54.3	$1,400

Table 103: Participating Jurisdiction Cold Wave Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
City of London	39097040700	Very Low	47.2	$489
-	39097041000	Very Low	51.1	$944
-	39097041100	Relatively Low	74.0	$7,300
Village of Mt. Sterling	39097041200	Very Low	61.9	$2,800
Village of Midway and South Solon	39097041300	Very Low	74.7	$5,100

Source: FEMA NRI

Table 104: Participating Jurisdiction Ice Storm Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	1
-	39097040101	Very Low	10.32	0.8
Village of Plain City	39097040102	Relatively Low	32.69	0.7
-	39097040201	Very Low	6.37	1
Village of West Jefferson	39097040202	Very Low	13.58	1
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	1
Village of West Jefferson	39097040500	Very Low	25.38	1
City of London	39097040600	Relatively Low	38.76	1
City of London	39097040700	Very Low	17.69	1
-	39097041000	Very Low	10.12	1
-	39097041100	Relatively Low	31.11	1
Village of Mt. Sterling	39097041200	Very Low	21.04	1
Village of Midway and South Solon	39097041300	Very Low	9.93	1

Source: FEMA NRI

Table 105: Participating Jurisdiction Ice Storm Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	87.1	$437,000
-	39097040101	Very Low	10.39	$15,000
Village of Plain City	39097040102	Relatively Low	33.83	$38,000
-	39097040201	Very Low	16.73	$33,000
Village of West Jefferson	39097040202	Very Low	14.40	$21,000
Village of West Jefferson, City of London	39097040400	Relatively Low	44.12	$84,000
Village of West Jefferson	39097040500	Relatively Low	30.90	$48,000
City of London	39097040600	Relatively Low	41.54	$67,000
City of London	39097040700	Very Low	16.93	$27,000
-	39097041000	Very Low	9.69	$13,000
-	39097041100	Relatively Low	30.62	$40,000
Village of Mt. Sterling	39097041200	Very Low	18.34	$31,000
Village of Midway and South Solon	39097041300	Very Low	12.79	$20,000

Source: FEMA NRI

Table 106: Participating Jurisdiction Winter Weather Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	2.7
-	39097040101	Very Low	10.32	2.7
Village of Plain City	39097040102	Relatively Low	32.69	2.7

Table 106: Participating Jurisdiction Winter Weather Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
-	39097040201	Very Low	6.37	2.7
Village of West Jefferson	39097040202	Very Low	13.58	2.7
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	2.7
Village of West Jefferson	39097040500	Very Low	25.38	2.7
City of London	39097040600	Relatively Low	38.76	2.7
City of London	39097040700	Very Low	17.69	2.7
-	39097041000	Very Low	10.12	2.7
-	39097041100	Relatively Low	31.11	2.7
Village of Mt. Sterling	39097041200	Very Low	21.04	2.7
Village of Midway and South Solon	39097041300	Very Low	9.93	2.7

Source: FEMA NRI

Table 107: Participating Jurisdiction Winter Weather Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	70.0	$108,000
-	39097040101	Very Low	76.5	$5,100
Village of Plain City	39097040102	Relatively Low	89.8	$12,000
-	39097040201	Very Low	83.2	$7,500
Village of West Jefferson	39097040202	Very Low	78.5	$5,700
Village of West Jefferson, City of London	39097040400	Relatively Low	91.4	$14,000
Village of West Jefferson	39097040500	Relatively Low	88.9	$11,000
City of London	39097040600	Relatively Low	91.8	$15,000
City of London	39097040700	Very Low	81.4	$6,700
-	39097041000	Very Low	81.1	$6,600
-	39097041100	Relatively Low	87.9	$10,000
Village of Mt. Sterling	39097041200	Very Low	84.3	$8,000
Village of Midway and South Solon	39097041300	Very Low	76.5	$5,100

Source: FEMA NRI

Population

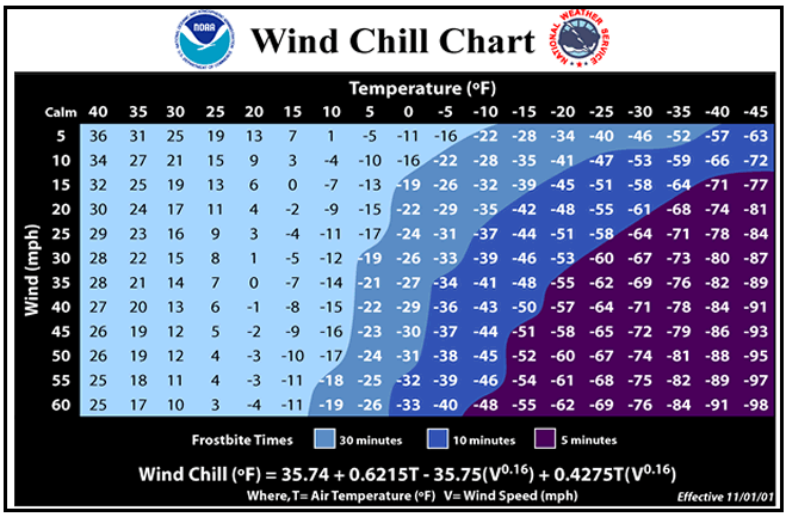
Severe winter weather, and the extremely cold temperatures that often accompany it, is a threat to anyone exposed to them. Extreme cold can cause frostbite and hypothermia. Bitterly cold temperatures can also burst water and create an excessive demand on providers to deliver energy for household heating. There are also fire dangers associated with home heating. Heavy snow and/or ice can paralyze communities. Roads can become hazardous, which may cause accidents, disrupted flow of supplies, and challenges in the delivery of emergency and medical services. Additional impacts on people and the community may include:

- **Injuries and Fatalities:** Slippery sidewalks, roads, and driveways can lead to slip and fall accidents, vehicle crashes, and pedestrian injuries. Exposure to extreme cold temperatures can cause frostbite, hypothermia, and cold-related illnesses, which can be life-threatening.
- **Power Outages:** Heavy snow, ice, and freezing rain can bring down power lines and disrupt electricity supply. Power outages can lead to heating and lighting challenges, particularly in extreme cold conditions.
- **Transportation Disruptions:** Winter storms can make roads and highways treacherous, leading to travel delays, accidents, and stranded motorists. Public transportation services may be disrupted, affecting commuters and essential travel.
- **Stranded or Isolated Communities:** Severe winter weather can leave communities isolated and cut off from emergency services and supplies. Residents may need to shelter in place or rely on local resources until conditions improve.

- **Health Risks:** Exposure to extreme cold can lead to a range of health risks, including frostbite, hypothermia, and cold-related illnesses. Individuals with pre-existing health conditions may face exacerbated risks.
- **Increased Heating Costs:** Cold weather can result in higher heating costs, which can be a financial burden for many households. Low-income individuals and families may struggle to afford adequate heating.
- **Disruption of Essential Services:** Severe winter weather can disrupt essential services such as healthcare, emergency response, and utilities. Hospitals may face increased patient volumes due to weather-related injuries and illnesses.

When extremely cold temperatures are accompanied by strong winds the result can be potentially lethal wind chills. Wind chill is the temperature your body feels when the air temperature is combined with the wind speed and is based on the rate of heat loss from exposed skin caused by the effects of wind and cold. As the speed of the wind increases, it can carry heat away from your body much more quickly, causing skin temperature to drop. The wind chill chart shows the difference between the actual air temperature and the perceived temperature due to wind, and amount of time until frostbite occurs.

Chart 14: Wind Chill Chart



Source: NOAA

All Madison County and participating jurisdiction populations are vulnerable to the impacts of severe winter weather. Please see Section 3.3: Population Data and Section 3.4: Socially Vulnerable and At-Risk Populations for data concerning jurisdictional populations.

Buildings and Structures

All buildings and structures within Madison County and participating jurisdictions can be impacted by severe winter weather. However, the location and construction of the facility will have a significant impact on the vulnerability. In general, older structures would be at higher risk of negative impacts. Some of the potential impacts include:

- **Electrical Infrastructure Damage:** Severe winter weather can damage electrical infrastructure, including power lines, transformers, and substations. This can result in widespread power outages, affecting homes, businesses, hospitals, and other critical facilities.
- **Communication Disruptions:** Severe winter weather can disrupt telecommunications infrastructure, including cell towers, data centers, and communication networks. This can impact emergency communication and coordination efforts.
- **Safety Risks:** Damage to infrastructure can pose safety risks to workers and the public. Fallen power lines, damaged buildings, and debris can be hazardous.
- **Building Damage:** Heavy snow or ice loads can cause damage to the building.

Governmental Operations
Severe winter weather can pose various risks to government operations. These risks can have significant economic and operational consequences, and can include:

- **Power Outages:** Severe winter weather can lead to power outages by damaging electrical infrastructure such as power lines and substations. Government buildings may lose power, affecting critical operations and services.
- **Flooding:** Heavy snow, or rapid melting of snow during severe winter weather can lead to flooding, which can damage government buildings and disrupt operations. Flood damage may require extensive repairs and cleanup.
- **Communication Disruptions:** Severe winter weather can damage communication equipment, including telephone lines and computer systems. This can hinder communication between government agencies and the public.
- **Transportation Disruptions:** Severe winter weather can make roads impassable due to snow or ice. This can impact the ability of government employees to commute to work.
- **Budgetary Impact:** The costs associated with repairing and restoring government buildings and infrastructure after severe winter weather can strain budgets.

Transportation and Electrical Infrastructure
Severe winter weather can have significant impacts on road infrastructure, creating changing conditions for transportation and necessitating proactive measures for maintenance and safety. Winter storms can impact road infrastructure through:

- **Snow Accumulation:** Snowfall can accumulate on road surfaces, creating slippery and hazardous conditions for drivers. Accumulated snow can reduce road visibility and make travel difficult.
- **Ice Formation:** Freezing temperatures can lead to the formation of ice on roadways, increasing the risk of accidents and making roads slippery. Black ice, which is nearly invisible, poses a particular hazard.
- **Snowdrifts:** Strong winds during winter storms can lead to the formation of snowdrifts on roads, especially in open areas. These drifts can obstruct visibility and impede traffic flow.
- **Road Surface Damage:** The freeze-thaw cycle, where melted snow refreezes, can lead to the formation of ice patches and potholes on road surfaces. This cycle can contribute to the deterioration of road infrastructure over time.
- **Freeze-Thaw Cycling:** Alternating freezing and thawing can cause the expansion and contraction of water within pavement cracks, leading to the formation and enlargement of potholes.
- **Snowplow and Deicing Operations:** Snowplows and deicing operations are necessary to clear roads and improve driving conditions. However, the use of salt and chemicals for deicing can contribute to corrosion and deterioration of road surfaces and infrastructure.
- **Infrastructure Stress:** Bridges and overpasses are particularly susceptible to ice formation due to the lack of ground contact. Winter storms can stress these structures, potentially leading to structural issues over time.

Significant cost can be incurred for snow removal from transportation routes. In smaller jurisdictions with fewer resources and equipment, the cost may be on the lower end of the spectrum, ranging from a few thousand dollars to around $10,000 per snow event. In Madison County and/ or urban areas with extensive road networks and higher population densities, the cost can be much higher, potentially ranging from $10,000 to $50,000 or more per snow event.

In general, the priority for snow removal is based on traffic volume, speed limits and road surface types. Preference is generally given in the following order:

- State trunklines
- Primary roads
- Major local roads
- Residential / subdivision streets

Severe winter weather can impact electrical utilities in various ways, potentially leading to disruptions in service. These impacts include:

- **Power Outages:** Low temperatures can strain electrical systems, leading to increased demand for heating systems. This heightened demand can overload power grids, resulting in power outages.
- **Equipment Failure:** Electrical equipment, such as cables and switches, may experience higher stress during extremely cold weather, increasing the likelihood of equipment failures.
- **Icing on Power Lines:** Ice accumulation on power lines can lead to increased weight, potentially causing lines to sag or break. This can result in power outages and safety hazards.

Mapping concerning transportation and electrical infrastructure may be found in Section 3.9: Critical Facilities and Infrastructure. Information concerning the costs to repair or reconstruct transportation and electrical infrastructure may be found in Section 5.8.6.

Water and Wastewater Utilities
In general, severe winter weather components do not have a large impact on water and wastewater infrastructure and operations. However, the cascading impacts from an event such as power loss disrupting pumping and treatment capabilities, localized flooding from heavy overwhelming drainage systems, or frozen pipes in water distribution systems, can cause system disruptions.

Medical and Response Facilities
Severe winter weather can significantly impact emergency response and medical infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of severe winter weather events. Winter storms can impact emergency response and medical services through:

- **Transportation Disruptions:** Snow and ice accumulation on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- **Communication Disruptions:** Severe winter weather can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- **Power Outages:** Severe winter weather can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- **Exposure:** Emergency responders face increased health and safety risks in severe winter weather conditions. Exposure to hail, high winds, extreme cold, snow, and ice can impact the well-being of responders and affect their ability to provide effective assistance.
- **Resource Allocation Challenges:** Severe winter weather often requires the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- **Increased Demand for Services:** Severe winter weather can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously. Severe winter weather can increase the demand for emergency shelters, particularly in cases of widespread power outages. Setting up and managing these shelters can strain resources.

Educational Facilities
Severe winter weather can significantly impact school operations. Impacts may include:

- **Transportation Disruptions:** Snow and ice accumulation on roads can hinder the ability of school vehicles to navigate and reach both students and facilities. Hazardous road conditions may result in delays or closures.

- **School Closures:** Severe winter weather can lead to the closure of schools due to hazardous conditions. This can strain caregivers and result in lower work attendance.

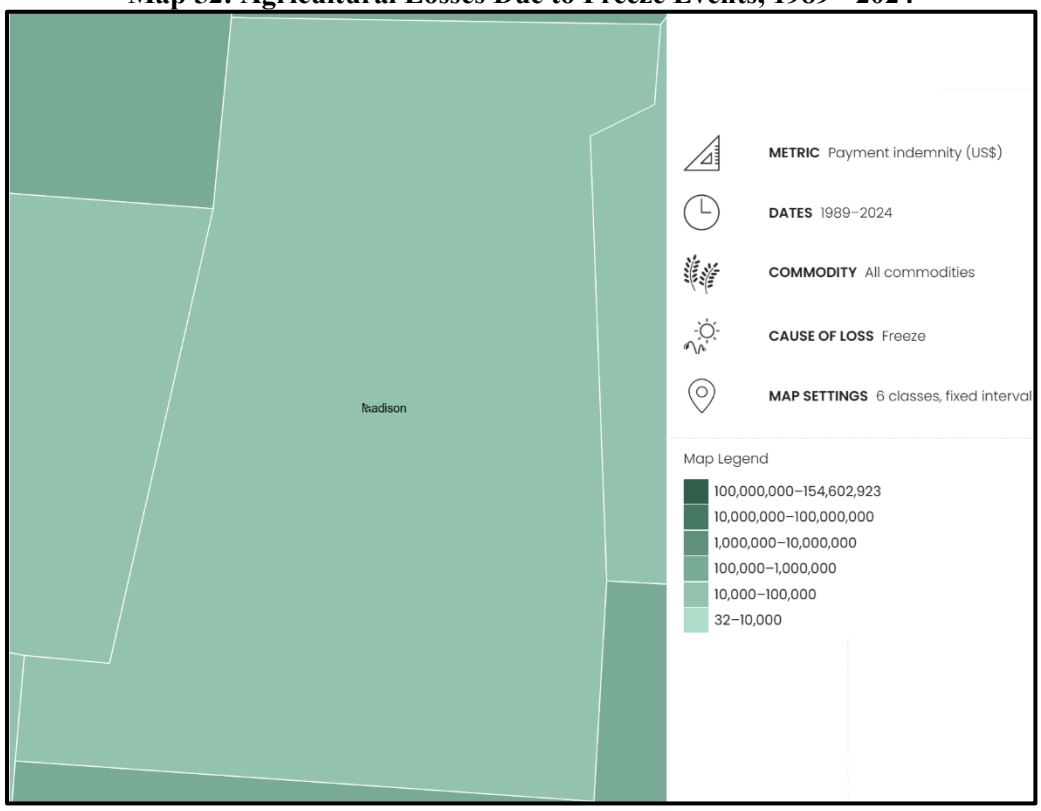
Communication Systems
All communication systems within Madison County are at risk to severe winter weather. Severe winter weather can disrupt vital communications system, affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Infrastructure Damage:** Heavy snow or ice conditions can cause physical damage to communication infrastructure such as cell towers, antennas, cables, and data centers. This damage can result in network outages and disruptions.
- **Power Outages:** Severe winter storms often lead to power outages, which can affect the operation of communication networks. Without a stable power supply, cell towers, data centers, and other critical components may become non-functional, leading to service interruptions.
- **Signal Interference:** Severe winter storms can create electromagnetic interference that disrupts radio signals used in wireless communication. This interference can lead to poor signal quality, dropped calls, and slower data speeds.
- **Loss of Backhaul Connectivity:** Severe winter weather events can damage the backhaul infrastructure that connects various communication nodes. This backbone infrastructure is crucial for transmitting data between local and regional networks, and any disruption can impact overall network performance.
- **Communication Tower Instability:** Heany snow and ice loads can compromise the stability of communication towers. If towers are not designed to withstand severe weather, they may collapse, leading to network outages.
- **Network Congestion:** In the event of a disaster, communication networks may experience a surge in usage as people attempt to contact emergency services, friends, and family. This increased demand can lead to network congestion, making it difficult for users to connect.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.9.6.

Environmental and Agricultural Impacts
Severe winter weather conditions can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to freeze events from 1989 - 2024:

Map 52: Agricultural Losses Due to Freeze Events, 1989 - 2024



Source: USDA

Severe winter weather can have various impacts on the environment, particularly in regions prone to cold and snowy winters. These impacts can affect ecosystems, wildlife, and natural resources and can include habitat disruption, reduction of food sources, changes in migration patterns, and damage to foliage (especially if a spring storm). Additionally, the use of salt and de-icing chemicals on roads and sidewalks can have negative environmental impacts. These chemicals can find their way into nearby water bodies, leading to water pollution and harm to aquatic ecosystems. Snowmelt can also introduce pollutants from roadways and urban areas into rivers and streams, leading to reduced water quality. Elevated sediment levels and changes in water temperature can also affect aquatic life.

Jurisdictional Concerns:

As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **City of London:** Winter weather disproportionately affects vulnerable populations, including elderly residents, individuals with disabilities, and low-income families who may lack reliable heat or transportation. The city must also contend with the economic disruption caused by winter weather. Businesses may close, public transportation can be interrupted, and government operations may slow down. The city would need to manage employee availability, budget for overtime and salt supplies, and plan for deferred maintenance caused by storm impacts. One of the primary concerns for the city is the vulnerability of critical infrastructure to winter hazards. Ice storms can down power lines and trees, creating extended outages that cripple both residential neighborhoods and essential services.
- **Village of Midway:** With 5.6% of citizens living in poverty, severe winter weather may disproportionately impact them due to underinsurance and the inability to properly heat a residence. With limited access and services, severe winter weather may cut the community (especially the elderly, 6.3% of the population) off from necessary services due to limited road access. With limited and aging response services, severe winter weather may affect overall community response and recovery.

- **Village of Mt. Sterling:** With 5.3% of citizens living in poverty, severe winter weather may disproportionately impact them due to underinsurance and the inability to properly heat a residence. With limited access and services, severe winter weather may cut the community (especially the elderly, 4.7% of the population) off from necessary services due to limited road access. With limited and aging response services, severe winter weather may affect overall community response and recovery.
- **Village of Plain City:** With 11.1% of citizens living in poverty, severe winter weather may disproportionately impact them due to underinsurance and the inability to properly heat a residence. With limited access and services, severe winter weather may cut the community (especially the elderly, 5.5% of the population) off from necessary services due to limited road access. With limited and aging response services, severe winter weather may affect overall community response and recovery.
- **Village of South Solon:** With 11.0% of citizens living in poverty, severe winter weather may disproportionately impact them due to underinsurance and the inability to properly heat a residence. With limited access and services, severe winter weather may cut the community (especially the elderly, 9.7% of the population) off from necessary services due to limited road access. With limited and aging response services, severe winter weather may affect overall community response and recovery.
- **Village of West Jefferson:** Winter weather disproportionately affects vulnerable populations, including elderly residents, individuals with disabilities, and low-income families who may lack reliable heat or transportation. The city must also contend with the economic disruption caused by winter weather. Businesses may close, public transportation can be interrupted, and government operations may slow down. The city would need to manage employee availability, budget for overtime and salt supplies, and plan for deferred maintenance caused by storm impacts. One of the primary concerns for the city is the vulnerability of critical infrastructure to winter hazards. Ice storms can down power lines and trees, creating extended outages that cripple both residential neighborhoods and essential services.
- **Jefferson Local**: Students in transit during a severe winter weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **Jonathan Alder Local:** Students in transit during a severe winter weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **London City Schools:** Students in transit during a severe winter weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **Madison-Plains Local:** Students in transit during a severe winter weather event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.

