



**Adams County, Ohio**

# **Natural Hazards Mitigation Plan**



**August 2022**



## Table of Contents

Executive Summary.....	9
Section I – Introduction.....	11
A. Background & Purpose.....	11
B. Scope .....	11
C. Project Management .....	11
D. Relationship to the 2010 Mitigation Plan .....	11
E. The Mitigation Planning Process .....	11
F. Integration of Results into Other Mechanisms .....	12
G. Other Uses for This Plan .....	12
H. Sources Consulted .....	12
I. Plan Organization.....	13
Section II – The Planning Process.....	15
A. Inform and Involve Chief Elected Officials, Stakeholders and the Public.....	15
B. Form the Planning Team .....	15
C. Identify Participants .....	15
D. Conduct Kick-Off Meeting.....	17
E. Gather Information.....	17
F. Draft the Updated Plan .....	18
1. Update Community Profile and Assets .....	18
2. Perform Hazard Analysis, Formulate Goals and Mitigation Actions.....	18
a. Hazard Identification .....	18
b. Hazard Profile, Vulnerability Assessment & Impacts .....	18
c. Mitigation Goals .....	18
d. Mitigation Actions.....	19
(1) Previous Actions .....	19
(2) Progress Made.....	19
(3) Current Actions .....	19
(4) Mitigation Action Changes as a Result of This Update .....	20
e. Draft Plan.....	20
G. Submit Plan to Ohio EMA and FEMA.....	20
H. Adopt Plan.....	21
I. Receive Federal Approval.....	21
J. Present Plan to the Public .....	21
K. Monitor Plan Implementation .....	21
L. Keep Plan Up to Date .....	21
Section III – Community Profile and Assets.....	23
A. Location .....	23
B. Geography.....	23
C. Surface Water .....	23
D. Ground Water .....	24
E. Land Use .....	24
1. Land Use/Land Cover.....	24
2. State Lands .....	24
F. Climate.....	25
G. Government .....	25
H. Jurisdictions and Populations .....	25

1. Townships .....	25
2. Municipalities .....	25
a. Village of Manchester .....	25
b. Village of Peebles .....	25
c. Village of Rome .....	25
d. Village of Seaman .....	25
e. Village of West Union .....	25
f. Village of Winchester .....	26
3. Populations .....	26
I. Congregate Care Facilities .....	27
J. Demographics .....	27
K. Major Employers .....	28
L. Major Transportation Routes .....	28
1. Highways .....	28
2. Airways .....	28
3. Railways .....	28
M. Utilities .....	28
1. Electric .....	28
2. Natural Gas .....	28
3. Landline Telephone .....	28
4. Potable Water Systems .....	28
5. Wastewater .....	29
N. Structure Types and Values .....	29
O. Public Warning and Notifications Systems .....	29
1. Outdoor Warning Sirens .....	29
2. Emergency Alert System .....	29
3. Integrated Public Alert and Warning System .....	29
P. Major Community Events .....	30
Q. Development Trends .....	30
1. Land Usage .....	30
2. Economic Conditions .....	30
R. Authorities Affecting Mitigation Activities .....	30
1. Zoning and Building Regulations .....	30
2. Floodplain Management .....	31
3. National Flood Insurance Program (NFIP) .....	31
4. Adams County Health Department .....	31
S. Mitigation Funding Sources .....	31
1. Operating Budgets .....	31
2. Grants .....	31
a. Community Development Block Grant Program .....	31
b. Appalachian Regional Commission .....	31
c. Hazard Mitigation Grant Program .....	32
d. Pre-Disaster Mitigation Program .....	32
e. Flood Mitigation Assistance Program .....	32
f. Other Mitigation Grants .....	32
Section IV – Hazard Identification and Analysis .....	33
A. Overview .....	33
B. Hazard Identification .....	33
C. Hazard and Vulnerability Analysis Methodology .....	34

D. Hazard and Vulnerability Analysis Results .....	36
1. Hazard Analysis.....	36
2. Vulnerability Analysis.....	36
Section V – Hazard Profiles, Analyses and Vulnerable Assets.....	37
A. Flooding.....	37
1. Description .....	37
2. Extent of Hazard.....	37
3. Historical Occurrence .....	38
4. Probability of Future Occurrences .....	40
5. Affected Locations .....	40
6. Analysis .....	41
7. Vulnerable Community Assets .....	42
B. Severe Summer Storm/Thunderstorm/Windstorm/Hail.....	44
1. Description .....	44
2. Extent of Hazard.....	44
3. Historical Occurrence .....	45
4. Probability of Future Occurrences .....	49
5. Affected Locations .....	49
6. Analysis .....	49
7. Vulnerable Community Assets .....	49
8. Estimated Structural Damages .....	50
C. Severe Winter Storm .....	51
1. Description .....	51
2. Extent of Hazard.....	52
3. Historical Occurrence .....	52
4. Probability of Future Occurrences .....	53
5. Affected Locations .....	53
6. Analysis .....	53
7. Vulnerable Community Assets .....	53
8. Estimated Structural Damages .....	53
D. Landslides .....	54
1. Description .....	54
2. Extent of Hazard.....	57
3. Historical Occurrence .....	57
4. Probability of Future Occurrences .....	57
5. Affected Locations .....	57
6. Analysis .....	58
7. Vulnerable Community Assets .....	58
8. Estimated Structural Damages .....	59
E. Drought.....	60
1. Description .....	60
2. Extent of Hazard.....	60
3. Historical Occurrence .....	60
4. Probability of Future Occurrences .....	63
5. Affected Locations .....	63
6. Analysis .....	63
7. Vulnerable Community Assets .....	63
8. Estimated Structural Damages .....	63
F. Tornado .....	64

1. Description .....	64
2. Extent of Hazard.....	64
3. Historical Occurrence .....	64
4. Probability of Future Occurrences .....	65
5. Affected Locations .....	65
6. Analysis .....	65
7. Vulnerable Community Assets .....	65
8. Estimated Structural Damages .....	66
G. Infectious Disease .....	67
1. Description .....	67
2. Extent of Hazard.....	68
3. Historical Occurrences .....	68
4. Probability of Future Occurrences .....	69
5. Affected Locations .....	69
6. Analysis .....	69
7. Vulnerable Community Assets .....	69
8. Estimated Structural Damages .....	69
H. Earthquake .....	70
1. Description .....	70
2. Extent of Hazard.....	70
3. Historical Occurrence .....	70
4. Probability of Future Occurrences .....	71
5. Affected Locations .....	71
6. Analysis .....	71
7. Vulnerable Community Assets .....	71
8. Estimated Structural Damages .....	72
I. Land Subsidence .....	75
1. Description .....	75
2. Extent of Hazard.....	76
3. Historical Occurrence .....	76
4. Probability of Future Occurrences .....	76
5. Affected Locations .....	76
6. Analysis .....	78
7. Vulnerable Community Assets .....	78
8. Estimated Structural Damages .....	78
J. Dam Failure.....	79
1. Description .....	79
2. Extent of Hazard.....	81
3. Historical Occurrence .....	81
4. Probability of Future Occurrences .....	81
5. Affected Locations .....	81
a. Class I Dams.....	81
b. Class II Dams.....	82
6. Analysis .....	82
7. Vulnerable Community Assets .....	82
8. Estimated Structural Damages .....	82
Section VI – Mitigation Goals and Actions .....	83
A. Overview.....	83
B. Non-Participating Jurisdictions .....	83