Cascading Impacts

Cascading impacts often result when one hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with severe winter weather may include:

- Direct physical damage to buildings and structures:
- Transportation infrastructure disruption
- Power outages and electrical grid disruption
- Communication system disruption
- Transportation and supply chain disruptions
- Environmental and ecological damage
- Economic impacts and business closures
- Emergency services overload

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Madison County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 108: Severe Winter Weather Consequence Analysis

Subject	Potential Impacts
Impact on the Public	Freezing temperatures coupled with heavy snow accumulation can cause dangerous travel conditions, leading to accidents and road closures. Downed power lines can lead to a loss of electricity and heat, with the young and the elderly especially vulnerable. Extremely cold temperatures may lead to hypothermia and death.
Impact on Responders	Dangerous road conditions create transportation challenges for first responders. First responders will need to control their own exposure to the elements for prolonged periods of time and will need to continuously seek heat and shelter to stay warm. Equipment may also be damaged or destroyed due to cold temperatures, heavy wind, ice, and heavy snowfall, which may lead to a decrease in response capabilities.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary. Severe winter weather may impact an agency's ability to maintain operations due to power outages and transportation difficulties. If the activation of alternate facilities was required, travel may be difficult. Additionally, computer/network and other communication access may be impacted due to power outages.
Delivery of Services	The ability to deliver services can be impacted locally, regionally, or statewide depending on the severity of the severe winter weather event. Dangerous road conditions may lead to roadway and bridge closures, as well as transit service disruptions. Businesses and places of commerce may completely shut down, which leads to the disruption of goods and services.
Property, Facilities, and Infrastructure	Transportation, governmental operations, and communications may be heavily disrupted. Roads and bridges may be heavily impacted by severe winter weather, and may be completely obstructed by downed trees, powerlines, and snow accumulation. Snow and ice can impact access to homes and critical facilities such as hospitals, schools, and supermarkets. Power loss can lead to disruption of critical infrastructure and technology.
Impact on Environment	Heavy snow and ice accumulation can weigh down and damage vegetation, tree limbs, and power lines. Flooding may also occur after the rapid melting of a heavy snowfall, causing bodies of water to flood, damaging the surrounding areas. Exposure to extreme winter weather may result in animal death. Chemicals used to treat roadways may contaminate natural environments and water reservoirs if used in large quantities.
Economic Conditions	Severe winter weather poses a fiscal impact on the governments, even if some of those costs can be recouped through federal grant reimbursements. Local, county, and state resources may be drained by a severe winter weather event.
Public Confidence in Governance	The public's confidence in governance is affected by immediate local and state response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence high.

5.12.7 Future Development

As Madison County continues to expand residential, commercial, and industrial areas, the proliferation of infrastructure, such as power lines, roads, and buildings, becomes more susceptible to damage from ice accumulation and high winds. Ice storms can lead to power outages, hazardous travel conditions, and structural damage, posing significant challenges to the community.

A growing population places additional demands on emergency services during severe winter events. Increased calls for assistance, coupled with treacherous road conditions, can hinder response times and resource availability, potentially compromising public safety. Extremely cold temperatures pose health risks, particularly to vulnerable populations such

as the elderly, young children, and those with pre-existing health conditions. As the population grows, ensuring adequate shelter, heating, and medical services during cold snaps becomes increasingly critical to prevent hypothermia and other cold-related illnesses.

Winter storms can disrupt transportation networks, supply chains, and daily economic activities. Prolonged road closures and power outages can lead to economic losses for businesses and increased costs for residents. Additionally, the environmental toll includes potential damage to local ecosystems and increased runoff from melting snow and ice, which can affect water quality.

5.12.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

Table 109: Example Severe Winter Weather Mitigation Actions

Category	Example Action
Planning and Regulation	Review building codes and structural policies to ensure they are adequate to protect older structures from snow loads.
	Require tie-downs with anchors and ground anchors appropriate for the soil type for manufactured homes.
	Incorporate passive ventilation in the site design to allow outdoor air to enter the home in a controlled way.
	Establish standards for all utilities regarding tree pruning around lines.
	Inspect utility poles to ensure they meet specifications and are ice resistant.
	Ensure the development and enforcement of building codes for roof snow loads.
Infrastructure	Protect traffic lights and other traffic controls from ice.
	Add building insulation to walls and attics.
Natural Systems	Property maintain stream and river channels to ensure flow.
	Use snow fences or “living snow fences” (e.g., rows of trees or other vegetation) to limit blowing and drifting of snow over critical roadway segments.
Education	Develop a winter weather brochure for distribution by recreation equipment retailers or outfitters in mountainous areas.
	Educate design professionals to include snow mitigation during building design.
	Instruct property owners on how to properly install temporary window coverings before a storm.
	Produce and distribute family and traveler emergency preparedness information about severe winter weather hazards.
	Organize outreach to vulnerable populations, including establishing and promoting accessible heating centers in the community.

5.13 Tornado

5.13.1 Hazard Description

A tornado is a violent, dangerous, rotating column of air that is in contact with both the surface of the earth and a cumulonimbus Barton or, in rare cases, the base of a cumulus Barton. Tornadoes come in many shapes and sizes but are typically in the form of a visible condensation funnel, whose narrow end touches the earth and is often encircled by a Barton of debris and dust.

Tornadoes can cause several kinds of damage to buildings. Tornadoes have been known to lift and move objects weighing more than three tons, toss homes more than 300 feet from their foundations, and siphon millions of tons of water. However, less spectacular damage is much more common. Houses and other obstructions in the path of the wind cause the wind to change direction. This change in wind direction increases pressure on parts of the building. The combination of increased pressures and fluctuating wind speeds creates stress on the building that frequently causes connections between building components, roofing, siding, and windows to fail. Tornadoes can also generate a tremendous amount of flying debris. If wind speeds are high enough, airborne debris can be thrown at buildings with enough force to penetrate windows, roofs, and walls.

5.13.2 – Location and Extent

All Madison County participating jurisdictions are vulnerable to tornadoes. Based on the non-geographic specific aspect of this hazard, i.e., no one area is at a greater risk, all of the planning area's structural inventory and population is vulnerable. A tornado may arrive with a squall line or cold front and touch down quickly. Smaller tornadoes can strike without warning. Other times tornado watches and sirens will alert communities of high potential tornado producing weather or an already formed tornado and its likely path.

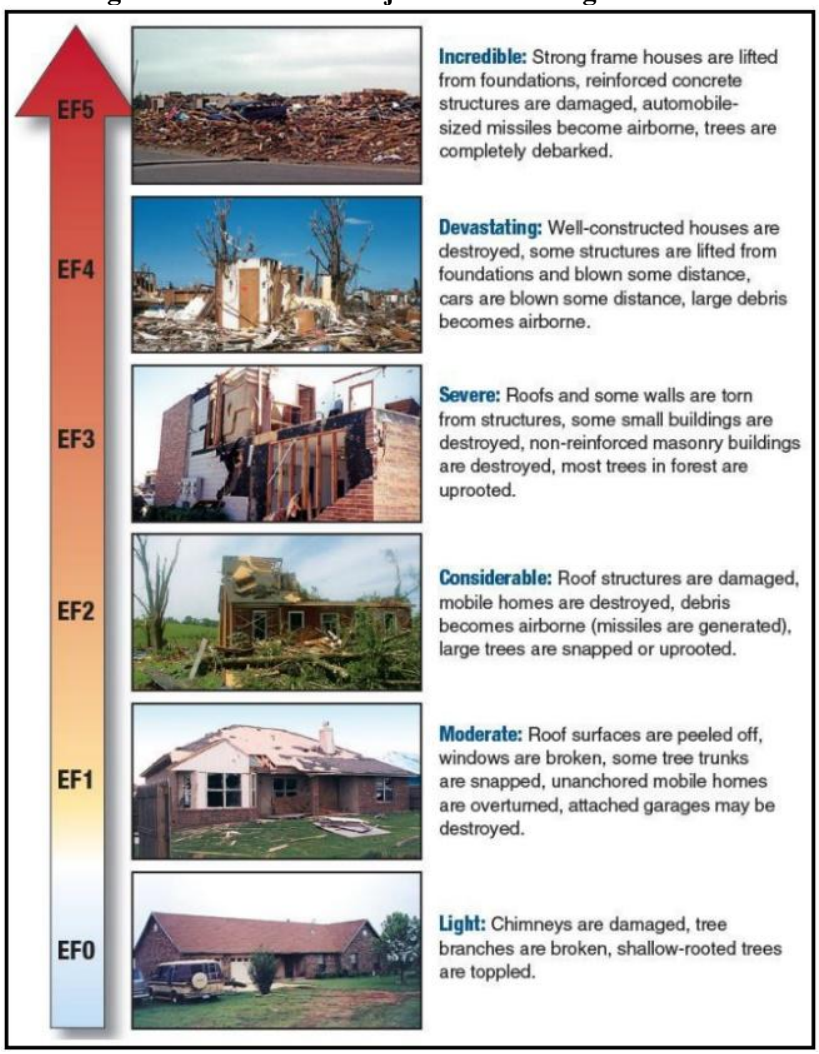
Since 2007, the United States uses the Enhanced Fujita (EF) Scale to categorize tornadoes. The scale correlates wind speed values per F level and provides a rubric for estimating damage.:

Table 110: Enhanced Fujita Scale

Scale	Wind Speed (mph)	Relative Frequency	Potential Damage
EF0	65-85	53.5%	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e., those that remain in open fields) are always rated EF0.
EF1	86-110	31.6%	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely leveled; cars thrown, and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center

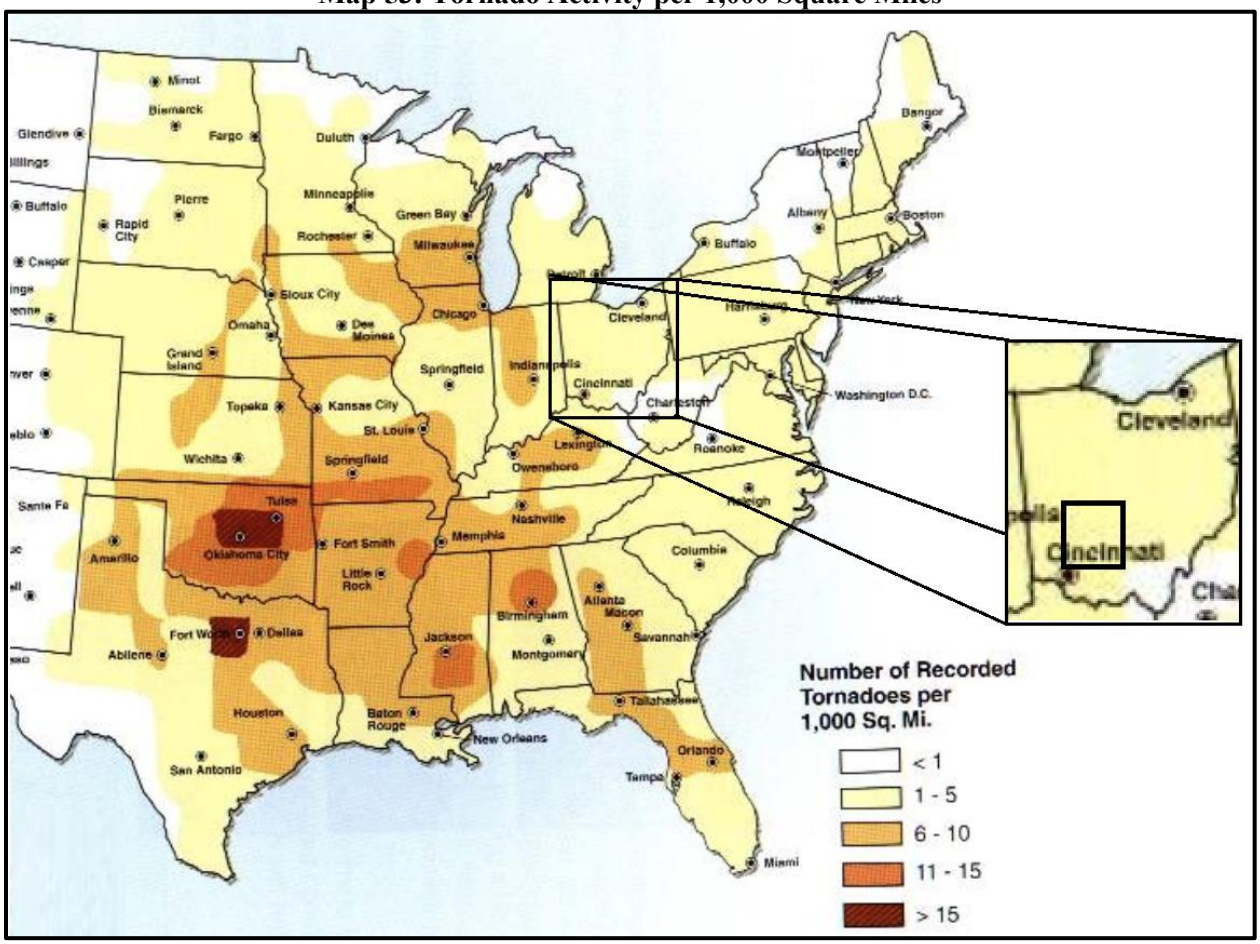
Figure 13: Enhanced Fujita Scale Damage Estimates



Source: FEMA

The following map, from FEMA, indicates tornado activity per 1,000 square miles for Madison County:

Map 53: Tornado Activity per 1,000 Square Miles



Source: FEMA

The MPC views tornadoes as a local, county-wide, and regional hazard. Discussions with the MPC and a review of all available data indicated tornadoes are a community concern for all participating jurisdictions. The following provides a narrative of the level of jurisdictional concern:

- **Madison County:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **City of London:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of Midway:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of Mt. Sterling:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of Plain City:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of South Solon:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Village of West Jefferson:** Tornadoes identified as a community concern as citizens, structures, and infrastructure are vulnerable.
- **Jefferson Local**: Tornadoes identified as a district concern as students, staff, structures, and infrastructure are vulnerable.
- **Jonathan Alder Local:** Tornadoes identified as a district concern as students, staff, structures, and infrastructure are vulnerable.

- **London City Schools:** Tornadoes identified as a district concern as students, staff, structures, and infrastructure are vulnerable.
- **Madison-Plains Local:** Tornadoes identified as a district concern as students, staff, structures, and infrastructure are vulnerable.

5.13.3 Previous Occurrences

Historical events of significant magnitude or impact can result in a Presidential Disaster Declaration. Madison County has experienced the following Presidential Disaster Declaration related to tornado events:

Table 111: Madison County Presidentially Declared Disasters

Designation	Declaration Date	Incident Type	Individual Assistance	Public Assistance	Mitigation Grant Program
DR-870-OH	06/06/1990	Flooding, Severe Storms, Tornado	-	-	-
DR-421-OH	04/04/1974	Tornadoes	-	-	-

Source: FEMA
-: Not reported

The President can declare an emergency for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local or Indian tribal government efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe. Ther have been no tornado Emergency Declarations for Madison County.

In Ohio, the governor has the authority to declare a state of emergency or disaster under various state statutes and provisions. This authority allows the governor to activate resources, issue orders, and coordinate responses to protect public safety. There have been no state declarations of emergency for tornadoes for Madison County from 2019-2024.

The following table presents NCEI identified tornado events and the resulting damage totals in Madison County from 1950 to 2025.

Table 112: Madison County Tornado Events

County	Number of Events	Property Damage	Deaths or Injuries	Highest Rated Tornados	Number of EF2 or Greater Tornadoes
Madison	14	$7,154,000	1	F3	3

Source: NCEI

Recent notable events include:

- **February 28, 2024:** The tornado developed near State Route 665, east of London, and moved to the east-northeast. The tornado initially caused minor tree and structural damage, including a tipped over trailer. It then strengthened as it crossed Spring Valley Road and then across Glade Run Road, where it peaked in intensity as it crossed Wilson Road. At this location, a home lost part of its roof and tree damage was considerable, with snapped off trunks. Damage in this area was consistent with wind speeds of around 110 mph. The tornado continued across West Jefferson-Klousville Road and then onward to Olmstead Road. Additional damage meeting the EF1 category was found along Roberts Road, just southeast of Plain City Georgesville Road. The tornado then entered Franklin County at 0525EST, about 1.5 mileseast-southeast of West Jefferson. It continued east-northeast for about 3 more miles before ending just before reaching Alton Hall Elementary School. Damages were reported at $250,000.
- **February 28, 2024:** The tornado first touched down in Clark County at 0452EST, 5 miles south-southeast of Springfield. It moved east-northeast and crossed into Madison County at 0506EST, 2.3 miles west-southwest of Summerford. The tornado downed numerous trees and caused significant damage to several structures as it moved through western Madison County. Notable damage occurred at the Madison County Airport where one of the metal hangars completely collapsed. There was also significant damage to several other hangars and

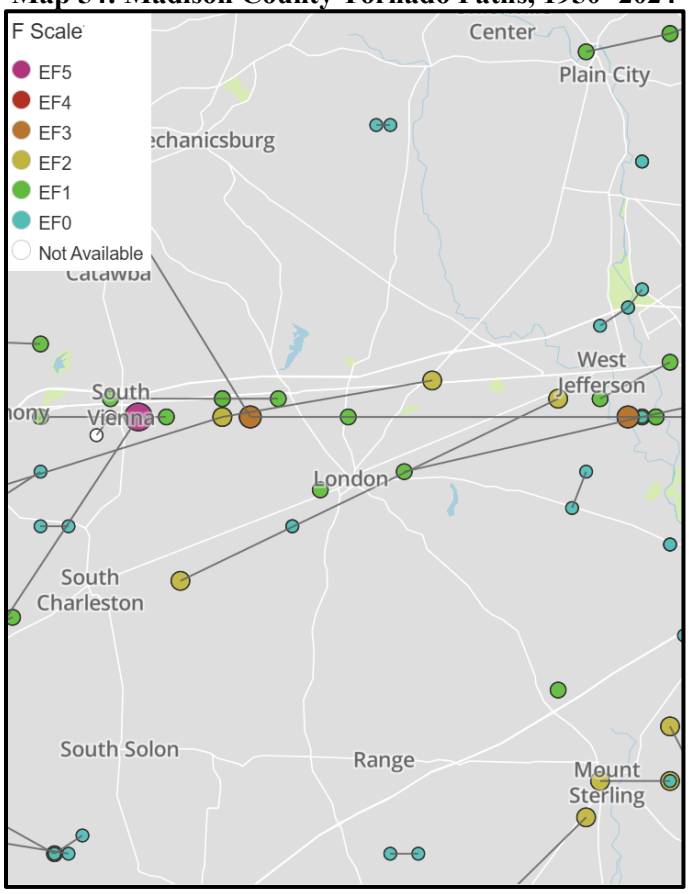
planes at the airport. Based on the damage, winds were estimated to be 130 mph at this location. The tornado continued east from here, damaging other dwellings and trees. One home in particular had its second story completely removed. The tornado then lifted in an open field, one mile north-northeast of Lafayette. Damages were reported at $1,000,000.

- **March 10, 1986:** A F2 tornado caused one injury and damages reported at $2,500,000.

It is worth noting that damage estimates indicated by the NCEI are often artificially low. This underreporting is a result of the way the events are reported to the NCEI, often by the local and/or NWS office. When reporting an event oftentimes the NWS office does not have access to the actual damage assessment resulting from that event. As such, the report often details a very low amount or zero-dollar amount for damages. Additionally, deaths and injuries may be underreported as they may be a result of a concurrent event, such as a person driving unsafely during heavy rain and passing away.

NOAA has been tracking tornadoes in Ohio for decades. This following map, which contains data from 1950 to 2024, pinpoints tornado tracts:

Map 54: Madison County Tornado Paths, 1950 -2024



Source: NOAA

5.13.4 Probability of Future Events

Predicting the probability of tornado occurrences is tremendously changing due to the large number of factors involved and the random nature of formation. Based on historical occurrences, Madison County will continue to experience tornado events on an annual basis. The following tables, using data from the NCEI, indicate the yearly probability of a tornado event, the number of deaths or injuries, and estimated property damage for Madison County:

Table 113: Madison County NCEI Tornado Event Probability Summary

County	Days with Event	Average Events per Year	Deaths / Injuries	Average Deaths / Injuries per Year	Property Damage	Average Property Damage per Year
Madison	14	<1	1	<1	$7,154,000	$93,387

Source: NCEI

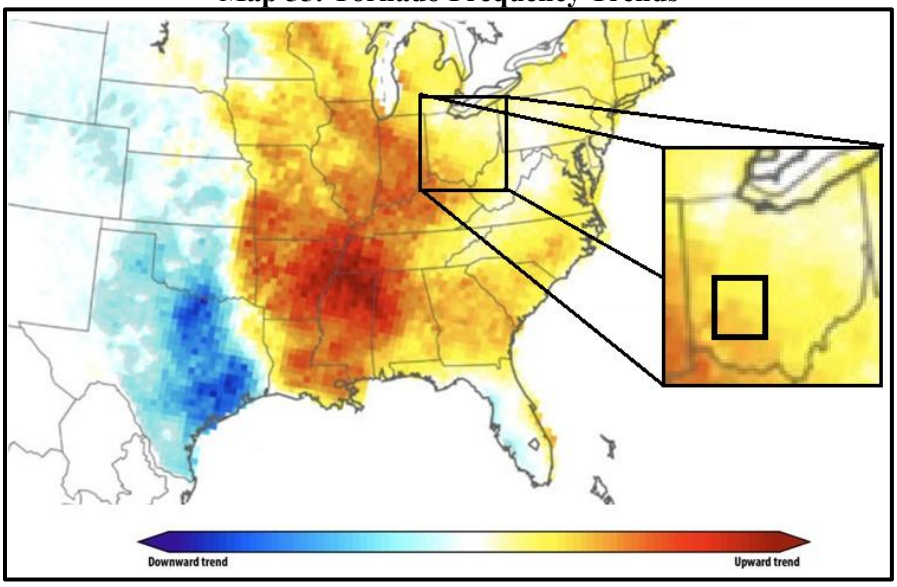
5.15.5 Projected Changes in Location, Intensity, Frequency, and Duration

The relationship between climate change and tornadoes is complex, and while there is ongoing research in this area, it is not fully understood. Tornadoes are small-scale, short-lived weather phenomena that can be influenced by a variety of atmospheric factors, including temperature, humidity, wind patterns, and atmospheric instability. Changing atmospheric conditions can influence some of these factors, which may, in turn, affect tornado activity. Tornadoes typically form when warm, moist air near the surface clashes with cooler, drier air aloft, creating atmospheric instability. Changing atmospheric conditions can alter temperature and humidity patterns, potentially affecting the conditions necessary for tornado formation. Additionally, changing atmospheric conditions can lead to more extreme and variable weather patterns. While this may not necessarily increase the overall number of tornadoes, it could lead to more unpredictable and severe tornado events when they do occur. Some research suggests that changing atmospheric conditions could lead to longer tornado seasons, with tornadoes occurring outside of their typical timeframes.

It's important to emphasize that while there may be some links between changing atmospheric conditions and tornado activity, these links are not fully understood. Tornadoes are influenced by a complex interplay of factors, and any changes in tornado patterns may vary by region.

Research conducted by the National Severe Storms Lab looked at Significant Tornado Parameters to help determine future tornado probability. Significant Tornado Parameters are a measurement of the major parameters of tornado conditions, including wind speed and direction, wind at differing altitudes, unstable air patterns, and humidity. The following map, generated by Northern Illinois University and compiled from Significant Tornado Parameter data, indicates Madison County and all participating jurisdictions may see an increase in the number of tornados:

Map 55: Tornado Frequency Trends



Source: Northern Illinois University

5.13.6 Vulnerability and Impact

FEMA NRI

Using the FEMA NRI, and consisting of three input components (expected annual loss, social vulnerability, and community resilience), the first table was created indicating the potential risk to Madison County and all participating jurisdictions from tornadoes. In order to gain an understanding of vulnerability, the second table details the estimated

annual loss data for Madison County and participating jurisdictions. To help understand the risk and vulnerability participating jurisdictions data from the FEMA NRI was run on a census tract level. As the NRI does not generate data for individual jurisdictions, census tract analysis is the closest analogue available to understand individual jurisdiction conditions.

Table 114: Participating Jurisdiction Tornado Risk Index

Jurisdiction	Census Tract	Risk Index	National Percentile	Frequency (per year)
Madison County	All	Very Low	22.81	0.3
-	39097040101	Very Low	10.32	0
Village of Plain City	39097040102	Relatively Low	32.69	0
-	39097040201	Very Low	6.37	0
Village of West Jefferson	39097040202	Very Low	13.58	0
Village of West Jefferson, City of London	39097040400	Relatively Low	45.48	0
Village of West Jefferson	39097040500	Very Low	25.38	0
City of London	39097040600	Relatively Low	38.76	0
City of London	39097040700	Very Low	17.69	0
-	39097041000	Very Low	10.12	0
-	39097041100	Relatively Low	31.11	0.1
Village of Mt. Sterling	39097041200	Very Low	21.04	0
Village of Midway and South Solon	39097041300	Very Low	9.93	0.1

Source: FEMA NRI

Table 115: Participating Jurisdiction Tornado Expected Annual Loss

Jurisdiction	Census Tract	EAL Index	National Percentile	$ EAL
Madison County	All	Very Low	55.7	$1,200,000
-	39097040101	Very Low	51.5	$57,000
Village of Plain City	39097040102	Relatively Low	69.9	$143,000
-	39097040201	Very Low	57.9	$80,000
Village of West Jefferson	39097040202	Very Low	51.9	$58,000
Village of West Jefferson, City of London	39097040400	Relatively Low	75.3	$177,000
Village of West Jefferson	39097040500	Relatively Low	66.1	$120,000
City of London	39097040600	Relatively Low	73.3	$163,000
City of London	39097040700	Very Low	55.3	$70,000
-	39097041000	Very Low	50.8	$55,000
-	39097041100	Relatively Low	63.4	$106,000
Village of Mt. Sterling	39097041200	Very Low	57.0	$76,000
Village of Midway and South Solon	39097041300	Very Low	49.9	$52,000

Source: FEMA NRI

Population

Tornadoes can have a wide range of effects on people, often posing significant risks to life, property, and general well-being. In the absence of proper shelter, tornadoes can cause serious injury. In general, if potentially exposed persons take shelter in a solid, well-constructed structure protection from would be provided. However, old or poorly constructed facilities may be more prone to damage, potentially increasing the impact on economically disadvantaged populations. Some of the potential effects of tornadoes on people may include:

- **Death and Injury:** Tornadoes can produce wind driven debris, causing injuries or fatalities.
- **Power Outages:** Strong tornadic winds can lead to power outages, disrupting daily life, and potentially affecting essential services, such as medical equipment and refrigeration.
- **Mental Health Impact:** Tornadoes can be frightening and stressful, leading to anxiety and post-traumatic stress disorder in some individuals. The emotional toll of property damage and loss can also be significant.

- **Displacement:** People may need to evacuate their homes or be temporarily displaced due to storm damage, requiring emergency shelter and support.
- **Economic Costs:** Tornadoes often result in high economic costs, including repair and recovery expenses, insurance claims, and potential loss of income due to property damage or work disruptions.
- **Public Safety Response:** Tornadoes can strain public safety resources, including emergency services, law enforcement, and medical facilities.

All Madison County and all participating jurisdiction populations are vulnerable to the impacts of tornadoes. Please see Section 3.3: Population Data. At greater risk may be the vulnerable populations, including those with disabilities and the elderly due to evacuation concerns, and those below the poverty level due to underinsurance and relocation concerns. Vulnerable population information may be found in Section 3.4: Socially Vulnerable and At-Risk Populations.

Buildings and Structures
All buildings and structures within Madison County and in all participating jurisdictions can be impacted by tornadoes. However, the location and construction of the facility will have a significant impact on the vulnerability. In general, older structures would be at higher risk of negative impacts. Some of the potential impacts include:

- **Electrical Infrastructure Damage:** Tornadoes can damage electrical infrastructure, including power lines, transformers, and substations. This can result in widespread power outages, affecting homes, businesses, hospitals, and other critical facilities.
- **Communication Disruptions:** Tornadoes can disrupt telecommunications infrastructure, including cell towers, data centers, and communication networks. This can impact emergency communication and coordination efforts.
- **Safety Risks:** Damage to infrastructure can pose safety risks to workers and the public. Fallen power lines, damaged buildings, and debris can be hazardous.
- **Building Damage:** Very high winds and blown debris can cause damage to the building.

Governmental Operations
Tornadoes can pose various risks to government operations. These risks can have significant economic and operational consequences, and can include:

- **Power Outages:** Tornadoes can lead to power outages by damaging electrical infrastructure such as power lines and substations. Government buildings may lose power, affecting critical operations and services.
- **Flooding:** Heavy rainfall during tornadoes can lead to flooding, which can damage government buildings and disrupt operations. Flood damage may require extensive repairs and cleanup.
- **Communication Disruptions:** Tornadoes can damage communication equipment, including telephone lines and computer systems. This can hinder communication between government agencies and the public.
- **Transportation Disruptions:** Tornadoes can make roads impassable due to flooding or debris. This can impact the ability of government employees to commute to work.
- **Budgetary Impact:** The costs associated with repairing and restoring government buildings and infrastructure after tornadoes can strain budgets.

Transportation and Electrical Infrastructure
In general, tornadoes do not have a large impact on transportation infrastructure, with the exception of power loss disrupting signaling and poor conditions and debris impacting driving conditions.

Tornadoes can have significant impacts on electrical utilities, leading to disruptions in power supply and potential damage to infrastructure. Tornadoes can affect electrical utilities in the following ways:

- **Lightning Strikes:** Lightning is a common occurrence during tornado events and poses a substantial risk to electrical infrastructure. Lightning strikes can damage power lines, transformers, substations, and other critical components, leading to power outages.

- **Wind Damage:** High winds associated with tornadoes can cause trees, branches, and other debris to fall onto power lines. This can result in downed power lines, structural damage to utility poles, and disruptions in electrical service.
- **Hailstorms:** Tornadoes may produce hail, which can damage power lines, transformers, and other equipment. Hailstones can also lead to short circuits and insulation damage on electrical components.
- **Power Surges:** Lightning strikes, strong winds, and other tornado-related events can lead to power surges in the electrical grid. These surges can damage electronic devices, appliances, and utility equipment connected to the power supply.

Water and Wastewater Utilities
In general, tornadoes do not have a large impact on water and wastewater infrastructure and operations unless they are directly struck. However, the cascading impacts from an event such as power loss disrupting pumping and treatment capabilities or localized flooding from heavy overwhelming drainage systems may cause disruptions to operations.

Medical and Response Facilities
Tornadoes can significantly impact emergency response infrastructure, creating challenges for first responders and organizations involved in managing and mitigating the effects of tornado events. Tornadoes can impact emergency response through:

- **Transportation Disruptions:** Debris accumulation on roads can hinder the ability of emergency vehicles to navigate and reach affected areas promptly. Hazardous road conditions may result in delays in response times.
- **Communication Disruptions:** Tornadoes can disrupt communication networks, affecting the ability of emergency responders to coordinate and communicate effectively. Downed power lines and damage to communication infrastructure contribute to these disruptions.
- **Power Outages:** Tornadoes can lead to power outages. Emergency response facilities, such as command centers and fire stations, may lose power, affecting their operational capabilities.
- **Exposure:** Emergency responders face increased health and safety risks in tornado conditions. Exposure to hail and high winds can impact the well-being of responders and affect their ability to provide effective assistance.
- **Resource Allocation Challenges:** Tornadoes often require the allocation of additional resources, including personnel, equipment, and supplies, to address immediate needs. This can strain emergency response organizations and impact their ability to respond to other concurrent incidents.
- **Increased Demand for Services:** Tornadoes can result in an increased demand for emergency services, including medical assistance, search and rescue operations, and responses to accidents. Emergency response organizations may need to manage a higher volume of incidents simultaneously. Setting up and managing these shelters can strain resources.

Educational Facilities
Depending on the educational facility capability and location, tornadoes may necessitate the closure of the facility for the duration of the event due to damages or lack of access. These closures are expected to have additional economic consequences as caregivers may be required to miss or modify work.

- **School Closures:** Tornadoes can lead to the closure of schools due to hazardous conditions. This can strain caregivers and result in lower work attendance.

Communication Systems
All communication systems within Madison County are at risk to tornadoes, which can disrupt vital communications system affecting reliability and functionality. Some of the key vulnerabilities include:

- **Physical Infrastructure Damage:** High winds and tornadoes can cause physical damage to communication infrastructure such as cell towers, antennas, cables, and data centers. This damage can result in network outages and disruptions.

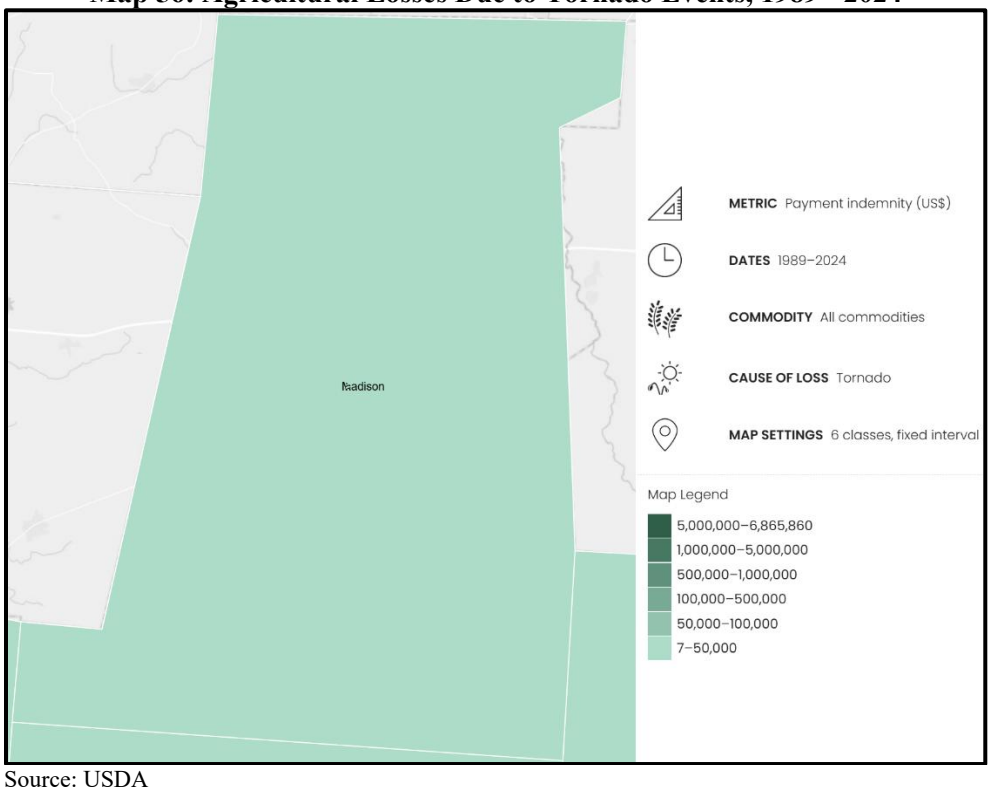
- **Power Outages:** Tornadoes often lead to power outages, which can affect the operation of communication networks. Without a stable power supply, cell towers, data centers, and other critical components may become non-functional, leading to service interruptions.
- **Signal Interference:** Tornadoes can create electromagnetic interference that disrupts radio signals used in wireless communication. This interference can lead to poor signal quality, dropped calls, and slower data speeds.
- **Loss of Backhaul Connectivity:** Tornadoes can damage the backhaul infrastructure that connects various communication nodes. This backbone infrastructure is crucial for transmitting data between local and regional networks, and any disruption can impact overall network performance.
- **Communication Tower Instability:** High winds and extreme weather conditions can compromise the stability of communication towers. If towers are not designed to withstand tornadoes, they may collapse, leading to network outages.
- **Network Congestion:** In the event of a disaster, communication networks may experience a surge in usage as people attempt to contact emergency services, friends, and family. This increased demand can lead to network congestion, making it difficult for users to connect.

The cost to repair communications networks can vary widely depending on the extent of the damage, the size of the network, and the specific technologies involved. Repair costs may include expenses for labor, equipment replacement or repair, materials, and any additional resources required to restore the network to full functionality. Estimated repair cost from the U.S. Department of Homeland Security Cybersecurity and Infrastructure Security Agency may be found in Section 5.9.6.

Environmental and Agricultural Impacts

Tornadoes can cause significant agricultural impacts. The following map from the United States Department of Agriculture details total county-wide agricultural losses, by county, due to tornado events from 1989 - 2024:

Map 56: Agricultural Losses Due to Tornado Events, 1989 - 2024



Source: USDA

Tornadoes can pose various risks to the environment. These risks can have both short-term and long-term impacts on natural ecosystems. Tornadic weather can produce heavy rainfall over a short period of time, leading to flash floods and riverine flooding. This can result in soil erosion, damage to aquatic habitats, and the displacement of aquatic organisms.

Large hailstones often associated with tornadoes can damage crops, vegetation, and natural habitats. Hail can strip leaves from trees and plants, reducing their ability to photosynthesize and grow. It can also damage wildlife habitats. Strong winds associated with tornadoes can uproot trees, damage forests, and disrupt animal habitats. They can also scatter debris and cause structural damage to buildings, which can lead to further environmental issues if hazardous materials are released. Downed power lines are a common occurrence during tornadoes and can spark wildfires. These wildfires can have significant ecological impacts, including habitat destruction, loss of wildlife, and changes in the local ecosystem.

Jurisdictional Concerns:
As of this plan there is a deficit of community specific data to help quantify both vulnerability and historic impact. However, over the life of this plan the MPC will work to quantify the local level impacts of hazard occurrences to citizens, vulnerable populations, structures, and infrastructure to better inform both this living LHMP and future planning efforts. The following initial vulnerabilities and potential impacts have been identified on a jurisdictional level:

- **City of London:** With 8.1% of citizens living in poverty, tornadoes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, with a high percentage of the population being elderly and/or identified as having a disability, evacuation and after-event care challenges are a concern. Limited emergency response capabilities and medical facilities are also a major jurisdictional concern. Many buildings, particularly older homes, barns, and manufactured housing may not be constructed to resist tornado-force winds. In the aftermath of a tornado, debris clearance, utility restoration, and damage and debris management will likely require external assistance. Disruptions to the local economy will be expected to impact municipal revenue.
- **Village of Midway:** With 5.6% of citizens living in poverty, tornadoes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, with a high percentage of the population being elderly and/or identified as having a disability, evacuation and after-event care challenges are a concern. Limited emergency response capabilities and medical facilities are also a major jurisdictional concern. Many buildings, particularly older homes, barns, and manufactured housing may not be constructed to resist tornado-force winds. In the aftermath of a tornado, debris clearance, utility restoration, and damage and debris management will likely require external assistance. Disruptions to the local economy will be expected to impact municipal revenue.
- **Village of Mt. Sterling:** With 5.3% of citizens living in poverty, tornadoes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, with a high percentage of the population being elderly and/or identified as having a disability, evacuation and after-event care challenges are a concern. Limited emergency response capabilities and medical facilities are also a major jurisdictional concern. Many buildings, particularly older homes, barns, and manufactured housing may not be constructed to resist tornado-force winds. In the aftermath of a tornado, debris clearance, utility restoration, and damage and debris management will likely require external assistance. Disruptions to the local economy will be expected to impact municipal revenue.
- **Village of Plain City:** With 11.0% of citizens living in poverty, tornadoes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek medical attention. Additionally, with a high percentage of the population being elderly and/or identified as having a disability, evacuation and after-event care challenges are a concern. Limited emergency response capabilities and medical facilities are also a major jurisdictional concern. Many buildings, particularly older homes, barns, and manufactured housing may not be constructed to resist tornado-force winds. In the aftermath of a tornado, debris clearance, utility restoration, and damage and debris management will likely require external assistance. Disruptions to the local economy will be expected to impact municipal revenue.
- **Village of South Solon:** With 11.1% of citizens living in poverty, tornadoes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, with a high percentage of the population being elderly and/or identified as having a disability, evacuation and after-event care challenges are a concern. Limited emergency response capabilities and medical facilities are also a major jurisdictional concern. Many buildings, particularly older homes, barns, and manufactured housing may not be constructed to resist tornado-force winds. In the aftermath of a tornado,

debris clearance, utility restoration, and damage and debris management will likely require external assistance. Disruptions to the local economy will be expected to impact municipal revenue.

- **Village of West Jefferson:** With 16.7% of citizens living in poverty, tornadoes are a concern as many citizens may not have adequate insurance coverage to rebuild or repair damaged structures or to seek needed medical attention. Additionally, with a high percentage of the population being elderly and/or identified as having a disability, evacuation and after-event care challenges are a concern. Limited emergency response capabilities and medical facilities are also a major jurisdictional concern. Many buildings, particularly older homes, barns, and manufactured housing may not be constructed to resist tornado-force winds. In the aftermath of a tornado, debris clearance, utility restoration, and damage and debris management will likely require external assistance. Disruptions to the local economy will be expected to impact municipal revenue.
- **Jefferson Local**: Students in transit during a tornado event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **Jonathan Alder Local:** Students in transit during a tornado event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **London City Schools:** Students in transit during a tornado event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.
- **Madison-Plains Local:** Students in transit during a tornado event are identified as being particularly vulnerable. Additionally, the age of many district structures is a concern due to potential structural impacts.

Cascading Impacts

Cascading impacts often result when one hazard event triggers one or more differing hazard events or loss of community lifelines. Cascading impacts associated with severe weather may include:

- Transportation infrastructure disruption
- Power outages and electrical grid disruption
- Communication system disruption
- Transportation and supply chain disruptions
- Economic impacts and business closures
- Emergency services overload

Consequence Analysis

This consequence analysis lists the potential impacts of a hazard on various elements of a community. The impact of each hazard is evaluated in terms of disruption of operations, recovery challenges, and overall wellbeing to all Madison County residents and first responder personnel. The consequence analysis supplements the hazard profile by analyzing specific impacts.

Table 116: Tornado Consequence Analysis

Subject	Potential Impacts
Impact on the Public	High wind speeds can cause destroy homes and turn debris into projectiles, which may cause injury or death. An increased demand for medical treatment for traumatic injuries caused would be anticipated. Significant portions of the population may be displaced and those individuals may not have access to personal documents or medical records.
Impact on Responders	First responders may be injured, resulting in employee absenteeism that impacts the overall capacity to respond. The deposit of debris on major roadways and/or damage to equipment or facilities may increase the response times. Exposed wires, debris, or hazardous materials may cause injury to first responders during search and rescue operations.
Continuity of Operations	Local jurisdictions maintain continuity plans which can be enacted as necessary based on the situation. Tornadoes may impact an agency's ability to maintain operations due to power or communications infrastructure impacts.
Delivery of Services	Delivery of services may be impacted by dangerous conditions or disruption to transportation systems, causing systems to be delayed or halted. Goods may be damaged, destroyed, or carried off by high winds.