C. Identification and Analysis Methodology.....	83
D. Goals.....	83
E. Actions.....	83
F. Cost-Benefit Review .....	84
1. Review Benefits and Costs.....	84
2. Prioritize Actions.....	84
Section VII – Mitigation Action Analysis.....	87
A. Goal: Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure .....	87
1. Action: Upgrade undersized storm water drainage systems.....	87
2. Action: Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data. ....	87
3. Action: Rehabilitate dams known to be of high hazard potential. ....	88
4. Action: Mitigate structures at risk.....	89
B. Goal: Provide timely warning .....	90
1. Action: Enhance public warning systems. ....	90
2. Action: Provide NOAA All-Hazards Warning Radios for all critical facilities.....	90
C. Goal: Enhance emergency response capability .....	92
1. Action: Upgrade the public safety countywide communications system. ....	92
2. Action: Install dry hydrants throughout the county.....	92
3. Action: Develop and implement a volunteer management program. ....	93
D. Goal: Create self sufficiency.....	94
1. Action: Install back-up generators for shelters and critical facilities.....	94
2. Action: Identify/upgrade facilities to be shelters.....	94
3. Action: Identify temporary facilities for non-life threatening emergencies. ....	95
4. Action: Identify alternate potable water sources and develop a distribution system. .	95
5. Action: Construct community and residential safe rooms. ....	96
E. Goal: Increase public awareness.....	97
1. Action: Develop and conduct public education program.....	97
Section VII – Supplemental Information .....	99
A. Meetings, Announcements and Correspondence .....	99
1. Public Announcement.....	99
2. Kick-Off Meeting .....	100
a. In-Person Meeting – June 17, 2021 .....	100
b. Talking Paper Prepared by Contractor.....	100
c. Talking Paper Emailing .....	101
3. Hazard Identification and Ranking Worksheet – June 16, 2021 .....	102
4. Mitigation Actions Review, Additions and Prioritization Worksheet .....	102
5. Township Trustees’ Meeting – September 13, 2021 .....	103
6. Village Review and Concurrence.....	104
B. Mitigation Actions by Jurisdiction .....	105
C. 2010 Mitigation Action Adjustments.....	107
D. Acronyms, Terms and Definitions.....	111

This page intentionally left blank



## Executive Summary

The Adams County Mitigation Plan lays the road map to a safer community by identifying the natural hazards that may affect the county, assessing the impacts of these hazards on community assets – those things that are important to the residents of the county – and developing mitigation actions to lessen or eliminate the impacts on community assets.

Having a current mitigation plan allows the county to apply for mitigation funding – as it may become available. It also provides a mitigation action list for other sources of funding. Further, it provides information that may be used in other planning efforts and future development.

Through a quantitative and qualitative process of analyzing hazards and impacts on our community, the Mitigation Planning Team identified five mitigation goals and developed fifteen mitigation actions to achieve the goals. Of these actions, twelve actions were carried over from the previous plan, four actions were added, no actions were completed, and sixteen actions were deleted.

The following summarizes these efforts:

- Hazards Identified and Analyzed in Rank Order
  - Flooding
  - Severe Summer Storm
  - Severe Winter Storm
  - Mud/Landslide
  - Drought
  - Tornado
  - Infectious Disease
  - Earthquake
  - Land Subsidence
  - Dam/Levee Failure
  - Cyber Attack\*
  - Power Outage\*

\* These hazards were included in the ranking of hazards but not hazard analysis, hazard profile or action development.
- Goals Identified and Mitigation Actions Developed, Analyzed and Prioritized
  - Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure
    - Upgrade undersized storm water drainage systems.
    - Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
    - Rehabilitate dams known to be of high hazard potential.
    - Mitigate flood-prone structures through acquisition, relocation, and/or retrofitting.
  - Provide timely warning
    - Enhance public warning systems.
    - Provide NOAA All-Hazards Warning Radios for all critical facilities.
  - Enhance emergency response capability
    - Upgrade the public safety countywide communications system.
    - Install dry hydrants throughout the county.
    - Develop and implement a volunteer management program.

- Create self sufficiency
  - Install back-up generators for shelters and critical facilities.
  - Identify/upgrade facilities to be shelters.
  - Identify temporary facilities for non-life-threatening emergencies.
  - Identify alternate potable water sources and develop a distribution system.
  - Construct community and residential safe rooms.
  - Encourage participation from all jurisdictions for future plan updates.
- Increase public awareness
  - Develop and conduct public education program.

This plan will be reviewed and updated annually and undergo a complete review and rewrite within five years of adoption. Please address any questions, comments, mitigation action status or additional mitigation actions to the Adams County Emergency Management Agency.

## Section I – Introduction

### A. Background & Purpose

There are two basic truths about hazards and community assets:

- *Hazards* will occur – there is little, if anything, we can do to prevent natural hazards from occurring.
- *Community assets* will be *impacted* by the occurrence of hazards to the extent of the assets' *vulnerabilities* to the hazards' *effects*.

Mitigation seeks to lessen or eliminate:

- The impact of hazards
- The vulnerability of assets to hazard impacts

As there are many impacts on community assets, impacts are ranked and mitigation actions cost-estimated using a quantitative analysis approach. Mitigation Actions may then be implemented in a cost-effective manner that resolves the greatest impact.

The purpose of this plan is to document the mitigation planning process conducted in Adams County, Ohio, and provide that road map to a safer community.

### B. Scope

This plan covers Adams County, Ohio, and all its political subdivisions and municipalities.

### C. Project Management

The Adams County EMA is the lead agency for this plan.

### D. Relationship to the 2010 Mitigation Plan

As this is an updated plan, the previously approved plan was the point of departure. All information in it was reviewed and updated as needed.

### E. The Mitigation Planning Process

The Adams County Mitigation Planning Team worked together to update the 2010 Plan. The team used the Federal Emergency Management Agency's (FEMA) *Local Mitigation Planning Handbook – March 2013*, as a guide.

Mitigation planning starts with profiling the community and identifying its assets – those things that are important to it. Next, hazards that potentially may affect these community assets are profiled – past and projected future occurrences and impacts. Then, mitigation actions are reviewed and updated and new ones developed that can either lessen or eliminate the impact of a hazard or the vulnerability of a community asset to the impact of a hazard are developed. These mitigation actions form the basis for making the community a safer place to live, work and recreate.

Throughout the process, those who have a stake – elected and appointed government officials, agencies providing services to people, the public – as well as those with pertinent information are advised, consulted and their input incorporated into the plan. *Section II – The Planning Process* describes and summarizes the results of this process.