Table 116: Tornado Consequence Analysis

Subject	Potential Impacts
Property, Facilities, and Infrastructure	Damages from lower intensity tornadoes can range from chimney damage to uprooted shallow trees. A significant tornado (EF-2) would cause damage to roofs on frame houses, complete destruction of mobile homes and large trees and utility lines snapping. A devastating tornado (EF-4) would result in well-constructed houses being leveled, weak foundations blown away, and cars thrown away. Communications or power infrastructure may be damaged or destroyed.
Impact on Environment	Tornadoes may cause significant damage to the environment by exposing hazardous materials, causing contamination of water or food sources, or uprooting vegetation. Animals may be injured by flying debris or being lifted by the tornado. Agricultural crops may be lost due to contamination or being uprooted.
Economic Conditions	Tornadoes pose a fiscal impact on the local governments, even if some of those costs can be recovered through federal grant reimbursements. Fiscal resources may be drained.
Public Confidence in Governance	The public's confidence in governance is affected by immediate local and state response through direct and effective actions. Efficiency in response and recovery operations is critical in keeping public confidence high.

5.13.7 Future Development

As Madison County expands residential, commercial, and industrial areas, more structures and infrastructure become susceptible to tornado damage. The proliferation of buildings, especially in areas historically prone to tornado activity, increases the potential for property damage and economic loss during such events.

With a growing population, more individuals are at risk during tornado occurrences. Higher population densities can complicate evacuation efforts and strain emergency response resources. Additionally, the presence of vulnerable populations, such as the elderly or those with limited mobility, necessitates tailored preparedness and response strategies.

Many structures in Madison County were built before the implementation of modern building codes designed to withstand severe weather events. These older buildings may not offer adequate protection against tornadoes, increasing the risk of injury and property damage. As development continues, ensuring that new constructions adhere to updated safety standards is crucial

5.13.8 Mitigation Opportunities

The following table presents examples of potential actions that can be instituted for mitigating the extreme heat hazard.

Table 117: Example Tornado Mitigation Actions

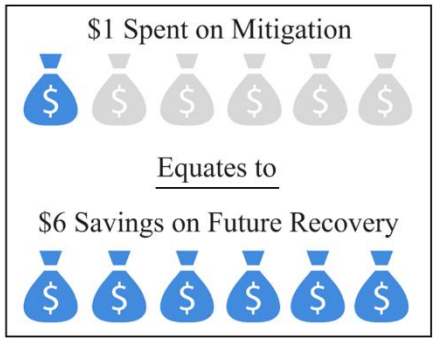
Category	Example Action
Planning and Regulation	Requiring construction of safe rooms in new schools, daycares, and nursing homes.
	Encouraging the construction and use of safe rooms in homes and shelter areas of manufactured home parks, fairgrounds, shopping malls, or other vulnerable public structures.
	Developing a local grant program to assist homeowners to construct a new safe room.
	Require or encourage wind engineering measures and construction techniques.
Infrastructure	Retrofit buildings with load-path connectors to strengthen the structural frames.
	Tie-down all modular homes and facilities.
	Retrofit all exterior windows with shatter resistant film
	Build safe rooms in jurisdictional facilities, including schools and government buildings.
Natural Systems	Properly maintain trees near facilities and power lines.
Education	Conduct tornado drills in schools and public buildings.
	Distribute tornado shelter location information.
	Promote use of National Oceanic and Atmospheric Administration weather radios.
	Educate citizens through media outlets.
	Organize outreach to vulnerable populations, including establishing and promoting accessible shelters in the community.

Section 6 – Mitigation Strategy

6.1 Introduction

As part of this planning effort, Madison County worked to minimize the risk of future impacts from identified hazards to all citizens of the region. In an attempt to shape future regulations, ordinances and policy decisions the MPC reviewed, revised, and developed a comprehensive hazard mitigation strategy. This comprehensive strategy includes:

- Goals to guide the selection of activities to mitigate and reduce potential loss.
- A discussion of funding capabilities for hazard mitigation projects.
- Identification, evaluation, and prioritization of mitigation actions along with potential funding sources.



Madison County's mitigation strategy promotes long-term hazard resilience that will have a positive impact on quality-of-life issues. By minimizing both the exposure to, and potential impacts from, identified hazards jurisdictions can expect to minimize injuries and loss of life, reduce property damage, and minimize the day-to-day social and economic disruptions that follow hazard events.

According to an analysis by the National Institute of Building Sciences, natural hazard mitigation saves $6 on average for every $1 spent on federal mitigation grants.

6.2 Mitigation Goals

Madison County, participating jurisdictions, and all stakeholders reviewed the previous LHMP's goals and objectives to determine if they remained viable and valid. During this process, and after a thorough review and discussion with all stakeholders, it was determined that the priorities of the Madison County in relation to hazard mitigation planning have not changed during the five years of the previous planning cycle. Additionally, and based on discussion with all stakeholders, it was determined that the goals and objectives identified in the previous LHMP remained viable and valid. The following represent the identified goals for the 2024 LHMP:

- **Goal 1:** Reduce the risk to the people and property from the identified hazards in this plan.
- **Goal 2:** Work to protect all vulnerable populations, structures, and critical facilities from the impacts of the identified hazards.
- **Goal 3:** Improve public outreach initiatives to include education, awareness, and partnerships with all entities in order to enhance the understanding identified hazards and hazard mitigation opportunities.
- **Goal 4:** Enhance communication and coordination among all agencies and between agencies and the public.

Participants in the LHMP will continuously evaluate these identified goals and objectives against current capabilities and conditions. As part of this process, and where possible, data and feedback from plan stakeholders will be collected and analyzed to help identify gaps, roadblocks, and achievements. Using this information, strategies will be developed to bridge identified gaps, remove identified roadblocks, and celebrate identified successes in achieving the goals of this LHMP. Additionally, when necessary, goals and objectives will be modified, updated, or expanded based on the review process.

6.3 Review and Creation of Hazard Mitigation Actions

Hazard mitigation actions are proactive measures taken to reduce or eliminate the long-term risk and impact of natural and human-made hazards. These actions are designed to minimize the damage caused by disasters and contribute to the overall resilience of communities and infrastructure.

For this plan update members of the MPC were provided with a complete list of previously identified mitigation actions and asked to review them to determine their status. Previously identified mitigation status was reported using the following definitions:

- **Completed:** The action has been fully completed.

- **Carried Over:** The action was not started.
- **Revised:** Action has been revised to reflect current planning environment or identified changes.
- **Cancelled:** The action has been removed from consideration due to either a lack of resources or changing mitigation priorities.
- **Ongoing:** The action is completed and has become an ongoing activity or capability.

Additionally, MPC members and stakeholders were provided with opportunities to identify and incorporate newly identified actions based on the changing hazard environment or previously unidentified needs. When considering new mitigation actions, participating jurisdictions were guided to the January 2013 FEMA publication Mitigation Ideas, A Resource for Reducing Risk to Natural Hazards. This document offers a comprehensive collection of strategies and best practices for reducing risks associated with natural hazards. It covers various types of natural hazards, and provides practical ideas for communities, local governments, and individuals to implement.

In preparing a mitigation strategy all reasonable and obtainable mitigation actions were considered to help achieve the general goals. Priorities were developed based on past damage, existing exposure to risk, and weaknesses identified by the State and local capability assessments. In identifying mitigation actions, the following activities were considered:

- The use of applicable building construction standards.
- Hazard avoidance through appropriate land-use practices.
- Relocation, retrofitting, or removal of structures at risk.
- Removal or elimination of the hazard.
- Reduction or limitation of the amount or size of the hazard.
- Segregation of the hazard from that which is to be protected.
- Modification of the basic characteristics of the hazard.
- Control of the rate of release of the hazard.
- Provision of protective systems or equipment for both cyber and physical risks.
- Establishment of hazard warning and communication procedures.
- Redundancy or duplication of essential personnel, critical systems, equipment, and information materials.

In general, all identified mitigation actions were classified under one of the following broad categories:

- **Local plans and regulations:** Actions that create or update plans to reflect situational changes and/or actions that aid in the creation, revision, or adoption of regulations related to hazard mitigation and management.
- **Infrastructure:** Actions that facilitate the modification of existing buildings or structures or involve the construction of structures to reduce the impact of hazard.
- **Natural system protection:** Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- **Public education and awareness:** Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them.

6.4 Prioritization of Mitigation Actions

The MPC and subject matter experts worked together to prioritize both previously identified and newly identified hazard mitigation actions. The methodology used to determine mitigation action priorities was based upon the following:

- Review of the updated risk assessments.
- Review of revised goals and objectives.
- Review of capabilities.

A multi-pronged and flexible analysis method was used for determining and prioritizing mitigation actions. An initial review of previously identified but not completed actions was conducted to ensure that, based on current condition and capabilities, the actions were still viable. Actions that were considered viable were retained in this plan update, with minor revisions completed as necessary.

For identified actions that were retained, and for newly identified actions, the FEMA recommended Social, Technical, Administrative, Political, Legal, Economic, and Environmental (STAPLEE) criteria were used to assist with prioritization. The following table details the STAPLEE criteria:

Table 118: STAPLEE Review Criteria

Criteria	Discussion	Example Considerations
Social	There should be community acceptance and support for the mitigation action?	Does the action have community acceptance? Will the proposed action adversely affect one segment of the population?
Technical	The proposed mitigation action should be technically feasible and should provide a long-term reduction in losses.	How effective is the action in avoiding or reducing future losses? Does it solve a problem or only a symptom? Does the action create additional problems?
Administrative	Personnel and administrative capabilities should be available to administer all phases of the project.	Are the staffing and administrative capabilities to implement the action in place? Is there someone to coordinate and lead the effort?
Political	Political support for the mitigation action needs to be present.	Is the action politically acceptable? Have political leaders been involved in the planning process? Is there a political champion to help see the project to completion?
Legal	The legal authority to implement the actions need to be in place or possible with the passing of laws or regulations.	Does the legal authority to implement the proposed action exist? Are there potential legal repercussions?
Economic	The current budget (and/or general obligation bonds or other instruments) need to be in place to fully fund the mitigation action.	Do the potential benefits of this action exceed the potential costs? Has funding been secured for the proposed action? What are the potential funding sources (public, non-profit, and private)? How will this action affect the fiscal capability of the community(s)? Does the action contribute to other community goals, such as capital improvements or economic development?
Environmental	Actions should interface with the need for sustainable and environmentally healthy communities. Also, statutory considerations, such as the National Environmental Policy Act need to considered for federal funds.	How will the action affect the environment? Will the action need environmental regulatory approvals? Will it meet federal, state, and local state regulatory requirements? Are endangered or threatened species likely to be affected?

Based on the prioritization review, the MPC assigned each action the following prioritized ranking:

- **High Priority:** Actions that provide substantial progress towards improving resiliency and are determined as potentially urgent in nature by the MPC. This would include actions that strongly support the reduction of high hazard risks and meet mitigation goals. Additionally, actions in this ranking may have imminent funding availability or strong community support.
- **Medium Priority:** Actions that provide reasonable progress towards improving resiliency and are determined as moderately urgent in nature by the MPC. This would include actions that would lessen impact hazard events, but not eliminate the impact completely.

- **Low Priority:** Actions that provide incremental progress towards improving resiliency and are determined as slightly urgent in nature by the MPC. This would include actions that are generally the responsibility of the local community, actions outside the normal authority of the State, or actions whose cost/benefit analysis returns a low yield.

6.5 Mitigation Action Funding Sources

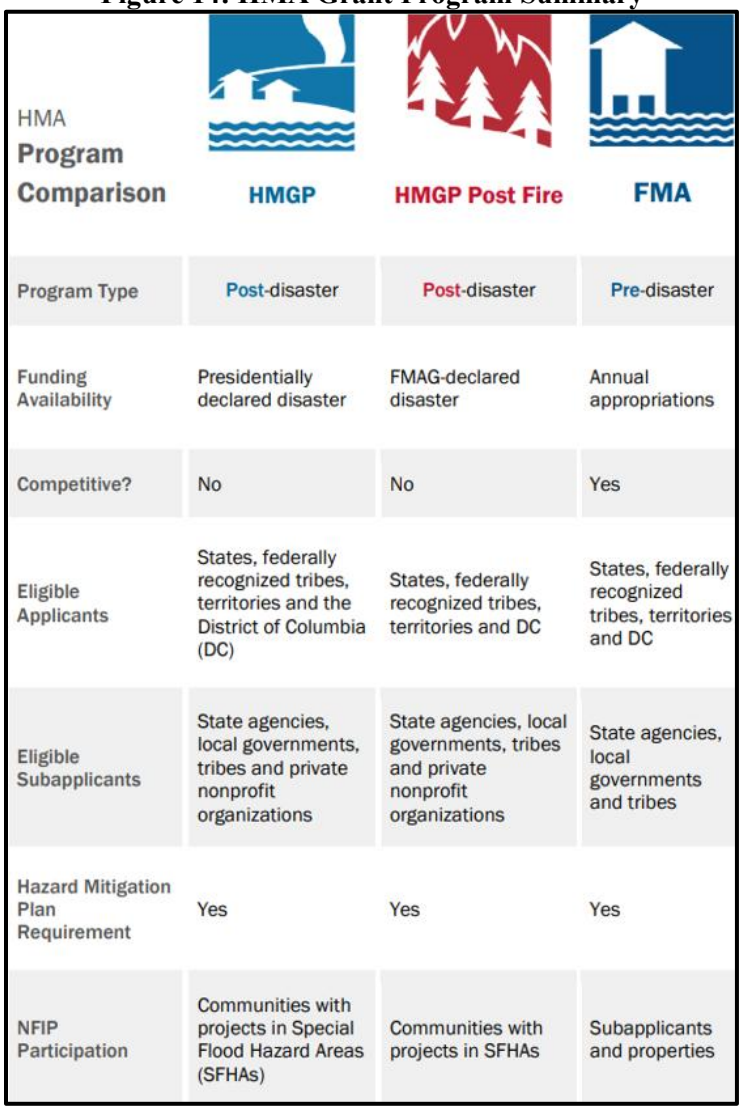
It is generally recognized that mitigation actions help realize long term savings by preventing future losses due to hazard events. However, many mitigation actions are beyond the budgetary capabilities of a single jurisdiction. This section provides a general description of some of the avenues available to defray the cost of implementing mitigation actions.

FEMA provides financial assistance to state, local, tribal, and territorial governments, as well as certain private non-profit organizations, to implement projects that help reduce the risk and impact of future disasters. These grant programs are designed to support initiatives aimed at mitigating hazards and improving resilience. The main grant program offered by FEMA for hazard mitigation is the Hazard Mitigation Assistance (HMA) program. The HMA program includes four subprograms, the Hazard Mitigation Grant Program (HMGP), the HMGP Post-Fire, and the Flood Mitigation Assistance (FMA) grant program. Applicants to these grant programs are required to submit project proposals that demonstrate the effectiveness of their proposed mitigation projects. The eligibility criteria, application process, and specific requirements for each program are outlined by FEMA in their guidelines and announcements, which are typically published on FEMA's website.
The following provides a general overview of major grant funding streams:

- **HMGP and HMGP Fire:** The HMGP grants assist in implementing long-term hazard mitigation measures following Presidential disaster declarations, including fire declarations. Funding is available to implement projects in accordance with State, Tribal, and local priorities.
- **FMA Grant Program:** FMA is a competitive grant program that provides funding to states, local communities, federally recognized tribes and territories. Funds can be used for projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the NFIP. FEMA chooses recipients based on the applicant's ranking of the project and the eligibility and cost-effectiveness of the project. FEMA requires state, local, tribal and territorial governments to develop and adopt hazard mitigation plans as a condition for receiving certain types of non-emergency disaster assistance, including funding for hazard mitigation assistance projects.

The following figure summarizes HMA grants programs:

Figure 14: HMA Grant Program Summary



HMA Program Comparison	HMGP	HMGP Post Fire	FMA
Program Type	Post-disaster	Post-disaster	Pre-disaster
Funding Availability	Presidentially declared disaster	FMAG-declared disaster	Annual appropriations
Competitive?	No	No	Yes
Eligible Applicants	States, federally recognized tribes, territories and the District of Columbia (DC)	States, federally recognized tribes, territories and DC	States, federally recognized tribes, territories and DC
Eligible Subapplicants	State agencies, local governments, tribes and private nonprofit organizations	State agencies, local governments, tribes and private nonprofit organizations	State agencies, local governments and tribes
Hazard Mitigation Plan Requirement	Yes	Yes	Yes
NFIP Participation	Communities with projects in Special Flood Hazard Areas (SFHAs)	Communities with projects in SFHAs	Subapplicants and properties

Additionally, the following provide available grant funding avenues for hazard mitigation projects:

- **Rehabilitation Of High Hazard Potential Dam (HHPD) Grant Program:** HHPD awards provide technical, planning, design and construction assistance in the form of grants for rehabilitation of eligible high hazard potential dams. A state or territory with an enacted dam safety program, the State Administrative Agency, or an equivalent state agency, is eligible for the grant.
- **Emergency Management Performance Grant:** Program provides state, local, tribal and territorial emergency management agencies with the resources required for implementation of the National Preparedness System and works toward the National Preparedness Goal of a secure and resilient nation. Allowable costs support efforts to build and sustain core capabilities across the prevention, protection, mitigation, response and recovery mission areas.
- **State Homeland Security Program:** Program includes a suite of risk-based grants to assist state, local, tribal and territorial efforts in preventing, protecting against, mitigating, responding to and recovering from acts of terrorism and other threats. This grant provides grantees with the resources required for implementation of the National Preparedness System and working toward the National Preparedness Goal of a secure and resilient nation.
- **Public Assistance Program:** The mission of FEMA's Public Assistance program is to provide assistance to State, Tribal and local governments, and certain types of Private Nonprofit organizations so that communities can quickly respond to and recover from major disasters or emergencies declared by the President. Through the Public Assistance program, FEMA provides supplemental Federal disaster grant assistance for debris removal,

emergency protective measures, and the repair, replacement, or restoration of disaster-damaged, publicly owned facilities and the facilities of certain private non-profit organizations. The Public Assistance Program also encourages protection of these damaged facilities from future events by providing assistance for hazard mitigation measures during the recovery process. The Federal share of assistance is not less than 75% of the eligible cost for emergency measures and permanent restoration. The grantee determines how the non-Federal share (up to 25%) is split with the eligible applicants.

- **Individual Assistance Program:** After a disaster, the federal government determines if any county in the state meets the criteria for individual disaster assistance. The decision is based on damage related to the severity and magnitude of the event. When a county receives an Individual Assistance declaration from the President of the United States, anyone who lives in that county can apply for assistance.
- **Small Business Administration Disaster Loans:** The Small Business Administration provides low-interest disaster loans to homeowners, renters, businesses of all sizes, and most private nonprofit organizations. Small Business Administration disaster loans can be used to repair or replace the following items damaged or destroyed in a declared disaster: real estate, personal property, machinery and equipment, and inventory and business assets.
- **The Housing and Urban Development Agency**: Provides flexible grants to help cities, counties, and States recover from Presidentially declared disasters, especially in low-income areas, subject to availability of supplemental appropriations.
- **Community Development Block Grant Program**: This is a flexible program that provides communities with resources to address a wide range of unique community development needs. The program provides annual grants on a formula basis to general units of local government and States.
- **Individual and Households, Other Needs Assistance Program:** This program provides financial assistance to individuals or households who sustain damage or develop serious needs because of a natural or man-made disaster. The funding share is 75% federal funds and 25% state funds. The program provides grants for necessary expenses and serious needs that cannot be provided for by insurance, another federal program, or other source of assistance. The current maximum allowable amount for any one disaster to individuals or families is $25,000. The program gives funds for disaster-related necessary expenses and serious needs, including personal property, transportation, medical and dental, funeral, essential tools, flood insurance, and moving and storage.
- **WUI Grants:** The 10-Year Comprehensive Strategy focuses on assisting people and communities in the WUI to moderate the threat of catastrophic fire through the four broad goals of improving prevention and suppression, reducing hazardous fuels, restoring fire-adapted ecosystems, and promoting community assistance. The WUI Grant may be used to apply for financial assistance towards hazardous fuels and educational projects within the four goals of: improved prevention, reduction of hazardous fuels, restoration of fire-adapted ecosystems and promotion of community assistance.

Small and impoverished communities that receive grants may receive a federal cost share of up to 90% of the total amount approved under the grant award. As defined in 44 CFR 201.2, a small and impoverished community is defined as:

- A community of 3,000 or fewer individuals that is identified by the State as a rural community
- Not a remote area within the corporate boundaries of a larger city
- Economically disadvantaged, by having an average per capita annual income of residents not exceeding 80% of national, per capita income
- The local unemployment rate exceeds by one percentage point or more, the most recently reported, average yearly national unemployment rate
- Any other factors identified in the State Plan in which the community is located

6.6 Previously Identified Jurisdictional Mitigation Actions

Previously identified hazard mitigation actions were reviewed by the relevant jurisdiction to determine the status of each action. The status of these previously identified hazard mitigation actions indicates if the action has been completed, is carried over to this version of the plan, has been revised, or is no longer being considered. Additionally, each action was assigned a new number to conform with the numbering system in this LHMP.