## F. Integration of Results into Other Mechanisms

The county's process to integrate the data, information, and hazard mitigation goals and actions in other planning mechanisms is accomplished through specifically including select positions in the planning process and are members of the Mitigation Planning Team. These include, but are not limited to:

- Adams County Commissioners – consider incorporating mitigation actions when approving and funding county development projects.
- Adams County Floodplain Administrator – use the results of flooding hazard analysis and vulnerability assessments in refining floodplain regulations.
- Adams County Planning Commission – use hazard analysis in approving land use proposals.
- Adams County Emergency Management Agency – use hazard analysis in focusing preparedness, response and recovery efforts on areas of higher risk.
- Adams County Sheriff's Office – use hazard analysis targeting response efforts in areas of higher risk for impending or ongoing incidents.
- Adams County Engineer's Office – use mitigation actions in performing maintenance or making repairs to lessen or eliminate damages caused by future hazard occurrences.
- Village Mayors and Councils; Township Trustees – consider incorporating mitigation actions when approving and funding development and maintenance projects.

These individuals take information to their respective organizations that are charged with the development, maintenance, and on occasion, enforcement of rules, regulations, codes, ordinances, policies, plans, procedures and other administrative instruments. Information from the mitigation planning effort is presented to the leadership of these organizations, who then authorize the information to be added, to revise or update current administrative instruments. This allows for oversight, commitment of time, energy, and resources to change actions into projects.

Although the jurisdictions do not have as many representatives to serve on the Planning Team, their representatives follow the same processes as those at County level.

## G. Other Uses for This Plan

While this plan focuses on mitigation actions, the results of the information gathered and analysis performed can be used for other purposes including:

- Already-identified mitigation actions for funding through other sources
- Assessing risk for other purposes

## H. Sources Consulted

Many sources were consulted in the planning process. The major sources are shown in the following table.

Source	Used to Provide Information on
Federal Emergency Management Agency (FEMA)	National Flood Insurance Program Previous Disasters
National Oceanic and Atmospheric Administration (NOAA)	Hazards U.S. Multi-Hazard Climate, Weather & Drought History and Trends

Source	Used to Provide Information on
Ohio Department of Natural Resources (ODNR)	Dams, Waterways & Drought History and Conditions Landslide Characteristics
United States Geological Survey (USGS) & Adams County Soil & Water Conservation District	Slopes & Soils Affecting Public Safety and County Assets
Ohio Emergency Management Agency (Ohio EMA)	Mitigation Plan State-Wide Hazards History and Trends
Adams County Emergency Management Agency	Emergency Operations Plan Previous Disasters, Emergencies & Other Incidents
Adams County Engineer's Office	Impacted Roadways and Cost Estimates
Adams County Sheriff's Office	Public Safety Impacts: Location, Severity, Frequency
Adams County Planning Commission	Planning Regulations and Development Trends

## I. Plan Organization

This plan is organized into the following sections:

*Section I – Introduction.*

*Section II – Planning Process.* This section details the planning process; it provides the summary information and conclusions as a result of hazard analysis and details mitigation goals developed.

*Section III – Community Profile and Assets.* This section provides detailed information about Adams County and its Assets.

*Section IV – Hazard Identification and Analysis.* This section lists the hazards likely to affect Adams County and details the analysis conducted on each. It also summarizes the rankings of hazards and impacts.

*Section V – Hazard Profiles, Analyses and Vulnerable Assets.* This section documents profiles and analyses conducted. It then details the impacts to vulnerable community assets.

*Section VI – Mitigation Goals and Actions.* This section lists and details the mitigation goals and actions updated or developed.

*Section VII – Mitigation Action Analysis.* This section details each action and its analysis.

*Section VIII – Supplemental Information.* This section includes information meaningful to the overall plan development but not included in the preceding sections. Note that this section may be published as a separate document.

This page intentionally left blank

## Section II – The Planning Process

This section describes and summarizes the steps and actions taken to update the 2010 Adams County Mitigation Plan. The ongoing COVID-19 pandemic placed many restrictions on public gatherings to where meeting face-to-face was all but prohibited. Video conferencing was not a viable option as Internet service is sketchy in most of Adams County. Therefore, all communication was conducted using email, phone calls, and several physically distanced mask-to-mask limited attendance meetings.

Note that the documentation for mentioned events/actions are included in *Section VIII – Supplemental Information*.

### A. Inform and Involve Chief Elected Officials, Stakeholders and the Public

Prior to the beginning of the planning process, the Adams County EMA Director met with the Board of County Commissioners advising them of the mitigation plan update project and received their full support.

Request for public participation and input to the planning process was first announced on the Adams County EMA Facebook page in April 2020. The current plan and a full description of the update process was posted on Adams County EMA web site and the current plan was made available at the West Union Branch of the Adams County Public Library. Two county residents attended the Kick-Off Meeting; there was no other participation by, nor comments received from the public.

Throughout the plan development phase, stakeholders – businesses, industry, commercial ventures, private organizations, and the public – were invited to attend and participate in the Planning Team meetings. Locations, dates and times were made to the public and announcements were posted at meeting locations.

All were advised of the Kick-Off meeting where any questions they may have would be addressed.

### B. Form the Planning Team

The Adams County EMA Director invited those individuals that were on the planning team to reconvene the team from the previous planning process along with additional individuals or organizations. This list included representatives from agencies involved in hazard mitigation activities, agencies with the authority to regulate development, and offices responsible for enforcing local ordinances were important members of the planning team.

### C. Identify Participants

The following agencies and individuals who were invited to participate in the development of this plan. Numerous emails and personal contacts were made to maximize participation. In the last three columns:

- *Invite* indicates an invitation was sent/emailed
- *Attend* indicates attendance
- *Sent Email* indicates at least one email was sent
- *Participate* indicates a response was received

Community	Agency/Position	Name	Plan Team	Kick Off	Hazards	Actions
State	Ohio EMA	Brody Davis		Attend		
	Ohio EMA	Lorie Mount		Attend		
County	EMA Board Member	Robin Stephens		Attend		
	EMA Deputy Director	Tom Peterson	X	Attend	Participate	Participate
	EMA Director	Karen Howelett	X	Attend	Participate	Participate
	EMS Coordinator	Terri Crothers	X	Invite		
	Engineer's Office	David Hook	X	Invite		
	Health Dept	Jason Work	X	Invite		
	Health Dept	William Hablitzel	X	Invite		
	Regional Water	Rick Adamson		Invite		
Township	Bratton Trustee	Mike Robinson		Participate	Participate	Participate
	Brush Creek Fiscal Officer	Chuck Taylor		Participate	Participate	Participate
	Franklin Trustee	Tom Perdue		Participate	Participate	Participate
	Green Trustee	Beverly Cox		Participate	Participate	Participate
	Jefferson Trustee	Jack Lewis		Participate	Participate	Participate
	Jefferson Trustee	Lawrence Shivener		Participate	Participate	Participate
	Liberty Trustee	Wendall Swearingen		Attend	Participate	Participate
	Manchester Trustee	Earl Ruark		Participate	Participate	Participate
	Manchester Trustee	Mack Morgan		Attend		
	Manchester Trustee	Phil Colvin		Participate	Participate	Participate
	Meigs Trustee	Bill Setty		Participate	Participate	Participate
	Meigs Trustee	Josh Lloyd		Participate	Participate	Participate
	Meigs Trustee	Paul Baker		Participate	Participate	Participate
	Monroe Fiscal Officer	Angela Wikoff		Participate	Participate	Participate
	Monroe Trustee	Susan Lee		Participate	Participate	Participate
	Oliver Trustee	Quintin Baker		Participate	Participate	Participate
	Scott Trustee	Sam Bolender		Participate	Participate	Participate
	Sprigg Fiscal Officer	David Dugan		Participate	Participate	Participate
	Sprigg Trustee	David Abbot		Participate	Participate	Participate
	Tiffin Trustee	Caleb Grooms		Participate	Participate	Participate
	Tiffin Trustee	Gregory Grooms		Participate	Participate	Participate
	Tiffin Trustee	Richard Dryden		Participate	Participate	Participate
	Wayne Trustee	Jimmy Tadlock		Participate	Participate	Participate
	Wayne Trustee	Tom Downing		Participate	Participate	Participate
Village	Manchester			Sent Email		
	Peebles			Sent Email		
	Rome			Sent Email		