It is important to note that in the previous plan mitigation actions were identified at the county level only (with the exception of one action for the Villages of Miday and South Solon). As such, the actions in this plan have been re-written and reclassified on a wholesale basis to ensure each participating jurisdiction has identified at least one action per identified hazard.

The following tables detail the status of previously identified actions and any modifications considered in this LHMP:

Table 119: Madison County Previous Plan Hazard Mitigation Actions

Previous Number	New Number	Description	Status
1	1	Identify most vulnerable buildings, infrastructure, residents, and critical facilities.	Ongoing.
2	2	Backup power resources.	Carried over, lack of funding. Modified. Added to all jurisdictions.
3	3	Install additional warning systems.	Carried over due to lack of funding. Modified.
4	13	Install additional storm shelters.	Carried over due to lack of funding. Modified. Added to all jurisdictions.
5	10	Evaluate protection of repetitive-flood loss.	Carried over due to lack of funding. Modified.
6	4	Increase awareness of actions to take during emergency.	On-going. Modified.
7	8	Improve flood hazard assessment.	Carried over due to lack of staff. Modified.
8	-	Increase data Collection and improve coordination between CAMA and GIS databases.	Complete.
9	10	Minimize non-addressable structures in floodplain.	Combined with similar action.
10	11	Obtain updated FIRMs and detailed flood studies.	On-going, Madison County and West Jefferson updated in 2023.
11	4	Develop resource manual.	On-going. Combined with similar action.
12	14	Evaluate winter storm planning.	Carried over due to lack of funding. Modified. Added to all jurisdictions.
13	Midway-1 and South Solon-1	Encourage adoption of zoning, land use, and floodplain ordinances in two villages.	Deleted for county. Added to Midway and South Solon.
14	1	Implement countywide special needs study.	On-going. Combined with similar action.

Completed actions may be found in the following section. Carried over actions may be found in 6.8.

6.7 Completed Mitigation Actions

Madison County and all participating jurisdictions remain committed to investigating and obtaining all available grant funding for the completion of hazard mitigation projects. Since the completion of the previous LHMP the following mitigation actions have been completed:

Table 120: Madison County Previous Plan Hazard Mitigation Actions

Previous Action Number	Description	Status
8	Increase data collection and improve coordination between CAMA and GIS databases.	Complete

Neither Madison County nor any participating jurisdictions have received any FEMA Hazard Mitigation Grant funding (HMGP, Building Resilient Infrastructure and Communities, PDM, FMAG) as of this plan.

6.8 Jurisdictional Mitigation Actions

To support the mitigation goals identified in this LHMP, Madison County and all participating jurisdictions identified a comprehensive range mitigation projects and activities. The selected set carefully takes an all-hazards approach to

mitigation while simultaneously addressing each of the plan's profiled hazards. The list of mitigation actions is based upon the potential to reduce risk to life and property with an emphasis on ease of implementation, community and agency support, consistency with local jurisdictions' plans and capabilities, available funding, and jurisdictional vulnerability.

The strategy for development and revision of hazard mitigation actions in this LHMP allows a more tailored approach to mitigation planning, ensuring that communities address the hazards most relevant to their circumstances while also acknowledging that not all hazards may be equally significant across different areas. It promotes a more efficient use of resources by focusing efforts on mitigating the most pressing risks faced by each community.

For each identified action, the following applies:

- New actions that have been added to this plan update are identified as such.
- Some actions have been reassigned or reclassified. In these cases, not all information is provided under the original listing, rather the newly assigned responsible entity has been given the opportunity to detail the requested information.
- All mitigation action information was provided by jurisdiction officials through outreach from the MPC.

The following table provides a mitigation action cross check for each participating jurisdiction.

Table 121: Participating Jurisdiction Mitigation Action Cross Check

Jurisdiction	All Hazards	Drought	Extreme Heat	Flood	Severe Weather	Severe Winter Weather	Tornado
Madison County	1-4	5,6	7	8-11	12,13	7, 14	12,13
City of London	-	1	2,3,4	5-8	4,9,10,11,12	2,3,4,13,14	4,10,11,12
Village of Midway	1	2	3,4	5,6	4,7,8	3,4,9	4,7,8
Village of Mt. Sterling	-	1	2,3	4,5	3,6,7	2,3,8	3,6,7
Village of Plain City	-	1	2,3	4,5,6	3,7,8	2,3,9	3,7,8
Village of South Solon	1	2	3,4	5,6	4,7,8	3,4,9	4,7,8
Village of West Jefferson	-	1	2,3,4	5-8	4,9,10,11,12	2,3,4,13,14	4,10,11,12
Jefferson Local	1	2	3	4	5,6	3	5,6
Jonathan Alder Local	1,2	3	4	5	6,7	4	6,7
London City Schools	1,2	3	4	5	6,7	4	6,7
Madison-Plains Local	1,2	3	4	5	6,7	4	6,7

The following tables identify mitigation action items for each participating jurisdiction, along with the following information:

- Hazard addressed
- Responsible party
- Overall priority
- Goal(s) addressed
- Estimated cost
- Potential funding source
- Proposed completion timeframe
- Current status

It is important to note that when assigning a responsible party for these actions some participating jurisdictions have limited staff and departments. As such, the overall assignment has been given to the highest-ranking employee or overarching department.

Table 122: Madison County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Madison County 1	Using GIS, identify the most vulnerable buildings, infrastructure, residents and critical facilities.	All hazards	Emergency Manager, GIS Director	High	1,2,3,4	Staff time	General fund	Continuous	On-going
Madison County 2	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Emergency Manager, Facilities Director	High	1, 3	$10,000 to $50,000 per location	HMGP, General fund	Ten years	Carried over due to lack of funding
Madison County 3	Upgrade and expand warning siren network throughout the county, especially in currently underserved areas.	All hazards	Emergency Manager	High	1, 2	Site and size dependent	HMGP, General fund	Ten years	Carried over due to lack of funding
Madison County 4	Conduct regular hazard mitigation information programs for all citizens.	All hazards	Emergency Manager	High	1, 2	Staff time	General fund	Continuous	On-going
Madison County 5	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Facilities Director	Low	1, 2	$5,000 - $50,000 per location	HMGP, General Fund	Five years	New
Madison County 6	Complete education campaign for citizens on the benefits of replacing water intensive landscaping with natural, low water plantings	Drought	Emergency Managers	Low	1,2,3	Volunteers and staff time	General fund	Five years	New
Madison County 7	Identify and prepare county building for usage as heat/cold shelters.	Extreme Heat, Severe Winter Weather	Facilities Director	Low	1, 2	$2,000 per facility	General fund	Continuous	On-going
Madison County 8	Improve county-wide assessment of known and yet to be identified frequent flood areas.	Flood	Emergency Manager	High	1, 2,3,4	Staff time	General fund	Three years	Carried over, lack of staff
Madison County 9	Enter CRS Program.	Flood	NFIP Administrator	High	1,2,3	Staff time	General Fund	Three years	New

Table 122: Madison County Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Madison County 10	Develop a program to acquire and preserve parcels of land subject to repetitive flooding from willing property owners.	Flood	NFIP Administrator	Medium	1, 2,3	Staff time, acquisition cost property dependent	HMGP, General fund	Ten years	Carried over due to lack of funding
Madison County 11	Continued to work with FEMA to update all FIRMs for Madison County.	Flood	NFIP Administrator	Medium	1,2,3,4	Staff time	General fund	Five years	On-going, Madison County and West Jefferson updated in 2023.
Madison County 12	Purchase protective window film for all county facilities to reduce the risk of airborne debris injuries.	Severe Weather, Tornado	Emergency Manager	Low	1,2	Facility size dependent	HMGP, General fund	Five years	New
Madison County 13	Construct community safe rooms throughout the county to required building standards	Severe Weather, Tornado	Emergency Manager	Medium	1, 2	$1,000,000 per facility	HMGP, General fund	Ten years	Carried over due to lack of funding
Madison County 14	Update planning and education program for citizens, including driving in winter storms and handling winter-related health effects.	Severe Winter Weather	Emergency Manager	Medium	3	Staff time	General fund	Three years	Carried over, lack of staff
Madison County 15	Continued monitoring hazard to determine if it warrants inclusion in LHMP.	Wildfire	Fire Chief, Emergency Manager	Medium	1,2,3	Staff time	General fund	On-going	New

Table 123: City of London Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
City of London-1	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Facilities Director	Low	1, 2	$5,000 - $50,000 per location	HMGP, General Fund	Five years	New
City of London-2	Develop an inventory of public buildings that may be used for temperature shelters.	Extreme Heat, Severe Winter Weather	Facilities Director	Medium	1, 2, 3, 4	Staff time	General fund	Three years	New
City of London-3	Develop an outreach program about outdoor recreation personal high and low temperature mitigation activities.	Extreme Heat, Severe Winter Weather	Parks Director	Low	1, 2	Staff time	General fund	Three years	New
City of London-4	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	Extreme Heat, Severe Weather, Severe Winter Weather, Tornado	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, General fund	Five years	New
City of London-5	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.	Flood	Building Department Director	High	1, 2, 3	Staff time	General Fund	Two years	New
City of London-6	Limit the percentage of allowable impervious surface within developed parcels.	Flood	Mayor	Medium	1, 2	Staff time	General fund	Three years	New
City of London-7	Construct rainwater retention/detention ponds at strategic locations.	Flood	Street Department Director	Medium	1, 2	Project dependent	General Fund, FMA, HMGP	Ten years	New
City of London-8	Meet requirements and join the CRS program.	Flood	NFIP Administrator	Low	1, 2	Staff time	General fund	Three years	New
City of London-9	Establish standards for all utilities regarding tree pruning around lines.	Severe Weather	Building Department Director	Low	1, 2	Staff time	General Fund	Five years	New
City of London-10	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, General fund	Ten years	New

Table 123: City of London Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
City of London-11	Purchase protective window film for all jurisdictional facilities	Severe Weather, Tornado	Facilities Director	Low	1,2	Facility size dependent	HMGP, General fund	Five years	New
City of London-12	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Facilities Director	Medium	1, 2	Project dependent	General Fund, HMGP	Five years	New
City of London-13	Protect traffic lights and other traffic controls from ice.	Severe Winter Weather	Street Department Director	Low	3	Location dependent	HMGP, General fund	Five years	New
City of London-14	Provide education classes for the public on winter driving.	Severe Winter Weather	Mayor	Low	3	Staff time	General fund	One year	New

Table 124: Village of Midway Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Village of Midway-1	Encourage adoption of zoning, land use, and floodplain ordinances.	All hazards	Mayor	High	1, 2, 3, 4	Staff time	General Fund	Five years	Carried over, lack of staff
Village of Midway-2	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Mayor	Low	1, 2	$5,000 per location	HMGP, General Fund	Five years	New
Village of Midway-3	Develop an inventory of regional public buildings that may be used for temperature shelters.	Extreme Heat, Severe Winter Weather	Mayor	Medium	1, 2, 3, 4	Staff time	General fund	Three years	New
Village of Midway-4	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	Extreme Heat, Severe Weather, Severe Winter Weather, Tornado	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, General fund	Five years	New
Village of Midway-5	Join the NFIP.	Flood	Mayor	High	1, 2, 3	Staff time	General Fund	Two years	New
Village of Midway-6	Construct rainwater retention/detention ponds at strategic locations.	Flood	Mayor	Medium	1, 2	Project dependent	General Fund, FMA, HMGP	Ten years	New
Village of Midway-7	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, General fund	Ten years	New
Village of Midway-8	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Mayor	Medium	1, 2	Project dependent	General Fund, HMGP	Five years	New
Village of Midway-9	Provide education classes for the public on winter driving.	Severe Winter Weather	Mayor	Low	3	Staff time	General fund	One year	New

Table 125: Village of Mt. Sterling Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Village of Mt. Sterling-1	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Mayor	Low	1, 2	$5,000 per location	HMGP, General Fund	Five years	New
Village of Mt. Sterling-2	Develop an inventory of regional public buildings that may be used for temperature shelters.	Extreme Heat, Severe Winter Weather	Mayor	Medium	1, 2, 3, 4	Staff time	General fund	Three years	New
Village of Mt. Sterling-3	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	Extreme Heat, Severe Weather, Severe Winter Weather, Tornado	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, General fund	Five years	New
Village of Mt. Sterling-4	Join the NFIP.	Flood	Mayor	High	1, 2, 3	Staff time	General Fund	Two years	New
Village of Mt. Sterling-5	Construct rainwater retention/detention ponds at strategic locations.	Flood	Mayor	Medium	1, 2	Project dependent	General Fund, FMA, HMGP	Ten years	New
Village of Mt. Sterling-6	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, General fund	Ten years	New
Village of Mt. Sterling-7	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Mayor	Medium	1, 2	Project dependent	General Fund, HMGP	Five years	New
Village of Mt. Sterling-8	Provide education classes for the public on winter driving.	Severe Winter Weather	Mayor	Low	3	Staff time	General fund	One year	New

Table 126: Village of Plain City Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Village of Plain City-1	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Facilities Director	Low	1, 2	$5,000 - $50,000 per location	HMGP, General Fund	Five years	New
Village of Plain City-2	Develop an inventory of public buildings that may be used for temperature shelters.	Extreme Heat, Severe Winter Weather	Facilities Director	Medium	1, 2, 3, 4	Staff time	General fund	Three years	New
Village of Plain City-3	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	Extreme Heat, Severe Weather, Severe Winter Weather, Tornado	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, General fund	Five years	New
Village of Plain City-4	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.	Flood	Building Department Director	High	1, 2, 3	Staff time	General Fund	Two years	New
Village of Plain City-5	Construct rainwater retention/detention ponds at strategic locations.	Flood	Street Department Director	Medium	1, 2	Project dependent	General Fund, FMA, HMGP	Ten years	New
Village of Plain City-6	Meet requirements and join the CRS program.	Flood	NFIP Administrator	Low	1, 2	Staff time	General fund	Three years	New
Village of Plain City-7	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, General fund	Ten years	New
Village of Plain City-8	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Facilities Director	Medium	1, 2	Project dependent	General Fund, HMGP	Five years	New
Village of Plain City-9	Provide education classes for the public on winter driving.	Severe Winter Weather	Mayor	Low	3	Staff time	General fund	One year	New

Table 127: Village of South Solon Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Village of South Solon-1	Encourage adoption of zoning, land use, and floodplain ordinances.	All hazards	Mayor	High	1, 2, 3, 4	Staff time	General Fund	Five years	Carried over, lack of political support
Village of South Solon-2	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Mayor	Low	1, 2	$5,000 per location	HMGP, General Fund	Five years	New
Village of South Solon-3	Develop an inventory of regional public buildings that may be used for temperature shelters.	Extreme Heat	Mayor	Medium	1, 2, 3, 4	Staff time	General fund	Three years	New
Village of South Solon-4	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	Extreme Heat, Severe Weather, Severe Winter Weather, Tornado	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, General fund	Five years	New
Village of South Solon-5	Join the NFIP.	Flood	Mayor	High	1, 2, 3	Staff time	General Fund	Two years	New
Village of South Solon-6	Construct rainwater retention/detention ponds at strategic locations.	Flood	Mayor	Medium	1, 2	Project dependent	General Fund, FMA, HMGP	Ten years	New
Village of South Solon-7	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, General fund	Ten years	New
Village of South Solon-8	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Mayor	Medium	1, 2	Project dependent	General Fund, HMGP	Five years	New
Village of South Solon-9	Provide education classes for the public on winter driving.	Severe Winter Weather	Mayor	Low	3	Staff time	General fund	One year	New

Table 128: Village of West Jefferson Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Village of West Jefferson-1	Conduct a native, low water planting program for all jurisdictional owned facilities.	Drought	Facilities Director	Low	1, 2	$5,000 - $50,000 per location	HMGP, General Fund	Five years	New
Village of West Jefferson-2	Develop an inventory of public buildings that may be used for temperature shelters.	Extreme Heat, Severe Winter Weather	Facilities Director	Medium	1, 2, 3, 4	Staff time	General fund	Three years	New
Village of West Jefferson-3	Develop an outreach program about outdoor recreation personal high and low temperature mitigation activities.	Extreme Heat, Severe Winter Weather	Parks Director	Medium	1, 2	Staff time	General fund	Three years	New
Village of West Jefferson-4	Purchase and install critical facility backup generators in conjunction with hardening existing electrical systems.	Extreme Heat, Severe Weather, Severe Winter Weather, Tornado	Mayor	High	1, 2	$25,000 - $50,000 per facility	HMGP, General fund	Five years	New
Village of West Jefferson-5	Develop an open space acquisition, reuse, and preservation plan targeting hazard areas.	Flood	Building Department Director	High	1, 2, 3	Staff time	General Fund	Two years	New
Village of West Jefferson-6	Limit the percentage of allowable impervious surface within developed parcels.	Flood	Mayor	Medium	1, 2	Staff time	General fund	Three years	New
Village of West Jefferson-7	Construct rainwater retention/detention ponds at strategic locations.	Flood	Street Department Director	Medium	1, 2	Project dependent	General Fund, FMA, HMGP	Ten years	New
Village of West Jefferson-8	Meet requirements and join the CRS program.	Flood	NFIP Administrator	Low	1, 2	Staff time	General fund	Three years	New
Village of West Jefferson-9	Establish standards for all utilities regarding tree pruning around lines.	Severe Weather	Building Department Director	Low	1, 2	Staff time	General Fund	Five years	New
Village of West Jefferson-10	Construct community saferooms in select jurisdictional buildings.	Severe Weather, Tornado	Mayor	High	1, 2	Facility size dependent	HMGP, General fund	Ten years	New

Table 128: Village of West Jefferson Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Village of West Jefferson-11	Purchase protective window film for all jurisdictional facilities	Severe Weather, Tornado	Facilities Director	Low	1,2	Facility size dependent	HMGP, General fund	Five years	New
Village of West Jefferson-12	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Facilities Director	Medium	1, 2	Project dependent	General Fund, HMGP	Five years	New
Village of West Jefferson-13	Protect traffic lights and other traffic controls from ice.	Severe Winter Weather	Street Department Director	Low	3	Location dependent	HMGP, General fund	Five years	New
Village of West Jefferson-14	Provide education classes for the public on winter driving.	Severe Winter Weather	Mayor	Low	3	Staff time	General fund	One year	New

Table 129: Jefferson Local Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Jefferson Local-1	Conduct hazard mitigation education programs for students.	All hazards	Jefferson Local Superintendent	Medium	1, 2, 3	$2,000	District general fund	As required	On-going
Jefferson Local-2	Install low flow fixtures in all school facilities.	Drought	Jefferson Local Superintendent	Low	1, 2	$3,000 -per location	HMGP, District general fund	Ten years	New
Jefferson Local-3	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Heat, Severe Winter Weather	Jefferson Local Superintendent	Medium	1, 2	$500	District general fund	Five years	On-going
Jefferson Local-4	Construct rainwater gardens adjacent to paved areas.	Flood	Jefferson Local Superintendent	Low	1, 2	Location and size dependent	HMGP, District general fund	As required	New
Jefferson Local-5	Construct safe rooms in all school buildings to required standards.	Severe Weather, Tornado	Jefferson Local Superintendent	High	1, 2	$1,000,000 -per location	HMGP, District general fund	Ten years	New
Jefferson Local-6	Install shatter resistant film on all facility external windows.	Severe Weather, Tornado	Jefferson Local Superintendent	Low	1, 2	Facility size dependent	HMGP, District general fund	Five years	New

Table 130: Jonathan Alder Local Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Jonathan Alder Local-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Jonathan Alder Local Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, District general fund	Five years	Carried over due to lack of funding
Jonathan Alder Local-2	Conduct hazard mitigation education programs for students.	All hazards	Jonathan Alder Local Superintendent	Medium	1, 2, 3	$2,000	District general fund	As required	New
Jonathan Alder Local-3	Conduct a native, low water planting program for all school facilities	Drought	Jonathan Alder Local Superintendent	Low	1, 2	$10,000 -per location	HMGP, District general fund	Ten years	New
Jonathan Alder Local-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Heat, Severe Winter Weather	Jonathan Alder Local Superintendent	Medium	1, 2	$500	District general fund	Five years	New
Jonathan Alder Local-5	Construct rainwater gardens adjacent to paved areas.	Flood	Jonathan Alder Local Superintendent	Low	1, 2	Location and size dependent	HMGP, District general fund	As required	New
Jonathan Alder Local-6	Construct safe rooms in all school buildings to required standards.	Severe Weather, Tornado	Jonathan Alder Local Superintendent	High	1, 2	$1,000,000 -per location	HMGP, District general fund	Ten years	Carried over due to lack of funding
Jonathan Alder Local-7	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Jonathan Alder Local Superintendent	Low	1, 2	Facility size dependent	HMGP, District general fund	Five years	New