Community	Agency/Position	Name	Plan Team	Kick Off	Hazards	Actions
	Seaman			Sent Email		
	West Union Councilperson	Jason Francis		Attend		
	West Union Administrator	Jerry Kirker		Participate	Participate	Participate
	Winchester Mayor	Kenneth Shelton		Participate	Participate	Participate
NGO	Adams County Regional Medical Center	Richard Lewis		Invite		
	DeForest Radio Club	Barbara Lock		Attend		
	DeForest Radio Club	Ed Lock		Attend		
Public	Resident	Kathryn Thompson		Attend		
Adjacent County	Brown County EMA	Barb Davis		Invite		
	Highland EMA	Dave Buschelman		Invite		
	Pike County EMA	Tim Dickerson		Invite		
	Scioto County EMA	Larry Mullins		Invite		
Contractor	RDI Solutions	David Pollinger	X	Participate	Participate	Participate

Note that the Villages of Manchester, Peebles, Rome, and Seaman did not participate in the planning process and are not considered planning participants.

#### D. Conduct Kick-Off Meeting

The Planning Team conducted their Kick-Off meeting on June 17, 2021. It also emailed a Kick-Off Meeting Talking Paper to those who could not attend.

#### E. Gather Information

The EMA Director invited each jurisdiction's governing body to participate in the team's efforts to gather information unique to each jurisdiction. The EMA Director also contacted agencies that have a mitigation-related role. This included the Adams County Health Department, Adams County Soil & Water Conservation District, Adams County Engineer's Office, Adams County Auditor's Office, Adams County Sheriff's Office and Adams County EMA.

The Planning Team reviewed existing plans and reports including Adams County's Emergency Operations Plan, Soil Report, plat maps, and Planning Commission regulations.

The Planning Team performed extensive research from online resources such as Federal Emergency Management Agency (FEMA), National Oceanic and Atmospheric Administration (NOAA), US and Ohio Departments of Transportation (USDOT/ODOT) and Ohio Department of Natural Resources (ODNR). The source is identified where this information is presented in this plan.

The contractor prepared instructions and worksheets to facilitate data collection and information exchange. The EMA Director sent emails to all participants as follows:

- Hazard Identification and Ranking
- Mitigation Actions Review
- Mitigation Actions Prioritization

The EMA Director sent out multiple emails and made personal contacts to ensure those who were required to participate as well as a broad spectrum of experience and responsibility gave their input.

The EMA Director and Deputy conducted a meeting on September 13, 2021, with township officials where they presented the kick-off information, reviewed hazards, and solicited input on mitigation actions.

The EMA Director also made direct contact with those villages that hadn't participated in the about opportunities, discussed this project and its value and impact, and received written concurrence.

## **F. Draft the Updated Plan**

### **1. Update Community Profile and Assets**

The Planning Team updated the community profile and its assets based on data collected and is presented in *Section III – Community Profile and Assets*.

### **2. Perform Hazard Analysis, Formulate Goals and Mitigation Actions**

#### **a. Hazard Identification**

The Planning Team identified the following hazards, in rank order, considered to be credible threats to Adams County's community assets.

- Flooding
- Severe Summer Storm
- Severe Winter Storm
- Mud/Landslide
- Drought
- Tornado
- Infectious Disease
- Earthquake
- Land Subsidence
- Dam/Levee Failure
- Cyber Attack\*
- Power Outage\*

\* These hazards were included in the ranking of hazards but not hazard analysis, hazard profile or action development.

Refer to *Section IV – Hazard Identification and Analysis* and for details.

#### **b. Hazard Profile, Vulnerability Assessment & Impacts**

The Planning Team collected and reviewed hazard information, assessed the impacts and the community's vulnerabilities. Refer to *Section V – Hazard Profiles, Analyses and Vulnerable Assets* for details.

#### **c. Mitigation Goals**

The Planning Team reviewed the vulnerabilities of impacted assets and decided on the following mitigation goals in priority order based on impact resolution.

The Planning Team selected the following goals:

- Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure
- Provide timely warning
- Enhance emergency response capability
- Create self sufficiency
- Increase public awareness

#### d. Mitigation Actions

##### (1) Previous Actions

The Planning Team first reviewed the 28 mitigation actions from the 2010 plan and found several issues that needed to be resolved as follows before continuing:

Issue	Count	Resolution
Not a mitigation action	4	Deleted
So close to another action as to be the same	12	Deleted/Merged
None (Restated as necessary)	12	Carried Forward

Refer to *Section VII – Supplemental Information* for a chart detailing these adjustments.

##### (2) Progress Made

While none of the carried-forward actions have been completed, tangible progress has been made to decrease hazard impacts. As for the bulk of the costly mitigation actions, lack of funding has resulted in little progress.

##### (3) Current Actions

The Planning Team then reviewed carried-forward mitigation actions for current viability. All were retained and four new ones were added. Using Cost Benefit Review procedures, the planning team prioritized the actions. The following table depicts the mitigation actions developed and selected and the priority assigned. Note that priorities from the previous Plan were modified based on the results of this approach.

Priority	Mitigation Action
1	Enhance public warning systems.
2	Upgrade the public safety countywide communications system.
3	Upgrade undersized storm water drainage systems.
4	Install back-up generators for shelters and critical facilities.
5	Identify alternate potable water sources and develop a distribution system.
6	Mitigate flood-prone structures through acquisition, relocation, and/or retrofitting.
7	Provide NOAA All-Hazards Warning Radios for all critical facilities.
8	Identify/upgrade facilities to be shelters.
9	Install dry hydrants throughout the county.
10	Develop and conduct public education program.
11	Identify temporary facilities for non-life threatening emergencies.
12	Construct community and residential safe rooms.
13	Develop and implement a volunteer management program.

Priority	Mitigation Action
14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
15	Rehabilitate dams known to be of high hazard potential.
16	Encourage participation from all jurisdictions for future plan updates.

Refer to *Section VI – Mitigation Goals and Actions* and *Section VII – Mitigation Action Analysis* for details.

#### (4) Mitigation Action Changes as a Result of This Update

The following table summarizes those actions that changed and what was changed.

Mitigation Action	2010 Priority	2022 Priority	Status
Enhance public warning systems.	*	1	Unchanged
Upgrade the public safety countywide communications system.	*	2	Unchanged
Upgrade undersized storm water drainage systems.	*	3	Unchanged
Install back-up generators for shelters and critical facilities.	*	4	Unchanged
Identify alternate potable water sources and develop a distribution system.	*	5	Unchanged
Mitigate flood-prone structures through acquisition, relocation, and/or retrofitting.	*	6	Unchanged
Provide NOAA All-Hazards Warning Radios for all critical facilities.	*	7	Unchanged
Identify/upgrade facilities to be shelters.	*	8	Unchanged
Install dry hydrants throughout the county.	*	9	Unchanged
Develop and conduct public education program.	*	10	Unchanged
Identify temporary facilities for non-life-threatening emergencies.	*	11	Unchanged
Construct community and residential safe rooms.		12	New
Develop and implement a volunteer management program.	*	13	Unchanged
Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.		14	New
Rehabilitate dams known to be of high hazard potential.		15	New
Encourage participation from all jurisdictions for future plan updates.		16	New

\* 2010 mitigation actions were not individually prioritized

#### e. Draft Plan

The draft plan was completed and reviewed for comments and changes.

#### G. Submit Plan to Ohio EMA and FEMA

The plan in its final form was submitted to Ohio EMA in April 2022.

On ~~\$\$\$ ##~~, 2022, FEMA determined this plan meets its requirements.

## H. Adopt Plan

This plan was adopted by the Adams County jurisdictions:

Jurisdiction	Adoption Date
Adams County	
Village of Manchester	Did not participate
Village of Peebles	Did not participate
Village of Rome	Did not participate
Village of Seaman	Did not participate
Village of West Union	
Village of Winchester	

## I. Receive Federal Approval

On **\$\$\$ ##, 2022**, FEMA granted federal approval.

## J. Present Plan to the Public

The plan was placed in the West Union Branch of the Adams County Public Library and on the Adams County EMA's website. A public notice was placed on the Adams County EMA web site as well as through a social media (Facebook) post inviting residents to review and comment on the plan.

Additionally, a copy of the updated plan was sent to the EMAs of adjacent counties.

## K. Monitor Plan Implementation

The Adams County EMA Director monitors the implementation of this plan by periodic contact with lead agencies and presents status to the Planning Team and commissioners at each annual review.

The Adams County EMA Director also provides a copy of this plan to all stakeholders and agencies with authorities related to mitigation actions and coordinates with them to assist in integrating mitigation goals and actions into their plans and actions.

## L. Keep Plan Up to Date

The Adams County EMA Director monitors the implementation of this plan by having lead agencies provide updates as the status of their mitigation actions change.

The Adams County EMA Director convenes the Planning Team annually to review the progress of this plan and propose any needed updates. This meeting is publicly announced and is open to the public; notices are posted on the Adams County EMA's web site and Facebook page as well as announced in the various newspapers serving Adams County. At this meeting, the team:

- Reviews the status of all mitigation actions.
- Assesses the progress toward achieving mitigation goals.
- Considers new related information as it becomes available. This includes recent hazard occurrences as well as changes in related planning documents. If this information would have an impact on goals or actions, the team proposes changes such as adding, changing or eliminating goals or mitigation actions.
- Presents proposed changes to the Board of County Commissioners and chief elected officials of affected jurisdictions for concurrence.

- Formally documents the proceedings, provides it to all stakeholders and makes it available with the current plan.

Once every five years, the Adams County EMA initiates a formal plan update based on then current FEMA requirements and FEMA and Ohio EMA guidance.

The Adams County EMA may process out-of-cycle updates by submitting changes to the Board of County Commissioners and the Ohio EMA.

## Section III – Community Profile and Assets

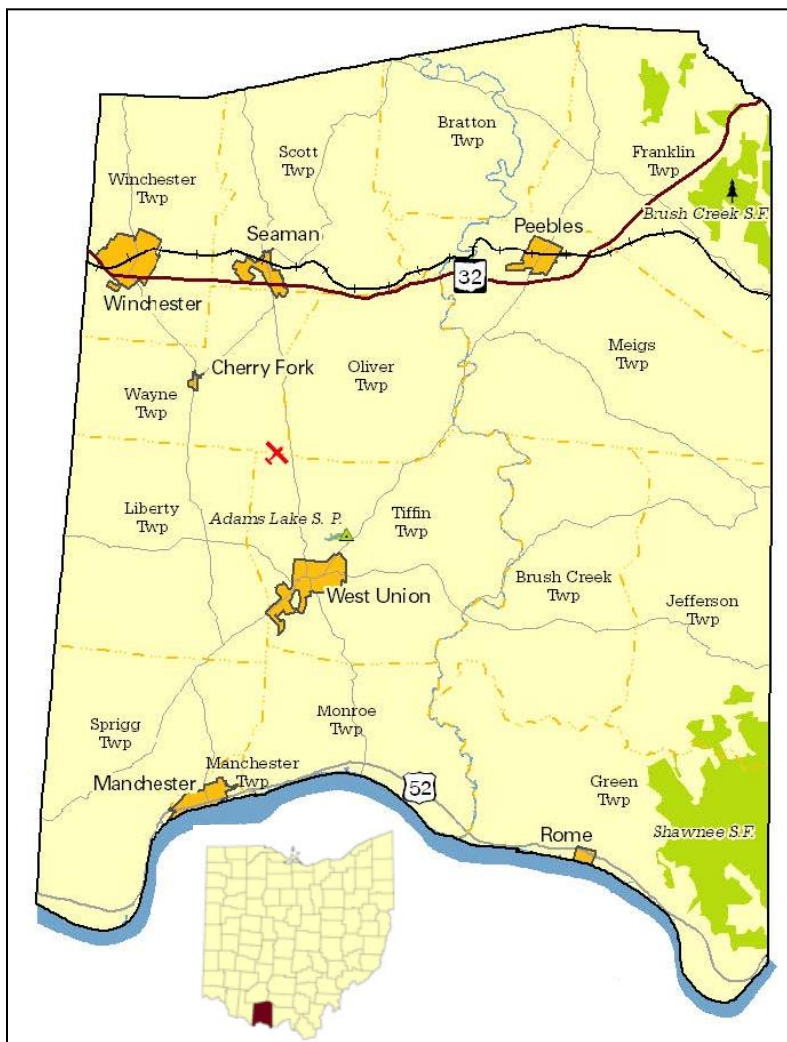
### A. Location

Adams County is located in the south-central portion of the State of Ohio. It covers approximately 584 square miles. It is bounded by Brown County to the west, Highland County to the north, Pike County to the northeast, Scioto County to the east, and Mason and Lewis Counties (Kentucky) to the south on the other side of the Ohio River.

### B. Geography

Adams County has large agricultural areas with forested rolling hills over extensive Karst geology.

The west central and northwest portions are primarily agricultural, the land being flat or gently undulating. The central and northern portions are more broken, the hills are loftier, their tops being gently rounded or spread out in broad table lands. In the east, the surface is very broken; there are high ridges and lofty hills, with many knobs. In the south bordering the Ohio River is a range of hills, some several hundred feet above the river basin.