Table 131: London City Schools Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
London City Schools-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	London City Schools Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, District general fund	Five years	Carried over due to lack of funding
London City Schools-2	Conduct hazard mitigation education programs for students.	All hazards	London City Schools Superintendent	Medium	1, 2, 3	$2,000	District general fund	As required	New
London City Schools-3	Conduct a native, low water planting program for all school facilities	Drought	London City Schools Superintendent	Low	1, 2	$10,000 -per location	HMGP, District general fund	Ten years	New
London City Schools-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Heat, Severe Winter Weather	London City Schools Superintendent	Medium	1, 2	$500	District general fund	Five years	New
London City Schools-5	Construct rainwater gardens adjacent to paved areas.	Flood	London City Schools Superintendent	Low	1, 2	Location and size dependent	HMGP, District general fund	As required	New
London City Schools-6	Construct safe rooms in all school buildings to required standards.	Severe Weather, Tornado	London City Schools Superintendent	High	1, 2	$1,000,000 -per location	HMGP, District general fund	Ten years	Carried over due to lack of funding
London City Schools-7	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	London City Schools Superintendent	Low	1, 2	Facility size dependent	HMGP, District general fund	Five years	New

Table 132: Madison-Plains Local Hazard Mitigation Actions

Action Identification	Description	Hazard Addressed	Responsible Party	Overall Priority	Goal(s) Addressed	Estimated Cost	Potential Funding Source	Proposed Completion Timeframe	Status
Madison-Plains Local-1	Purchase and install school facility backup generators in conjunction with hardening existing electrical systems.	All hazards	Madison-Plains Local Superintendent	High	1, 2	$10,000 - $50,000 per facility	HMGP, District general fund	Five years	Carried over due to lack of funding
Madison-Plains Local-2	Conduct hazard mitigation education programs for students.	All hazards	Madison-Plains Local Superintendent	Medium	1, 2, 3	$2,000	District general fund	As required	New
Madison-Plains Local-3	Conduct a native, low water planting program for all school facilities	Drought	Madison-Plains Local Superintendent	Low	1, 2	$10,000 -per location	HMGP, District general fund	Ten years	New
Madison-Plains Local-4	Conduct an extreme temperature awareness seminar to educate on risks and mitigation methods.	Extreme Heat, Severe Winter Weather	Madison-Plains Local Superintendent	Medium	1, 2	$500	District general fund	Five years	New
Madison-Plains Local-5	Construct rainwater gardens adjacent to paved areas.	Flood	Madison-Plains Local Superintendent	Low	1, 2	Location and size dependent	HMGP, District general fund	As required	New
Madison-Plains Local-6	Construct safe rooms in all school buildings to required standards.	Severe Weather, Tornado	Madison-Plains Local Superintendent	High	1, 2	$1,000,000 -per location	HMGP, District general fund	Ten years	Carried over due to lack of funding
Madison-Plains Local-7	Install high wind, hail, and fire-resistant roofing on all jurisdictional facilities.	Severe Weather, Tornado	Madison-Plains Local Superintendent	Low	1, 2	Facility size dependent	HMGP, District general fund	Five years	New

Prior to the implementation of any action further feasibility analysis will be performed. Additionally, a Benefit-Cost Analysis that determines the future risk reduction benefits of a hazard mitigation project and compares those benefits to its costs will be conducted as required. Applicants and sub-applicants will use FEMA approved methodologies and tools, such as the Benefit-Cost Analysis Toolkit, to demonstrate the cost-effectiveness of their projects. The result of the analysis is a Benefit-Cost Ratio, and a project is considered cost-effective when the Benefit-Cost Ratio is 1.0 or greater. Depending on the project, either a full Benefit-Cost Analysis will be completed by entering documented values into the FEMA Benefit-Cost Analysis Toolkit, which calculates a benefit-cost ratio or, if the project meets specified criteria, a streamlined Benefit-Cost Analysis may be completed (FEMA's cost-effectiveness requirement is never waived).

Madison County and all participating jurisdictions acknowledge that the adoption and approval of this plan does not obligate the completion of each identified action. Rather, the MPC understands that progress should be shown in mitigation efforts which may include the completion of mitigation actions or other actions or progress in achieving the goals of the LHMP.

6.9 Mitigation Action Implementation and Monitoring

Madison County and each participating jurisdiction is responsible for implementing and managing identified mitigation actions. To foster accountability and increase the likelihood that actions will be implemented, every proposed action is assigned to a specific department or position as a champion. In general:

- The identified champion will be responsible for tracking and reporting on action status.
- The identified champion should provide input on whether the action as implemented is successful in reducing vulnerability, if applicable.
- If the action is unsuccessful in reducing vulnerability, the identified champion will be tasked with identifying deficiencies and additional required actions.

Additionally, each action has been assigned a proposed completion timeframe to determine if the action is being implemented according to plan.

MCEMA is responsible for monitoring the progress of mitigation activities and projects throughout the county in conjunction with the participating stakeholder communities. To facilitate the tracking of any awarded hazard mitigation grants, the MCEMA will compile a list of projects funded throughout the calendar year, if any, and add it to an electronic database. Additionally, MCEMA will monitor information on any other mitigation projects that were not funded through hazard mitigation grants. MCEMA will utilize the Ohio EMA tracking system, an automated system that provides a streamlined and efficient way to apply for and manage grant funding.

Providing grant oversight, Ohio EMA will continuously monitor the grant process to ensure compliance with federal and state regulations and requirements. Monitoring focuses on providing technical assistance and guidance to validate or improve administrative and fiscal efficiencies in managing award funds. As part of the monitoring process, Ohio EMA will provide as needed compliance assessment to review all related transactions and processes to verify that Grant Subaward funds were expended in compliance with federal and state regulations and the terms and conditions of the Subaward.

During the monitoring process, Ohio EMA may determine that the process is not in compliance with federal and state regulation and requirements. The following are common areas of non-compliance:

- Internal Controls
    - Lack of segregation of duties for smaller nonprofit organizations
    - Inadequate policies for victim petty cash/financial assistance
    - Single audit findings, audit reports submitted late, lack of required audits
    - Inadequate monitoring of second tier subrecipients
- Financial Management
    - Improper/inadequate tracking and recording of Subaward costs
    - Costs not allocated properly and/or Inadequate cost allocation plan

    - Overcharging of office facility rent or indirect costs
    - Inadequate/unsupported/unallowable required match
    - Match not recorded or not identified in accounting records as match
    - Match not claimed on reimbursement request as occurred
    - Reimbursement requests not submitted timely
- Personnel
    - Functional timesheets not used for Subaward Personnel costs
    - Fringe benefit costs claimed in incorrect cost category
    - Unsupported/unallowable Personnel costs
    - Unsupported volunteer in-kind match claimed on reimbursement request
- Operating
    - Unsupported/unallowable operating cost items
    - Lack of proof of payment of cost item(s)
    - Cost claimed on reimbursement request prior to expending money
- Equipment
    - Equipment inventory records missing required information
    - Disposal data and information missing from records
    - Physical equipment inventory/record reconciliation not performed
    - Missing or unidentifiable equipment (onsite equipment inspections)
- Procurements/Contracts
    - Lack of written procurement procedures
    - Lack of written code of conduct covering conflicts of interest in procurements
    - Improper procurement
    - Non-competitive procurement not justified/approved
    - Procurement documentation not maintained
    - Suspension/debarment not checked prior to awarding contract
    - Competition requirements not met (quotes, bids, proposals)
    - No cost/price analysis
    - Lack of negotiating profit/discount when required
    - Contracts/purchase orders do not contain all required provisions

Should any areas be determined as non-complaint, a Corrective Action Plan may be required to address any identified issues, with the plan needing to be completed and implemented in a specific time frame.

Upon completion of a project, a member of the awarded jurisdiction, a member of the Madison County MPC, and an Ohio EMA representative will conduct a closeout site visit to:

- Review all files and documents
- Review all procurement files and contracts to third parties
- Take photos of the completed project

Project closeout packages will generally be submitted 90 days after a project has been completed, and will include the following:

- Summary of documentation
- Pictures of completed project
- Materials, labor, and equipment forms, if required
- Close-out certification

Section 7 – Plan Maintenance

7.1 Introduction

The LHMP is a living document that will be updated and submitted to FEMA for approval every five years as required by 44 CRF 201.4. During the five-year cycle, the plan will undergo continuous monitoring and evaluation to ensure that the policies, procedures, priorities, and state environment established in the plan reflect current conditions. Madison County and all participating jurisdictions will utilize the MPC to provide plan updates, revisions, and data collection for future LHMP planning purposes.

7.2 Plan Maintenance Responsibilities

MCEMA serves as the lead coordinating agencies for plan maintenance. Additional assistance in the plan maintenance process is provided by members of the MPC, subject matter experts, and representatives of local jurisdictions.

MCEMA will facilitate the review and revision of the LHMP every five years, with each participating jurisdiction managing the revision of their specific jurisdictional annex. The review and revision will be an ongoing process. This process will incorporate all of the revisions made during the life of the plan, especially newly obtained data on hazard occurrence or identified vulnerability.

7.3 Plan Review Meetings

The MPC will meet annually for the first two years after plan approval. MPC members will determine the meeting dates and locations and will ensure that the meetings are open to all interested parties. The Madison County Emergency Manager will be the main point of contact for these meetings and will maintain attendance and meeting minutes.

The purpose of these meetings is to discuss capability changes, the status of proposed projects, and any new studies or mapping that may inform the LHMP. Should a specific plan element or section require revision or amendment due to a state or federal legislation or policy change, the MPC will work with Ohio EMA to complete a plan addendum and submit it to FEMA as quickly as is practicable.

During these meetings, and in order to monitor LHMP progress, the following information will be tracked:

- How the actions from the mitigation strategy are being pursued and completed
    - Are actions being prioritized
- How the plan goals and objectives are being carried out
- How mitigation funding mechanisms are being utilized
- How is technical assistance being received

Additionally, the MPC will monitor the following elements to ensure the LHMP is current and correct:

- Reviewing the hazards and determining if any of them have changed
- Determining if there are new hazards that pose a risk to the state
- Ensuring goals and objectives are still relevant
- Determining if any actions have been completed or are deemed irrelevant
- Determining if new actions should be added
- Determining if capabilities have changed

After each meeting, the MPC will compile a meeting report for usage in future plan revisions.

In addition to these meetings, MPC members will monitor and evaluate the progress of mitigation projects via quarterly reports, site visits, correspondence, and reimbursements. Completed projects will be evaluated for loss avoidance and alignment with local development plans.

Ohio EMA may request a non-scheduled report on the monitoring, evaluation, or updating of any portion of the LHMP due to irregular progress on mitigation actions and or projects, in the aftermath of a hazard event, or for any reason deemed appropriate.

7.4 Plan Monitoring and Situational Change

Plan monitoring can be defined as the ongoing process by which stakeholders obtain regular feedback on the progress being made towards achieving their goals and objectives. In the more limited approach, monitoring may focus on tracking projects and the use of the agency's resources. In the broader approach, monitoring also involves tracking strategies and actions being taken by partners and non-partners, and figuring out what new strategies and actions need to be taken to ensure progress towards the most important results.

The MPC will track and record all substantial situational changes and will address, as appropriate, the following questions:

- Is the mitigation project under, over, or on budget?
- Is the mitigation project behind, ahead of, or on schedule?
- Are there any changes in jurisdictional capabilities which impact the plan?
- Are there any changes in jurisdictional hazard risk?
- Has the mitigation action been initiated, or its initiation planned?
- Is the current process of prioritizing mitigation actions and projects appropriate and accurate?
- Has the current method of incorporating mitigation actions and projects yielded a comprehensive action and project strategy to address seen and unforeseen hazards?
- If applicable, has participation in a mitigation action's collaboration been regular?
- Was a negative result caused directly or indirectly by insufficient levels of public outreach?
- If any, what plan updates occurred, why they occurred, and what is their impact?

7.5 Post-Disaster Review

After each Presidential disaster declaration, and in coordination with FEMA and the Ohio EMA, the MPC will convene to document impacts on Madison County and to determine if any mitigation actions should be considered to reduce future risk. This will allow for the development of hazard mitigation recommendations to FEMA during the disaster operation as well as to update the mitigation strategy as needed. The post-disaster review may coincide with established meetings or may be convened as separate events.

7.6 Plan Evaluation

A plan evaluation is a rigorous and independent assessment of either completed or ongoing activities to determine the extent to which they are achieving stated goals and contributing to decision making.

A plan evaluation report, conducted by the MPC, will be completed when the situation dictates. The following situations are typical examples of when an evaluation will be necessary:

- Post hazard event
- Post training exercise
- Post tabletop or drill exercise
- Significant change or completion of a mitigation project
- Significant change or completion of a mitigation action

An evaluation report will ask the following questions in response to the previously listed events.

- Do the mitigation objectives and goals continue to address the current hazards?
- Are there new or previously unforeseen hazards?
- Does a change in hazard vulnerability demand a change of or addition of mitigation actions or projects?
- Does a change in the mitigation strategy demand a change of or addition of mitigation actions or projects?
- Are current resources appropriate for implementing a mitigation project?
- Was the outcome of a mitigation action/project expected?
- Are there implementation problems?

- Was the public engaged to the point where they were satisfied with current engagement strategies?
- Did the public participate in a number that produced a positive yield on the plan, action, or project?
- Are there coordination problems?

7.7 Plan Updates

Typically, the updating of a LHMP is initiated upon the completion of a plan evaluation when the evaluation determines an update is appropriate. A plan update also occurs every five years per FEMA guidelines or at any time it is deemed necessary by MPC.

According to FEMA DMA 2000 guidelines for mitigation planning, Madison County will begin the update process three years from this plan's adoption. An increase in meeting tempo to twice a year will allow MPC to gather relevant information needed for the next plan update. The following meeting schedule indicates the tasks to be performed during this plan update period:

- **2028 Spring Meeting:** The MPC will begin updating the risk assessment portion of the plan. Hazards will be analyzed to determine if they are still relevant, if location should be updated, and if new hazards should be added. Previous occurrences will be reviewed to help determine the probability of future events.
- **2028 Fall Meeting:** The MPC will begin updating the vulnerability assessment. The MPC will update the vulnerability assessment portion of the plan. Data will need to be gathered for assets, critical facilities, building stock values, jurisdictional damages, etc.
- **2029 Spring Meeting:** The MPC will review information received and determine if the goals and objectives are still relevant and if new ones should be added. Actions will be reviewed to determine if they should remain in the plan, have been completed, or are no longer relevant. The MPC will review the potential funding sources for each action.
- **2029 Fall Meeting:** As appropriate, a new MPC for Madison County will be formed to take over the planning process. The new MPC will evaluate the policies, programs, capabilities, and funding sources from the previous plan to determine if they are still accurate and if any new items should be added.
- **2030 Spring Meeting:** The new MPC will review the draft copy of the mitigation plan and make comments and updates if necessary. Formal submittal to FEMA for re-approval will follow.

In general, the following steps will be taken to complete the next LHMP revision:

Table 133: LHMP Update Task List

Task	Action
1	Evaluate and update the planning process.
2	Review the stakeholder contact list and identify new stakeholders.
3	Initiate plan outreach and discussion, including a stakeholder meeting.
4	Consider the addition, removal, or modification of hazards identified in the plan.
5	Update and revise membership of the MPC.
6	Evaluate risk assessment methodologies and data sources.
7	Evaluate and update critical facility inventory information.
8	Evaluate and update the hazard profiles.
9	Evaluate and update the risk assessment summary.
10	Evaluate and update the mitigation strategy, including proposed mitigation actions.
11	Evaluate and update the mitigation implementation system.
12	Integrate new and updated local plans.
13	Evaluate and update other plans sections.
14	Identify and add any additional sections or information needed.
15	Review updated plan in its entirety.
16	Conduct updated plan outreach, including public information, comment period, and meetings.
17	Integrate additional comments received.
18	Finalize plan document.

Table 133: LHMP Update Task List

Task	Action
19	Complete crosswalk and submit final plan to FEMA for review and approval.
20	Make additional modifications as required.
21	Obtain jurisdictional adoption resolutions.

7.8 Continued Public Involvement

Madison County and all participating jurisdictions are dedicated to involving the public in the continual shaping of the LHMP and in the development of its mitigation projects and activities.

The Madison County MPC will continue to keep the public informed about hazard mitigation projects and activities through jurisdictional websites, and as appropriate, public announcements. The public will also be invited to participate in all meetings to review and discuss the mitigation-related events. Additionally, participating jurisdictions will present to public officials in a public forum concerning the progress of mitigation actions identified in this plan as progress is made.

Copies of the Madison County LHMP will be made available to the public. Methods of public availability may include electronically posted on a website or a hard copy kept at a jurisdictional office.

7.9 Plan Amendment

Amending the approved and adopted Madison County LHMP does not necessarily result in the need to re-evaluate the entire plan against all requirements. As the Madison County MPC will consistently review this LHMP, FEMA Region V expects modifications to the risk assessment or adding/removing mitigation actions, especially in preparation for submitting applications to FEMA for assistance and ensuring the project conforms with the mitigation plan. Madison County and all participating jurisdictions are encouraged to keep the State of Ohio and FEMA Region V informed, but these amendments do not need to be reviewed by either. If these changes identify new mitigation actions that might be eligible for FEMA assistance programs, then Madison County and/or the participating jurisdiction will advise FEMA Region V and the State of Ohio. FEMA will acknowledge and note the receipt of the added action(s), where appropriate, but will not need to formally review or approve the action(s).

7.10 Amendment to Include New Jurisdiction

Jurisdictions may be added to this existing and approved LHMP only if the following conditions below met:

- The jurisdiction asking to be included is within the boundaries of Madison County.
- Madison County agrees with adding the requesting jurisdiction(s) to the mitigation plan.
- An analysis of the natural hazards that have the potential to affect the additional jurisdiction must be completed and integrated into any current analysis within the LHMP.
- The new jurisdiction must meet all requirements of 44 CFR § 201.6, including:
    - Review the multi-jurisdictional hazard analysis and determine if any additional hazards that have not been addressed threaten the jurisdiction(s).
    - Document their agreement with the stated mitigation goals
    - Develop a list of proposed mitigation actions
    - Document the involvement of both the general public and the local government in the planning process
    - Submit the annex or appendix, along with the multi-jurisdictional mitigation plan and correspondence of concurrence from Madison County for formal review.
    - Adopt the LHMP.

7.11 Late LHMP Adoption

Any participating jurisdiction that did not adopt the plan within one year of the Approved Pending Adoption date must either:

- Validate that the information in the plan remains current with respect to both the risk assessment and mitigation strategy.

Or:

- Make the necessary updates before submitting the adoption resolution to State of Ohio and FEMA Region V.

This late adoption does not affect the plan expiration date, with the adopted LHMP expiring five years from the date the first adoption was received.

Appendix A – Madison County Adoption Documentation and FEMA Region V Approval Documentation

Appendix B – Community Feedback

Kickoff Survey

What is your name, title (if applicable), and email address?