### C. Surface Water

Adams County is geographically divided by two watersheds:

*Scioto Brush Creek* is located in southern Ohio. Scioto Brush Creek flows into the Scioto River near the town of McDermott in Scioto County. The Scioto Brush Creek watershed is located in Scioto and Adams counties and drains nearly 273 square miles. The dominant land use in the watershed is forest (73%). Pasture/hay is next most common (10%), followed by various stages of developed land and scrub/shrub land at 5% each.<sup>1</sup>

*Ohio Brush Creek* is a 59.9-mile-long (96.4 km) tributary of the Ohio River in southern Ohio. Via the Ohio River, it is part of the watershed of the Mississippi River, draining an area of 435 square miles (1,130 km<sup>2</sup>). Ohio Brush Creek rises in southeastern Highland

<sup>1</sup> <http://www.adamssoilandwater.org/scioto-brush-creek.html>



County, and flows generally southwardly into Adams County, past the Serpent Mound, to its confluence at the Ohio River, about 4 miles (6 km) west of Rome.<sup>2</sup>

## D. Ground Water

Adams County falls in the Ohio River Main Stem watershed. Adams County Regional Water District (ACRWD) supplies water to Adams and Brown Counties – approximately 18,000 people. The source for the water comes from eight deep wells that are approximately 75 feet deep. These are drilled into the Ohio River Valley Aquifer. Ohio EPA considers this source to be ground water. The well field is situated on the south side of US 52 and just west of the Wrightsville area.

## E. Land Use

### 1. Land Use/Land Cover

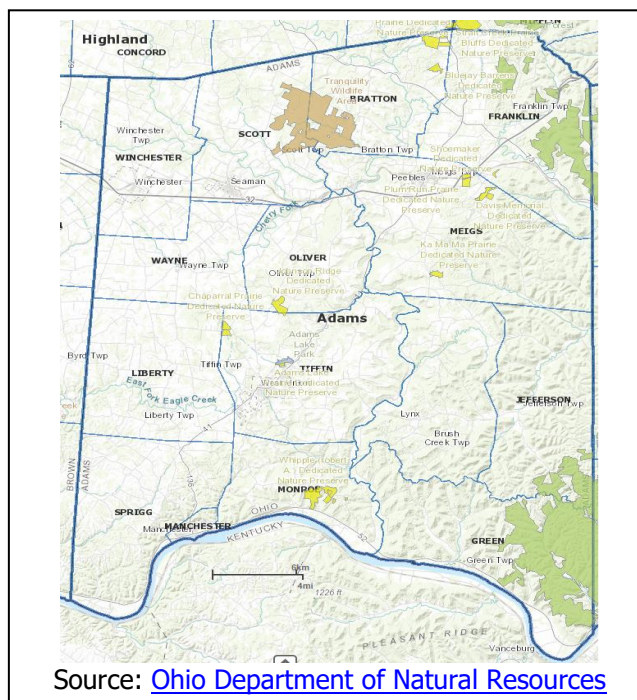
The following chart depicts Adams County's land use and cover<sup>3</sup>:

Land Use/Land Cover	Percentage
Developed, Lower Intensity	4.77%
Developed, Higher Intensity	.39%
Barren (strip mines, gravel pits, etc.)	.27%
Forest	63.06%
Shrub/Scrub and Grasslands	1.23%
Pasture/Hay	20.92%
Cultivated Crops	8.73%
Wetlands	.07%
Open Water	.56%

### 2. State Lands<sup>4</sup>

There are many state lands in Adams County. These are:

*Adams Lake State Park*  
*Adams Lake Prairie State Nature Preserve (NP)*  
*Bluejay Barrens Dedicated NP*  
*Brush Creek State Forest*  
*Chaparral Prairie State NP*  
*Davis Memorial State NP*  
*Johnson Ridge State NP*  
*Ka Ma Ma Prairie State NP*  
*Shawnee State Forest*  
*Shoemaker State NP*  
*Strait Creek Prairie Dedicated NP*  
*Tranquility Wildlife Area*  
*Whipple State Nature Preserve*  
*Serpent Mound*



<sup>2</sup> <http://www.adamssoilandwater.org/ohio-brush-creek.html>

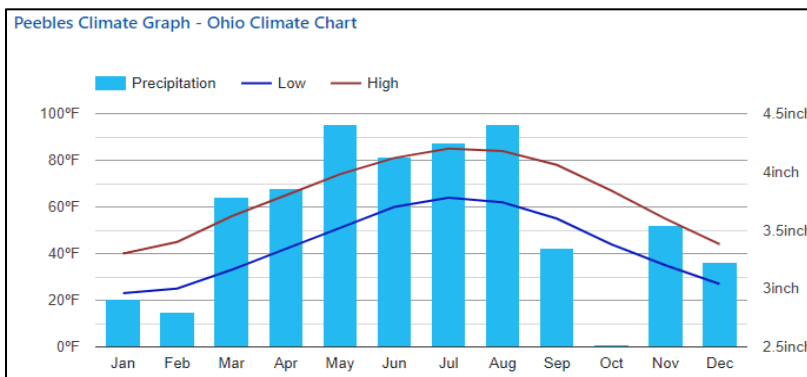
<sup>3</sup> <https://www.development.ohio.gov/files/research/C1002.pdf>

<sup>4</sup> <http://ohiodnr.gov/>



## F. Climate

The following chart depicts climate information for Adams County<sup>5</sup>. The average temperature in Adams County is 65 degrees. The county has temperature extremes from low 20s in the winter to the upper 80s in the summer. The average annual rainfall in Adams County is 43 inches.



## G. Government

The government of Adams County<sup>6</sup> is organized as specified in Ohio Revised Code Title 3, Chapters 301, 303 and following. The Village of West Union is the county seat.

## H. Jurisdictions and Populations

Adams County is subdivided into fifteen townships and seven incorporated villages.

### 1. Townships

- Bratton
- Brush Creek
- Franklin
- Green
- Jefferson
- Liberty
- Manchester
- Meigs
- Monroe
- Oliver
- Scott
- Sprigg
- Tiffin
- Wayne
- Winchester

### 2. Municipalities

#### a. Village of Manchester

Manchester is located in southwest Adams County in Manchester Township (with a small portion in Sprigg Township) along US 52. It borders the Ohio River to the south. The village has a total land area of 1.1 square miles.

#### b. Village of Peebles

Peebles is located in northwest Adams County along SR 41 in Meigs Township. The village has a total land area of 1.2 square miles.

#### c. Village of Rome

Rome is located in southeast Adams County along US 52 in Green Township. The village has a total land area of 0.3 square miles.

#### d. Village of Seaman

Seaman is located in northwest Adams County east of Winchester in Scott Township (with a small portion in Wayne Township) along SRs 32, 247 and 770. The village has a total land area of 1.0 square miles.

#### e. Village of West Union

West Union is located in Tiffin Township (with a small portion in Liberty Township) in central Adams County. SRs 41, 125 and 247 intersect the village. The village has a total area of 2.6 square miles.

<sup>5</sup> <https://www.usclimatedata.com/climate/peebles/ohio/united-states/usoh0755>

<sup>6</sup> <https://www.adamscountyoh.gov/>

**f. Village of Winchester**

Winchester is located in northwest Adams County in Winchester Township. SR 136 goes through the village east to west and SR 32 north to south. The village has a total land area of 2.7 square miles.

**3. Populations**

Populations are 2019 estimates calculated by the Ohio Development Services Agency<sup>7</sup>

<b>Population by Municipality</b>	<b>2019</b>	<b>2018</b>	<b>2010</b>	<b>2010 to 2019</b>
Manchester Village	1,955	1,955	2,016	-3.0%
Peebles Village	1,717	1,722	1,795	-4.3%
Rome Village	95	94	98	-3.1%
Seaman Village	895	898	930	-3.8%
West Union Village	3,161	3,160	3,249	-2.7%
Winchester Village	1,006	1,007	1,044	-3.6%
Unincorporated Adams County	18,869	18,858	19,409	-2.8%
<b>Adams County Total</b>	<b>27,698</b>	<b>27,694</b>	<b>28,541</b>	<b>-3.0%</b>

<b>Population by Township</b>	<b>2019</b>	<b>2018</b>	<b>2010</b>	<b>2010 to 2019</b>
Bratton Township	1,416	1,418	1,453	-2.5%
Brush Creek Township	1,194	1,194	1,229	-2.8%
Franklin Township	1,086	1,087	1,129	-3.8%
Green Township	618	618	638	-3.1%
Rome Village	95	94	98	-3.1%
Unincorporated	523	524	540	-3.1%
Jefferson Township	1,029	1,028	1,048	-1.8%
Liberty Township	1,972	1,974	2,037	-3.2%
West Union Village (pt.)	76	76	76	0.0%
Unincorporated	1,896	1,898	1,961	-3.3%
Manchester Township	1,990	1,990	2,052	-3.0%
Manchester Village (pt.)	1,952	1,952	2,013	-3.0%
Unincorporated	38	38	39	-2.6%
Meigs Township	3,753	3,760	3,911	-4.0%
Peebles Village	1,717	1,722	1,795	-4.3%
Unincorporated	2,036	2,038	2,116	-3.8%
Monroe Township	670	670	684	-2.0%
Oliver Township	1,278	1,279	1,318	-3.0%
Scott Township	2,096	2,100	2,178	-3.8%
Seaman Village (pt.)	886	889	921	-3.8%
Unincorporated	1,210	1,211	1,257	-3.7%
Sprigg Township	1,810	1,812	1,873	-3.4%
Manchester Village (pt.)	3	3	3	0.0%
Unincorporated	1,807	1,809	1,870	-3.4%
Tiffin Township	5,344	5,343	5,484	-2.6%
West Union Village (pt.)	3,085	3,084	3,173	-2.8%

<sup>7</sup> <https://development.ohio.gov/files/research/P5027.pdf>

Population by Township	2019	2018	2010	2010 to 2019
Unincorporated	2,259	2,259	2,311	-2.3%
Wayne Township	1,318	1,293	1,308	0.8%
Seaman Village (pt.)	9	9	9	0.0%
Unincorporated	1,309	1,284	1,299	0.8%
Winchester Township	2,124	2,128	2,199	-3.4%
Winchester Village	1,006	1,007	1,044	-3.6%
Unincorporated	1,118	1,121	1,155	-3.2%
<b>Adams County Total</b>	<b>27,698</b>	<b>27,694</b>	<b>28,541</b>	<b>-3.0%</b>

The Ohio Development Services Agency also projects the following populations for Adams County<sup>8</sup>:

	2010	2015	2020	2025	2030	2035	2040
	28,550	28,410	28,380	28,210	28,100	27,780	27,520
Change from 2010	-	-0.49%	-0.60%	-1.19%	-1.58%	-2.70%	-3.61%

### I. Congregate Care Facilities

There are four nursing/rehabilitation facilities in Adams County:

Facility	Type	Location
Adams County Manor	Assisted Living Facility, Nursing School	10856 SR 41 West Union
Eagle Creek Nursing Center	Rehabilitation Center	141 Spruce Ln West Union
Comfort Home Care	Personal Care Service	150 Chestnut Ridge Rd West Union
Peebles Place Care Center Inc	Assisted Living Facility, Nursing School	25773 SR 41 Peebles

### J. Demographics

The following information is a summary of information from the US Census Bureau<sup>9</sup>:

*Population Trend.* While the nation is growing at a 6.3% rate and Ohio at a 1.6% rate, Adams County is losing population at an estimated rate of .3% per year.

*Diversity.* With the exception of ethnicity and primary language (Adams County is approximately 15% more European American, 12% less African American and 3% less Hispanic than Ohio overall), Adams County's diversity closely matches that of Ohio and the United States. This includes gender, age, and family size.

*Home Ownership.* Adams County's home ownership rate is about 5% higher than the national average.

*Home Values.* The average value of homes in Adams County is \$100,200, 28% less than the state average and 51% less than the national average.

*Education.* Adams County students graduate high school at a rate 11% less than the state and national averages. The number of residents with post-high school degrees is slightly more than one third of the state and national averages.

<sup>8</sup> <https://www.development.ohio.gov/files/research/P6002.pdf>

<sup>9</sup> <https://www.census.gov/quickfacts/fact/table/Adamscountyohio,oh,US/PST045219>

*Unemployment.* Adams County's unemployment rate is approximately 8.4%, similar to Ohio as a whole and the national average.

*Income.* The per capita income is \$21,543, 29% lower than the state average and 34% lower than the national average. Twenty percent of Adams County's population live below the poverty line, 50% higher than the state and 88% higher than national levels.

## **K. Major Employers**

Major employers in Adams County<sup>10</sup> are:

- Adams County Government
- Adams County Regional Medical Center
- Adams County Ohio Valley Local Schools
- AES Corp/Dayton Power & Light
- Eagle Creek Nursing Center
- General Electric Co
- Wal-Mart Stores Inc

## **L. Major Transportation Routes**

### **1. Highways**

The major highways in Adams County are:

SR 32 traverses the county east-west from Jackson County (Cities of Jackson and Athens) to Brown County (Mt Orab) and on to Cincinnati.

SR 41 traverses the county north-south from Highland County through Peebles, West Union and Bentonville to Brown County, connecting to US 52.

### **2. Airways**

The Alexander Salamon Airport is located about 4 miles north of West Union on Cross Rd (CR 23) just off SR 247.

### **3. Railways**

Norfolk Southern operates a rail line that parallels SR 32 from Brown County west to east and then follows SR 73 into Scioto County.

## **M. Utilities**

### **1. Electric<sup>11</sup>**

- Adams Rural Electric
- AEP Ohio
- Southern Power Company

### **2. Natural Gas<sup>12</sup>**

- Duke Energy Ohio (Gas)

### **3. Landline Telephone**

- Frontier Communications

### **4. Potable Water Systems**

- Adams County Regional Water District

<sup>10</sup> <https://development.ohio.gov/files/research/P5027.pdf>

<sup>11</sup> <https://puco.ohio.gov/wps/portal/gov/puco/utilities/electricity/service-area-map/electricserviceareaswebmappingapplication>

<sup>12</sup> [https://puco.ohio.gov/wps/wcm/connect/gov/0bd5594e-d98d-43dd-bdfc-4dccc1a88178/Natural\\_Gas\\_Distribution\\_Companies.pdf?MOD=AJPERES&CONVERT\\_TO=url&CACHEID=RO\\_OTWORKSPACE.Z18\\_M1HGGIK0N0JO00QO9DDDDM3000-0bd5594e-d98d-43dd-bdfc-4dccc1a88178-naVi3mK](https://puco.ohio.gov/wps/wcm/connect/gov/0bd5594e-d98d-43dd-bdfc-4dccc1a88178/Natural_Gas_Distribution_Companies.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=RO_OTWORKSPACE.Z18_M1HGGIK0N0JO00QO9DDDDM3000-0bd5594e-d98d-43dd-bdfc-4dccc1a88178-naVi3mK)

- Village of Manchester
- Private Wells - 5% of population/homes

## 5. Wastewater

The following municipalities operate wastewater treatment plants:

- Manchester
- Peebles
- Seaman
- West Union
- Winchester

All other wastewater is treated with private septic systems.