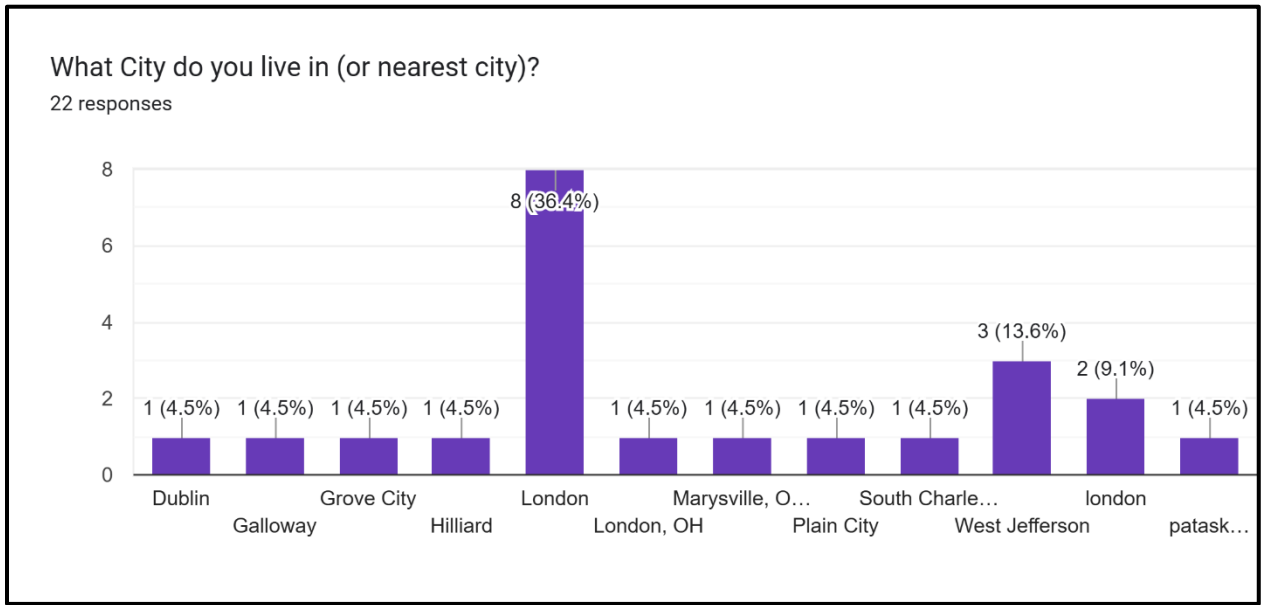
- Jacob Ray
- Sgt. Tharon Prather tprather@plain-city.com
- Glenn A. Nicol, Chief, gnicol@londonohio.gov
- Andrew Bell, FF/ EMT-B
- Chris Snyder, Fire Chief, csnyder@jeffersontwpmadison.org
- Deborah Sims, EMA Director deb.sims_1976@madison.oh.gov
- Corey Jones FF/PM
- Dustin Farrell, Paramedic, docfarrell89@gmail.com
- Alyson Ray Paramedic aly.ray02@gmail.com
- Jennifer Hitt, City of London Law Director, jhitt@londonohio.gov
- firefighter siders sidersdustin@yahoo.com
- Kyla Fryman, Firefighter, frymky03@gmail.com
- Eve Breedlove
- Justin Hicks, EO Coordinator, Madison County Board of DD, justin.hicks@madison.oh.gov
- Lieutenant Casey Conley cconleywestjeffersonohio.gov
- Lieutenant
- Chad Midgley FF chadmidgley292@gmail.com
- Jacqueline Porter
- Amanda Douridas, Agriculture and Natural Resources Extension Educator, douridas.9@osu.edu
- Firefighter Max Smith
- Holly Langham Deputy Director holly.langham@yahoo.com
- John Swaney, Sheriff swaney@madiosnsheriff.org

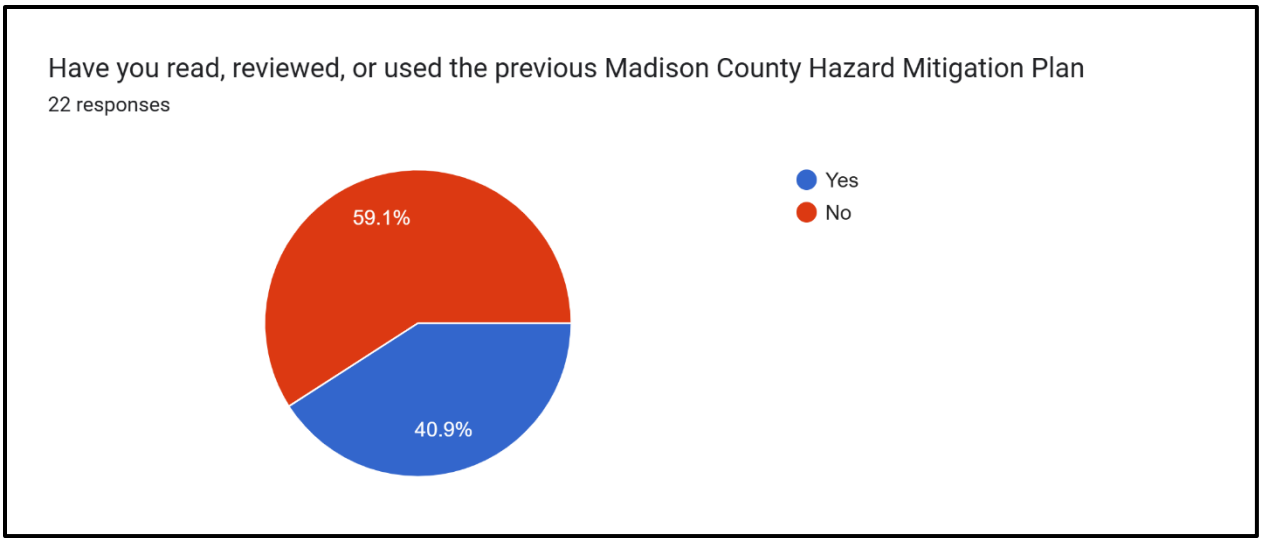
Who are you here representing?

- CTFD
- City of London
- West Jefferson Police Department
- Madison County EMA
- Madison County Board of DD
- Plain City PD
- Madison County Sheriff's Office
- City of London - Police Division
- Madison County Sheriff
- Madison County EMD
- Central Townships Joint Fire District
- MCEMD
- Central Township
- Fire
- OSU Extension, Madison County

How did you hear about this meeting?

- EMA
- Chief
- Chief Bennington
- Email
- Email
- Chief
- Ohio EMA
- Chief/ Supervisor
- Madison Co EMA
- Chief Bennington
- Working on update
- work
- Email from EMA
- Email invitation
- I work here
- Chief





Is there anyone else you know (person, department, agency) that should be included in the planning process? If yes, please provide the contact information.

- No
- n/a
- N/A
- Unknown
- No
- Not that I can think of
- Not currently
- Chief Brandon Smith bsmith@westjeffersonohio.gov
- Madison County Commissioners

Are there any departments or agencies working with underserved or vulnerable (elderly , disabled, those in poverty, etc.) communities that should be included in the planning process? If yes, please provide the contact information.

- No
- n/a
- Unknown
- Unknown
- No
- Can I send this through email?
- FCFC
- Madison County Job and Family Services

Do you have any specific concerns about any hazard that could impact Madison County?

- No
- N/A
- n/a
- Limited manpower and resources
- No
- I do not.
- Not at this time
- Evacuation off farm and temporary housing of livestock in the event of a disaster such as train derailment, fire, or natural disaster N/A

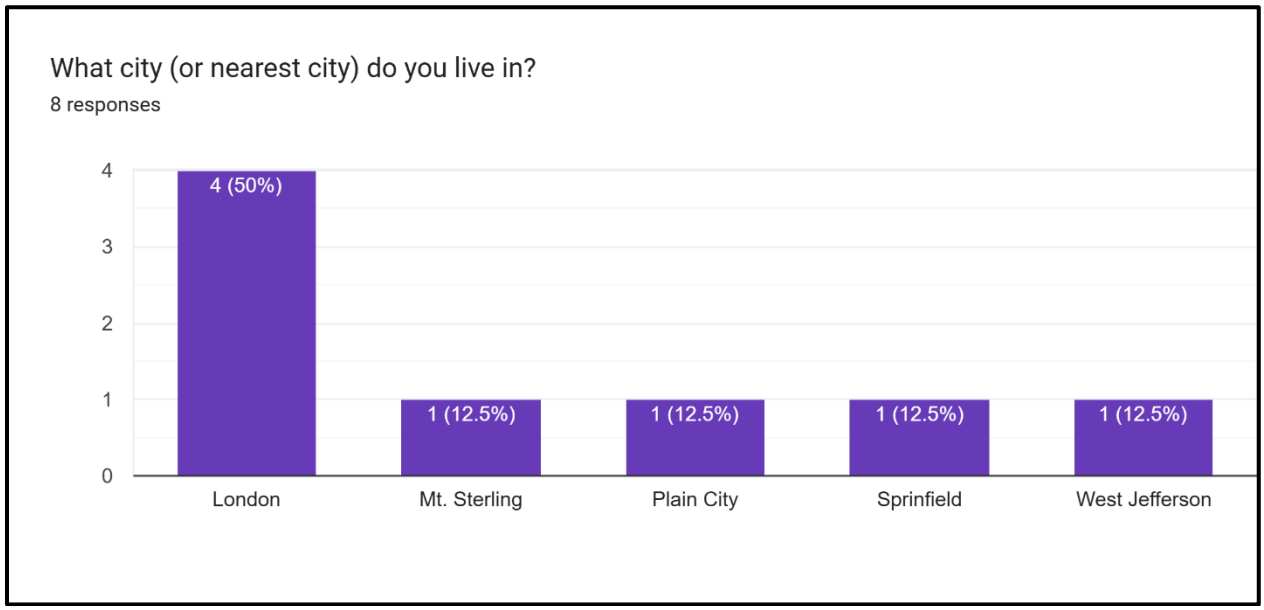
Is there anything else concerning hazard mitigation that you would like us to know?

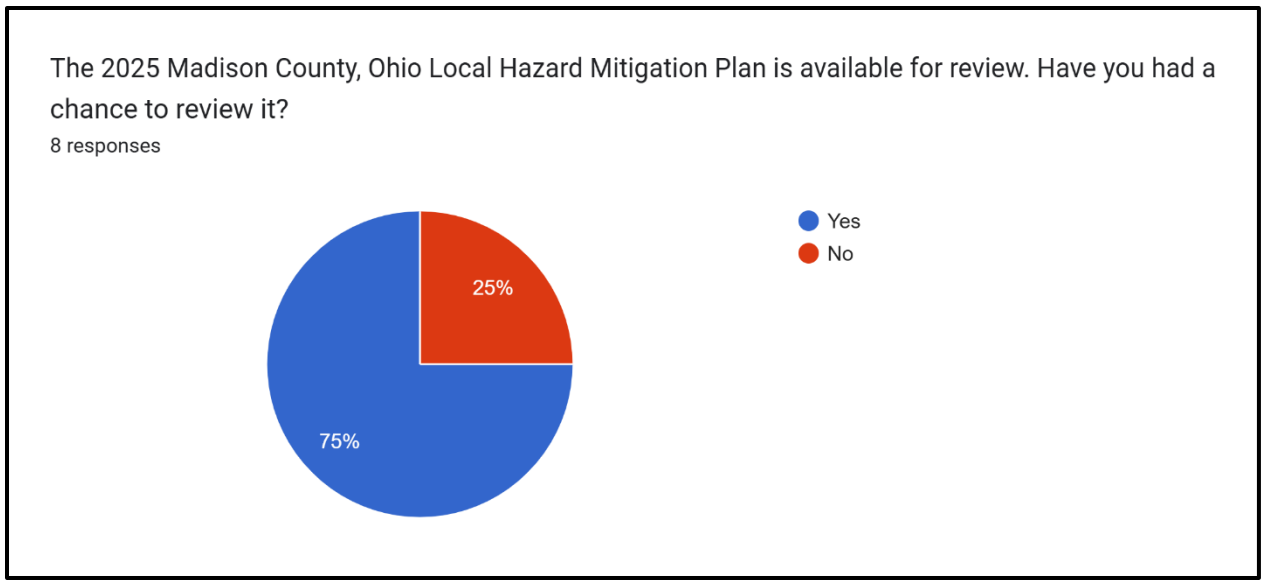
- No
- n/a
- N/A
- Unknown
- No
- No that I can think of.
- Not at this time
- Not at this time

Final Survey

What is your name and title (if applicable)
Matt McCann - 9-1-1 Coordinator

- Steven Dersom
- Erik Scheiderer, EMS & Preparedness Coordinator, Madison Health
- Jacob Keever
- Dave Lohrer
- Bridgett Shoemaker - Fiscal Officer, Oak Run Township
- Bryan Adams- Fire Chief
- Julia Cumming, Program Administrator





Are there any changes or additions you would like to see to the plan?

- No
- I would be happy to review and comment on the plan. The document appears to be 216 pages and I could not quickly find an Executive Summary. Is there a 5 page document or PowerPoint that I could read in say 10 minutes? Otherwise, I am not sure what I should focus on or read in the document.
- I did not see Tri County Fire listed in the report, also did not see anything in the report about railroads and there possible hazards they pose, or any of the farm chemical distributors and the posable hazards they pose.
- It's a lot of stuff about weather. What's the point?
- None

Would you like to be involved in future hazard mitigation meetings or planning sessions? If yes, please let us know how to best contact you.

- Yes email mccann@madisonsheriff.org
- Yes via email.
- Jkeever0402@gmail.com
- Yes text 6148865625
- Sure. Email @ badams@pleasantvalleyfire.com
- Yes, by email

Is there anything else concerning hazard mitigation that you would like us to know?

- No
- These are probably in the plan, but just mentioning in case not. Biggest hazards near me: 1) near a railroad track (what happens if a spill), 2) I'm near woods - what if fire starts there, 3) heavy rain/flooding (what if roads are not drivable) and water ponds/enters our house.
- railroad, chemical distributors
- Are we taking any steps to mitigate weather modification in Madison County? Ie. Rainmaker
- N/A
- The SWCD is a potential partner/resource for educating the general public about using native plants in landscaping to help with drought conditions.

Appendix C – Meeting Sign-In Sheets

Madison County Hazard Mitigation Meeting

Date	February 6th, 2025
Start Time	2:00 PM
Location	20 South Walnut Street, London, Ohio 43140

Name	Title	Representing	Email
Lauren Sweeney	CHE	MCPH	lsweeney@madisonpublichealth.org
John Harper	EM Specialist	Clark County EMA	jwharper@clarkcountyohio.gov
Adam Smith	Parks & Rec	City of London	adsmith48@yahoo.com
Adam Zimmerman	FF	City of London	AZ8490771@gmail.com
Nate Ernst	Operations Manager	Madison County Engineer	nathan.ernst@madison.oh.gov
Chris Snyder	Fire Chief	Jefferson Twp F.D	csnyder@Jeffersontwp-Madison.
Amanda Douridas	Ag Educator	OSU Extension	douridas.90@osu.edu
Jacqueline J Porter	Dispatcher	MCSO	porter@madisonsheriff.org
Max Smith	Fire Fighter	CTFD	max.smith@northwestfield
Corey Jones	Firefighter	CTFD	coreyshan13@gmail.com
Kyla Fryman	Firefighter	CTFD	frymky03@gmail.com
Jacob Ray	Firefighter	CTFD	jray266@gmail.com
Destin Sawell	Medic	Madison County EMD	destinsawell89@gmail.com
Alyson Ray	Medic	Madison County EMD	aly.ray02@gmail.com
Adam Hall	Paramedic	Madison County EMD	adamxhall@gmail.com
Dustin Siders	Firefighter	CTFD	siders.dustin@yahoo.com
Robert Gylle	Firefighter	CTFD	Bobbygylle29538@gmail.com
Logan Patrick	FF	CJJFD	loganpatrick186@yahoo.com

Madison County Hazard Mitigation Meeting

Date	May 12, 2025
Start Time	1:00
Location	Zoom/EMA Conference Room

Name	Title	Representing	Email
Stacey McKenzie	Madison County Treasurer	Treasurer	Stacey.mckenzie@madison.oh.gov
Casey Conley	~~Lieutenant~~	WJPD	cconley@westjefferson.ohio.gov
Jon McKinney	Director	Madison County Chamber	Jon@madisoncountyohio.org
Brian Bennington	Chief	CTJFD/MCEMD	centralchief2@gmail.com
David Kell	Asst. County Admin	MC BoCC	david.kell@madison.oh.gov
William Leonard	EMT	MCEMD	WML122390@outlook.com
Patricia Hull	Lt. Paramedic	MCEMD	thull@madisoncountyema.org
Sierra Barrett	Paramedic	MCEMD	sierra.barrett03@yahoo.com
Dylan Holley	EMT	CTJFD	dylanholley2014@gmail.com
K. Michael Clark	Paramedic	MCEMD	kmikeclark@gmail.com
Kyla Fryman	FF	CTJFD	frymky03@gmail.com
Noah Hopkins	FF	CTJFD	nmhopkins@hotmail.com
Robert Cook	FF/EMT	CTJFD	unit51716@gmail.com
Brian Huddleston	Lt.	Madison Co SO	huddleston@madisonsheriff.org
Donaan Cooper	Sgt.	LPD	Dcooper@londonohio.gov
Dillan Rice	Deputy Sheriff	Madison Co SO	rice@madisonsheriff.org
Matt McCann	9-1-1 Coordinator	Madison Co SO	mccann@madisonsheriff.org
Holly Langham	Madison CO EMA Deputy Director	Madison CO EMA	holly.langham@madison.oh.gov

Blue Umbrella Solutions

Madison County Hazard Mitigation Meeting

Date	May 12, 2025
Start Time	7:00 PM
Location	Zoom/EMA Conference Room

Name	Title	Representing	Email
Holly Langham	Deputy Director	Madison Co EMA	holly.langham@madison.oh.gov
Matt McCann	9-1-1 Coordinator	Madison County Sheriff	mccann@madisonsheriff.org

Blue Umbrella Solutions

Safety Council:	**Madison County Safety Council (51)**			
Meeting Date:	**5/14/2025**			
Employer	**Policy Number**	**Print Name**		**Sign Name**
Ace Hardware	502450		1	
			2	
Advanced Drainage Systems	20004219	Logan Longman	1	
			2	
AllState Exteriors LLC	1618731		1	
			2	
Armaly Brands	1599080	Jacob Cliff	1	
			2	
Bodycote	1087169		1	
			2	
Buckeye Ford, Inc.	897361		1	
			2	
Buckeye Propane	415925	Megan Holbert	1	
		Abby Holbert	2	
Bucks Carryout	1723245		1	
			2	
Central Ohio Concrete Cutting, Inc	802735	James Gunn JR	1	
			2	
Choctaw Lake Property Owners Association	431616		1	
			2	
City of London	34905502	Brad Lewis	1	
			2	
CJ Logistics	1126637		1	
			2	
Conduit Pipe Products	1376401	Randy Coy	1	
			2	
Construct Plumbing Design	80027486		1	
			2	
Coughlin London Auto, Inc	1214285		1	
			2	
Creamer Metal Products, Inc.	1671416	Chris Ansel	1	
			2	
Creative Carpet	800600		1	
			2	

Safety Council:	Madison County Safety Council (51)			
Meeting Date:	5/14/2025			
Employer	Policy Number	Print Name		Sign Name
DB Schenker	20005718		1	
			2	
Fisher Cast Steel	306319		1	
			2	
Forrest Trucking Company	274455	Caitlin DeLuint	1	
			2	
Fyda Freightliner	454111	Kevin Gstarried	1	
		CHRIS FOLEY	2	
Gordon CDJR	80096047		1	
			2	
Gra-Mag Truck Interior Systems	1323136		1	
			2	
Grace Energy Services	80032403	Toni Daniels	1	
			2	
Honeywell Intelligrated	20003261		1	
			2	
Humane Society of Madison Cnty	1253827		1	
			2	
Jay Car Construction Comp., Inc.	426683		1	
			2	
Jefferson Industries Corporation	966493	Al Overholser	1	
			2	
Joann Fabrics	20003715		1	
			2	
Jonathan Alder Local Schools	34950451		1	
			2	
Junior Achievement of Mad River Region	312456		1	
			2	
KA Sims Construction Co Inc	672793	JANICE CLOSSER	1	
		MARK SPANGLER	2	
KMAK Group LLC	1693468		1	
			2	
Krazy Glue Co.	1006803	GLORIA KALMAN	1	
			2	

Safety Council:	Madison County Safety Council (51)			
Meeting Date:	5/14/2025			
Employer	Policy Number	Print Name		Sign Name
London CDJR	80183035		1	
			2	
London City Schools	34905551		1	
			2	
London Public Library	34950752	Allison Ratcliff	1	Allison Ratcliff
			2	
M H Eby, Inc.	970756		1	
			2	
Madison County Commissioners	34900001	Holly Kingham	1	
		Steve Lamb	2	Steve Campbell
Madison Health	652992		1	
			2	
Madison Health Partners	1266827		1	
			2	
Madison Tree & Landscape Co.	911136		1	
			2	
Mahle Behr	20005781		1	
			2	
Main St. Photography Inc.	797057		1	
			2	
Matco Services, Inc.	494257	Herman D. Thornton Sec	1	
			2	
McMahon Trucking Centers	1665860		1	
			2	
Mid-Ohio Construction	1436343		1	
			2	
Nesco Resource	465305	Toni Wickline	1	
			2	
Nissen Chemitec America, Inc.	1396381	Sierra Rowland	1	
		Jessica Bauer	2	
Remedy Staffing Staffing Solutions SE INC	1571424	Ryan Smith	1	
			2	
Royal Cabinets, Inc	986785	Kim Bayes	1	
			2	

Safety Council:	**Madison County Safety Council (51)**			
Meeting Date:	**5/14/2025**			
Employer	**Policy Number**	**Print Name**		**Sign Name**
Stanley Electric U S Co., Inc.	20004339		1	
			2	
Stephens Pipe & Steel LLC	1207381	Kevin Boettcher	1	[signature]
			2	
The Loving Care Hospice, inc.	20005682		1	
			2	
Tolles Career & Technical Center	30005623		1	
			2	
Torrid	1725478	LaSatra Moore	1	[signature]
			2	
United Surface Finishing	368980		1	
			2	
Vander Haags	80071154	[illegible]	1	[signature]
		[illegible] Ryan Hochmiller	2	[signature]
Village of West Jefferson	34910903	[illegible]	1	[signature]
			2	
Wincup, Inc.	1507653		1	
			2	
		Guest Employer Information		
Guest Employer	**Policy Number**	**Print Name**		**Sign Name**
Madison County Safety Council		Todd D. [illegible]		[signature]
Madison County Chamber		Ashley Good Wheeler		[signature]
Madison County Chamber		Nicole Thomas		[signature]
Butcher Block Restaurant				
Ohio BWC Rep/s		TIM RITTNER		[signature]
Ohio BWC Rep/s				
Ohio BWC Rep/s				
Madison County D/D				
Minute Men Ohio Comp				
Guest Speaker/s				
Nissen Chemitec		Bernie Cunn		[signature]
Nissen Chemitec		Chris Jenkins		[signature]
JTC		Stephanie Toy		[signature]
JTC		Nancy Blair		[signature]
MCEMA		Deb Sims		[signature]
Nissen		Debbora Springer		[signature]

Safety Council:	**Madison County Safety Council (51)**			
Meeting Date:	**5/14/2025**			
		Guest Employer Information		
Guest Employer	**Policy Number**	**Print Name**		**Sign Name**
Guest		Alice Robinson Bond		[signature]
Guest NISSEN		Barb Clippinger		[signature]
Nissen		Jacey Hamilton		[signature]
Nissen		Daniel R. Chase JR		[signature]
Beck		Jeremiah Lazo		[signature]
Beck's		Tyler Schindel		[signature]
[illegible]		Jonathan Hildebrand		[signature]
Beck's		Connor Gamash		[signature]
Beck's		Jason Berchtold		[signature]
Beck's		Zach Thum		[signature]
Beck's		Eric Rife		[signature]
Madison Co. SO		Jacob Gibson		[signature]
Jefferson Industries		Ethan Miner		[signature]

MADISON COUNTY CHIEF'S ASSOCIATION AGENDA
4/24/25

CALL TO ORDER

PLEDGE OF ALLEGIANCE

ROLL CALL OF OFFICERS

President	Chief Brian Bennington
Vice President	Chief Glenn Nicol
Secretary/Treasurer	Deb Sims
Trustees	

INTRODUCTION OF GUESTS:

APPROVAL OF MINUTES:

COMMITTEE REPORTS:

- Communications Committee

UPDATES:

- EMA Update:
- Ohio Fire Chief's Update:
- Law Enforcement Update:
- Health Department Update:
- Hospital Update:
- American Red Cross Update:

OLD BUSINESS:

NEW BUSINESS:

- Hazard Mitigation Presentation Director Deb Sims

Meeting Sponsor:

NEXT MEETING DATE: June 26, 2025

ADJOURNMENT

Madison County Chief's Association
4/24/25

NAME	AGENCY	ADDRESS	PHONE	EMAIL	Sign In
Adams, Bryan	Pleasant Valley Joint Fire Dist		614-873-4067	badams@pleasantvalleyfire.com	
Bennington, Brian	CTJFD/MCEMD	91 St R: 56 Somerford, Ohio	937-605-5258	CentralChief291@verizon.net	
Blazier, Mark	Stokes Twp. Fire Dept		740-837-1749	markblazier@gmail.com	
Boswell, Rob	Stokes Twp. Fire Dept		937-505-7724	robboswell@gmail.com	
Burns, Dave	American Red Cross	570 W First Dayton, OH 45402	937-231-6317	david.burns@redcross.org	
Carlin, Gary	Battelle	505 King Ave, Columbus, OH	614-424-4929	carling@battelle.org	
Conley, Casey	WJPD	28 E Main St., West Jefferson, OH	614-879-7672	cconley@westjeffersonohio.gov	
Dorn, Norman	Range Twp. Fire Dept.	1215 Counts Rd. Sedalia, OH	740-604-0507		
Eades, Todd	London Fire Dept.	103 E. High St. London, OH	740-837-0551	teades@londonohio.gov	
Fawley, Erin	Madison County Public Health	306 Lafayette St., London, OH	740-852-3065	efawley@madisonpublichealth.org	
Forrest, Richard	Jefferson Twp. Fire Dept.	745 West Main St.West Jefferson, OH	614-879-8265	rforrest@jeffersontwpmadison.org	
Huddleston, Bryan	MCSO	222 Garfield Ave., London OH	740-852-1332	huddleston@madisonsheriff.org	
Johnson, Ethan	Madison County Public Health	306 Lafayette St., London, OH	740-852-3065	ejohnson@madisonpublichealth.org	
Langham, Holly	Madison County EMA	271 Elm St., London, OH	740-852-4200	holly.langham@madison.oh.gov	
McCann, Matt	MCSO	222 Garfield Ave., London, OH	740-852-1332	mccann@madisonsheriff.org	
Mathews, Bob	Stokes Twp. Fire Dept		740-648-0894	mbobandkaren@yahoo.com	
Meyer, John	Range Twp. Fire Dept.	11540 Danville Rd. London, OH	812-343-5354	range340@yahoo.com	
Mitchem, JD	ARC	9375 Hume Lever Rd London, OH	614-205-4696	mitchjd48@yahoo.com	
Newland, Jim	1-800-Boardup		567-204-9684	rvldchief81@gmail.com	
Nicol, Glenn	London PD	10 E First St., London, OH	740-852-7031	gnicol@londonohio.gov	
Scheiderer, Erik	Madison Health	210 N Main St., London, OH	740-845-7134	escheiderer@madison-health.com	
Sims, Deb	Madison County EMA	271 Elm St., London, OH	740-852-4200	deb.sims@madison.oh.gov	
Skeldon, Scott	Madison County EMA	271 Elm St., London, OH	740-852-4200	scott.skeldon@madison.oh.gov	
Smith, Brandon	West Jefferson PD	28 E Main St., West Jefferson, OH	614-879-7672	bsmith@westjeffersonohio.gov	

Madison County Chief's Association
4/24/25

NAME	AGENCY	ADDRESS	PHONE	EMAIL	Sign In
Snyder, Chris	Jefferson Twp. Fire Dept.	745 West Main St.West Jefferson, OH	614-879-8265	csnyder@jeffersontwpmadison.org	
Solomon, Al	State Pharmacy/Commerce		419-396-1616	allen.solomon@pharmacy.ohio.gov	
Sweney, John	MCSO	222 Garfield Ave., London, OH	740-852-1212	sweney@madisonsheriff.org	
Taylor, Dave	Tri-County Joint Fire District	P.O. Box 325, Mt. Sterling, OH	740-869-2643	Chieftaylor491@yahoo.com	
Thompson, Merrill	OSP	1485 West Main St. West Jeff. OH	614-879-7626	mjthompson@dps.ohio.gov	

Madison County Hazard Mitigation Meeting

Date	February 6th, 2025
Start Time	2:00 PM
Location	20 South Walnut Street, London, Ohio 43140

Name	Title	Representing	Email
Lauren Sweeney	CHE	MCPH	lsweeney@madisonpublichealth.org
John Harper	EM Specialist	Clark County EMA	jwharper@clarkcountyohio.gov
Adam Smith	Parks & Rec	City of London	adsmith48@yahoo.com
Adam Zimmerman	FF	City of London	AZ8490771@gmail.com
Nate Ernst	Operations Manager	Madison County Engineer	nathan.ernst@madison.oh.gov
Chris Snyder	Fire Chief	Jefferson Twp F.D	csnyder@Jeffersontwpmadison.org
Amanda Douridas	Ag Educator	OSU Extension	douridas.9@osu.edu
Jacqueline J Porter	Dispatcher	MCSO	porter@madisonsheriff.org
Max Smith	Fire Fighter	CTFD	Max.Smith@northwesternfd.org
Corey Jones	Firefighter	CTFD	coreyshan13@gmail.com
Kyla Fryman	Firefighter	CTFD	frynky03@gmail.com
Jacob Ray	Firefighter	CTFD	jray266@gmail.com
Dustin Sivell	Medic	Madison County EMD	dustinsivell89@gmail.com
Alyson Ray	Medic	Madison County EMD	aly.ray02@gmail.com
Adam Hall	Paramedic	Madison County EMD	adamxhall@gmail.com
Dustin Sides	Firefighter	CTFD	sidesdustin@yahoo.com
Robert Coyle	Firefighter	CTFD	Bobbycoyle2853@Smail.com
Logan Patrick	FF	CJJFD	loganpatrick18@yahoo.com

Madison County Hazard Mitigation Meeting

Date	February 6th, 2025
Start Time	2:00 PM
Location	20 South Walnut Street, London, Ohio 43140

Name	Title	Representing	Email
Jen Smith	Community Health Educator	Madison Co public Health	Jsmith@madisonpublichealth.org
Ethan Johnson	Director of Health Planning	Madison Co Public Health	ejohnson@madisonpublichealth.org
JOHN SWANEY	SHERIFF	MCSO	SWANEY@MADISONSHERIFF.ORG
GLENN NICOL	CHIEF	LONDON POLICE	GNICOL@LONDONOHIO.GOV
THARON PRATHER	SERGEANT	PLAIN CITY P.D.	TPRATHER@PLAINCITY.COM
Mike Chamberlain	FF	City of London	lonfall11@yahoo.com
TROY MARTIN	FF/P	CITY OF LONDON	TMARTIN@LONDONOHIO.GOV
Carol Sowder	Event Coord.	Mad. Co. Fairground	madisoncountyfairground@gmail.com
Andrew Bell	FF/EMT-B	Mad. Co. EMD	andrewljb15@gmail.com
Sarah Anderson	Sheriff/Dispatch	Mad CO. Sheriff	Banderson@mad.sonsheriff.org
Julia Cumming	Madison SWCD	Madison Soil + Water	julia.cumming@oh.nacdnet.net
Matt McCann	9-1-1 Coordinator	Madison Co Sheriff	mccann@madisonsheriff.org

Madison County Hazard Mitigation Meeting

Date	February 6th, 2025
Start Time	2:00 PM
Location	20 South Walnut Street, London, Ohio 43140

Name	Title	Representing	Email
Eve Breedlove	Executive Assistant	City of London	ebreedlove@londonohio.gov
Holly Langham	Deputy Director	Madison Co EMA	holly.langham@madison-oh.gov
JUSTIN HICKS	EO COORDINATOR	MADISON CO BDD	justin.hicks@madison.oh.gov
Casey Conley	Lt West Jeff	WJPD	cconley@westjeffersonohio.gov
SCOTT ACKLEY	COUNCIL MEMBER	VILLAGE OF MIDWAY	SCOTT.ACKLEY@YAHOO.COM.
BRIAN HUDDLESTON	LT.	MADISON CO SHD	HUDDLESTON@MADISONSHERIFF.ORG
Austin Fultz	FF/P	LFD	afultz@london ohio.gov
Jennifer Hitt	City Law Director	London	jhitt@londonohio.gov
Emma Crace	FF/EMT	LFD	ecrace22@yahoo.com
Tyler Kidd	FF/P	LFD	tkidd@ Londonohio.gov
Zach Kosikowski	FF/Emt	LFD	ZachKYt@gmail.com
Chad Lawhun	Firefighter	LFD	clawhun@londonohio.gov
Margaret E Johnson	Nova/MCCRT volunteer		p1680johnson187@yahoo.com
Kacey Draper	FF/EMT	LFD	kcdraper@gmail.com
ALEC PAIGE	FF/P	LFD	APAIGE@ London ohio.Gov
Brian Pennington	Fire Chief	CTJFD	Centralchief1@gmail.com
Chad Wolfley	FF	CTJFD	chadwolfley252@gmail.com
Spencer Combs	FF/EMT	CTJFD	FFSwl@yahoo.com

MADISON COUNTY
FAMILY AND CHILDREN FIRST COUNCIL
DEPARTMENT OF FAMILY & CHILDREN

Executive
FCFC Meeting Sign-in Date: 3/14/25 Madison Co DJFS

	Print Name	Signature	Company
1.	Patrick Closser		City of London
2.	Sydney Robare		MCPH
3.	Karen Wells		MCPH
4.	Lisa Halley		MVCDC
5.	Rebekah Pettit		MCDFC
6.	Lou		CCS
7.	Bryan Huddleston		MCSO
8.	Deb Sims		MCEMA
9.	Sherry Baldwin		DFC
10.	Rebecca Rickenberg		Parent Rep
11.	ONLINE:		
12.	Susan Thompson		BDD
13.	Yemy Predaza		United Way
14.	Kab Slane		MCC
15.	Jessica Thompson		WJLSD
16.	Patrice Edwards		DCY
17.	Greta Mayer		MHRB
18.			
19.			
20.			

Madison County Hazard Mitigation Meeting

Date	03/10/2025
Start Time	07:30 PM
Location	Madison County Engineer's Office

(Trustee Assoc)

Name	Title	Representing	Email
Dennis Marshall	Trustee	Range Twp	marsh34Dell@yahoo.com
Dana Fisher	MCPH Board	MCPH Board	dafisher1964@yahoo.com
Gary Bogenrife	Trustee	Union Twp	
Rachel Fisher	Fiscal Officer	Union TWP	Uniontownship49@yahoo.com
Roger Weeks	Trustee	Darby	weeks.roger@gmail.com
Jeff Kimble	Trustee	Paint	jeffreyWKimble57@email
Wayne Hill		Oak Run	
Steve Denes	Trustee	Fairfield Twp	
Kelly Mann	"	Oak Run	
Julie Harris	MCPH Board		
Robin Kimbler	MCPH Board		
Leon H Hutson	Trustee	Deercreek	hutsonhighwayman@gmail.com
Rob Turvy	Trustee	Deercreek	turvyr@gmail.com
Jeff Pfeil	Trustee	Jefferson	JPfeil@Jeffersontwpmadison.org
Mike Sullivan	Trustee	Union	Sullivan.Mike78@Yahoo.Com
Myron Mast	Trustee	Darby Township	mastengineer@gmail.com
Steve Renner	Trustee	Jefferson	
Elmer R Jones	Trustee	Darby Twp	

Blue Umbrella Solutions

Madison County Hazard Mitigation Meeting

Date	03/10/2025
Start Time	07:30 PM
Location	Madison County Engineer's Office

Name	Title	Representing	Email
	Trustee	Stokes Twp	
Don Whitman	Trustee	Canaan	
Kay A Mast	Mayor	West Jefferson	
Darrell Chamberlain	Trustee	Pleasant Twp.	darrellchamper@gmail.com
Tony Xenikis	Comm Twp	Comm	
Patrick Closser	Mayor	City of London	
Brent Thomas	Trustee	Monroe Township	
Andy Kolarsky	Pike Trustee	Pike Twp	
M Boerger	Pike Trustee	Pike Twp	
Nick Adkins	Prog	County	
Aaron Boerger	Trustee	Pike Twp	
Scott Ackley	Village Council Member	Village of Midway	
Markerbaugh	Community Member		mark.election@gmail.com
Phillip Earley	Paint Chief		
Chuck Fee	Oak Run Trustee		
Chris Wallace	Commissioner		
Daniel Call	Range Township Trustee		

Blue Umbrella Solutions

Madison County Hazard Mitigation Meeting

Date	03/10/2025
Start Time	07:30 PM
Location	Madison County Engineer's Office

Name	Title	Representing	Email
Jim MORAN	Twp Trustee	SomerFord	JKMORAN73@CMAIL
Brendan Shea	Commissioner		brendan.shea@madison.oh.gov
Sue Hackett	guest	Somerford	Sephackett@gmail.com
Robert Hackett	guest	Somerford	Bobdhackett@gmail.com
Holly Langham	Madison CO Deputy Director	Madison County	holly.langham@madison.oh.gov
Ashley Cooper	Fiscal officer/MCPH	MCPH	acooper@madisonpublichealth.org
Erin Fawley	Health Commissioner	MCPH	efawley@madisonpublichealth.org
Ethan Johnson	Director of Health Planning	MCPH	ejohnson@madisonpublichealth.org

Blue Umbrella Solutions

Madison County Hazard Mitigation Meeting

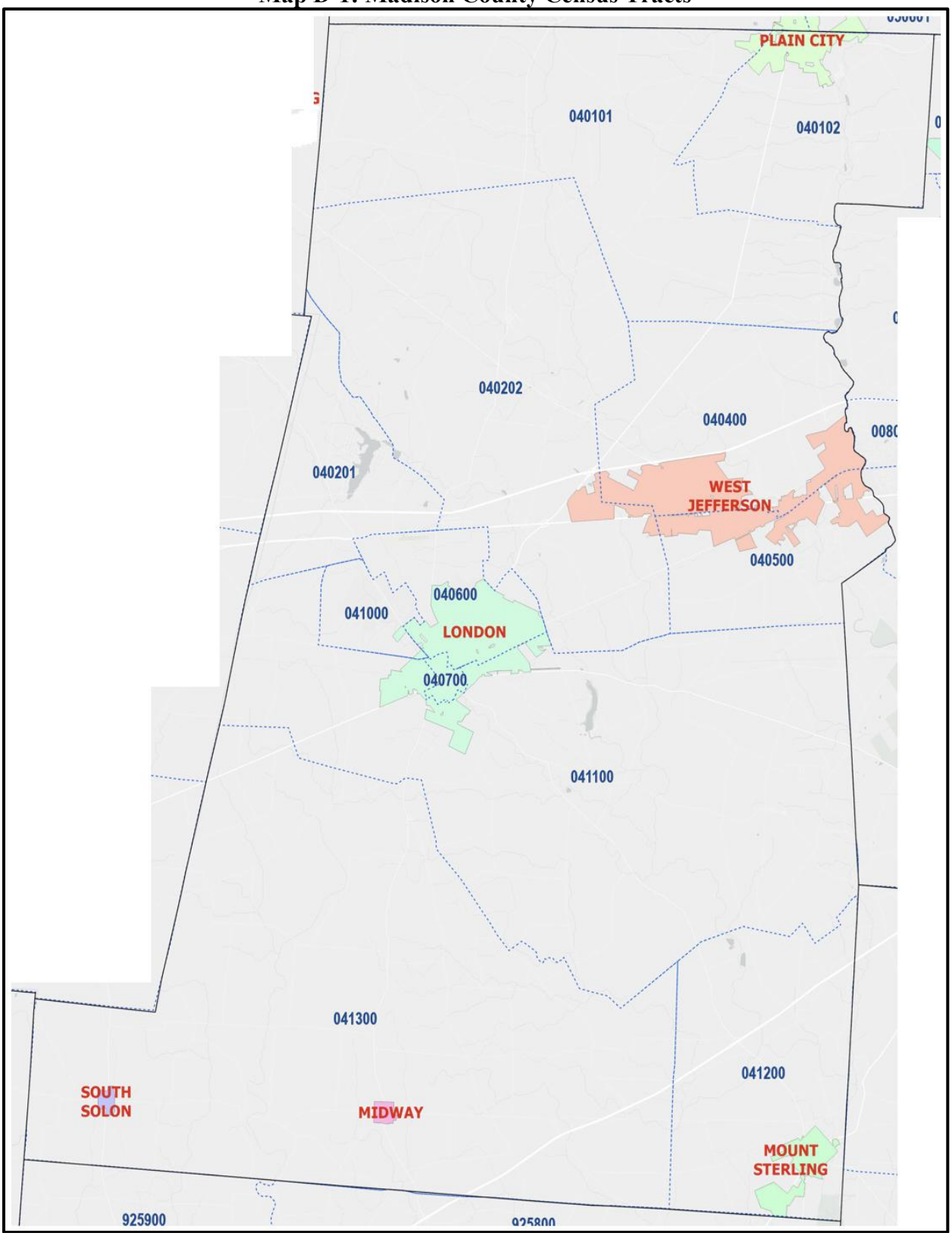
Date	July 18, 2025
Start Time	10:00
Location	City Meeting Room

Name	Title	Representing	Email
Patrick Closser	Mayor	City of London	pclosser@londonohio.gov
Eve Breedlove	E.A.	City of London	ebreedlove@londonohio.gov
Glenn Nicol	Chief of Police	" "	GNICOL@LONDONOHIO.GOV
Mallory Teders	Detective	Village of West Jefferson	mteders@westjeffersonohio.gov
Ethan Johnson	Director of Health Planning	Madison Co Public Health	ejohnson@madisonpublichealth.org
Chris Snyder	Fire Chief	Jefferson Twp Fire	csnyder@jeffersontwpmadison.org
Jennifer Hunter	County Auditor	Madison Co.	jennifer.hunter@madison.oh.gov
Merrill Thompson	Lieutenant	OSHP	MSTHompson@DPS.OHIO.GOV
Brigitte Bouska	Ohio EMA	EM Spec.	bbouska@dps.ohio.gov
Brian Bennington	CHIEF	LTJFD	Centralchief1@gmail.com
Emily Bennington	RN		eabnurse@gmail.com
Julie Cumming	Program Admin.	Madison SWCD	julie.cumming@ohiomail.net
Matt McCann	9-1-1 Coordinator	Madison Co Sheriff	mccann@madisonsheriff.org
Benan Huddleston	Lt.	Madison Co Sheriff	HUDDLESTON@MADISONSHERIFF.ORG
Todd P. Gaines	CHIEF	City of London	tgaines@londonohio.gov
Rex Castle	S.S.D	City of London	RCastle@LondonOhio.gov
Chris Williams	OHIO EMA	OHIO EMA	
Deb Holly Langham			

Blue Umbrella Solutions

Appendix D – Madison County Census Tract Map

Map D-1: Madison County Census Tracts



RESOLUTION 195-25
Sponsored by: Andrew Hitt

A RESOLUTION TRANSFERRING APPROPRIATIONS

WHEREAS, The Police Department needs to replace the computers in all of the cruisers; and

WHEREAS, the available funds must be transferred prior to expenditure.

NOW THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF LONDON, STATE OF OHIO

SECTION I:

City Council hereby authorizes the City Auditor to make the following transfer:

From:	101.100.51009- Admin. Support PT	$49,338.00
To:	101.100.52505- Misc. Police	$49,338.00

SECTION II:

That this Resolution is hereby declared an emergency measure necessary for the immediate preservation of the public peace, health and safety of the City to take effect and be in full force immediately upon its passage.

PASSED:

ATTEST:

_____
Matt Edgington
Clerk of Council

_____
Joshua Peters
President of Council

Submitted to Mayor:_____

APPROVED:

Date of Approval:_____

_____
Patrick Closser, Mayor

_____
Rickelle Davis, Law Director
Approved as to Form

I, Matt Edgington, Clerk of Council for the City of London, Ohio, do hereby certify that the foregoing Ordinance/Resolution No.195-25 was posted on the City of London's website, www.londonohio.gov or a newspaper of general circulation on the _____day of_____, 2025 and on the_____day of_____, 2025

_____
Clerk

#_____

Vote	Abstain	Suspend	Adopt
Andrew Hitt			
Rich Hays			
John Stahl			
Greg Eades			
Shannon Treynor			
Brent McDaniels			
Lisa Jackman			