## N. Structure Types and Values

The following structure and related information are used in the plan:

Structure Type	Inventory	Average Value	Total Value
Residential	12,461	\$145,364	\$1,811,380,804
Nonresidential	1,084	\$520,894	\$564,649,096
Critical	25	\$520,894	\$13,022,350
<b>Total</b>	<b>13,570</b>		<b>\$2,389,052,250</b>

Refer to *Section IV – Hazard Identification and Analysis* for details on the source.

## O. Public Warning and Notifications Systems

### 1. Outdoor Warning Sirens

There are outdoor warning sirens located throughout the county. They are activated through 911 Dispatch Center and some fire departments have the capability to activate the sirens in their jurisdictions.

### 2. Emergency Alert System<sup>13</sup>

The Emergency Alert System (EAS) is a national public warning system that requires radio and TV broadcasters, cable TV, wireless cable systems, satellite and wireline operators to provide the President with capability to address the American people within 10 minutes during a national emergency.

Broadcast, cable, and satellite operators are the stewards of this important public service in close partnership with state, local, tribal, and territorial authorities.

### 3. Integrated Public Alert and Warning System<sup>14</sup>

The Integrated Public Alert & Warning System (IPAWS) is FEMA's national system for local alerting that provides authenticated emergency and life-saving information to the public through mobile phones using Wireless Emergency Alerts, to radio and television via the Emergency Alert System, and on the National Oceanic and Atmospheric Administration's Weather Radio.

<sup>13</sup> <https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system/public/emergency-alert-system>

<sup>14</sup> <https://www.fema.gov/emergency-managers/practitioners/integrated-public-alert-warning-system#:~:text=The%20Integrated%20Public%20Alert%20%26%20Warning%20System%20%28IPAWS%29,the%20National%20Oceanic%20and%20Atmospheric%20Administration%27s%20Weather%20Radio.>

## P. Major Community Events

Community events draw a number of people into a small area. These events also cause congestion on highways and roads in the county. The most attended ones are:

*Jack Roush Day* is held annually in Manchester.

The *Adams County Junior Fair*<sup>15</sup> is held each year in July at the Adams County Fairgrounds in West Union.

## Q. Development Trends

### 1. Land Usage

Land usage hasn't changed significantly in recent years.

### 2. Economic Conditions

Adams County is enjoying a steady decrease in unemployment – 20.1% in 2010 to currently 8.4%. There was a spike in unemployment between March and August 2020 – the highest of 17.5% in April – attributed to the ongoing COVID-19 pandemic.

## R. Authorities Affecting Mitigation Activities

### 1. Zoning and Building Regulations

Adams County has a Planning Commission and countywide Comprehensive Plan which is and includes all townships and jurisdictions. Adams County (covering unincorporated areas) as well as all villages participating in the National Flood Insurance Program (NFIP) have floodplain regulations formally adopted by resolution or ordinance. All entities in Ohio now follow Ohio's State Building Code. There are no zoning ordinances in Adams County. All health and safety regulations follow State of Ohio laws. Below is a summary of their capabilities:

Jurisdiction	Planning Commission	Comprehensive Plans	Floodplain Regulations	Building Codes	Zoning Ordinances	Capital Budget for Mitigation	Public Works Budget for Mitigation
Adams County (Covers Unincorporated Areas)	Yes	Yes	Yes	Ohio Building Codes	No	No	Operating Funds In-Kind Wages
Wayne Twp					Yes		
Manchester	No	No	Yes		No		
Peebles	No	No	No		No		
Rome	No	No	Yes		No		
Seaman	No	No	Yes		No		
West Union	No	No	Yes		No		
Winchester	No	No	No		No		

<sup>15</sup> <https://adams.osu.edu/program-areas/4-h-youth-development/adams-county-fair>



## 2. Floodplain Management

Adams County floodplain regulations are maintained by the county commissioners and mayors of those villages with such regulations. These regulations are the Special Purpose Flood Damage Reduction Regulations. Section 3.1 designates the position of Floodplain Administrator. Section 3.2 outlines the duties and responsibilities of this position. Duties include, but are not limited to enforcement of the regulations, routine monitoring of the flood zones and providing community assistance such as encouragement of owners to maintain flood insurance.

## 3. National Flood Insurance Program (NFIP)

The following table reflects participation and compliance with the NFIP<sup>16</sup>.

CID	Jurisdiction	Initial FHB Identified	Initial FIRM Identified	Current Effective Map Date	Reg- Emer Date	Sanction Date
390001	Adams County	3/3/1978	11/21/2001	12/3/2010	2/3/2003	N/A
390002	Manchester	4/5/1974	8/1/7978	12/3/2010	8/1/1978	N/A
	Peebles	Not Participating				
390003	Rome	7/25/1975	10/18/1983	12/3/2010	10/18/1983	N/A
390907	Seaman		11/21/2001	NSFHA	8/3/2010	N/A
390908	West Union		11/21/2001	13/3/2010	11/21/2002	N/A
	Winchester	Not Participating				

## 4. Adams County Health Department

The Health Department monitors and enforces regulations for septic systems and potable wells as well as deals with public health issues.

## S. Mitigation Funding Sources

### 1. Operating Budgets

Funding for routine maintenance and improvements come from normal operating budgets. Mitigation Actions are considered when performing routine maintenance and improvements. Property values (and therefore taxes collected) suffer due to the lack of industry and commercial businesses and sales tax collected per capita is about one-fourth of the state average – both factors limiting what would be considered to be normal revenues. In-kind labor is generally the only resources that can be committed to mitigation activities.

### 2. Grants

#### a. Community Development Block Grant Program<sup>17</sup>

The US Department of Housing and Urban Development's (HUD) Community Development Block Grant (CDBG) program is a flexible program that provides communities with resources to address a wide range of unique community development needs.

#### b. Appalachian Regional Commission<sup>18</sup>

As an Appalachian County, Adams County is eligible for grants and contracts from funds appropriated to the Appalachian Regional Commission annually by Congress.

<sup>16</sup> <https://www.fema.gov/cis/OH.html>

<sup>17</sup> [http://portal.hud.gov/hudportal/HUD?src=/program\\_offices/comm\\_planning/communitydevelopment/programs](http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs)

<sup>18</sup> <http://www.arc.gov/>

**c. Hazard Mitigation Grant Program**

The Hazard Mitigation Grant Program (HMGP) is authorized by Section 404 of the Robert T. Stafford Disaster Relief and Emergency Act, as amended. The key purpose of HMGP is to ensure that the opportunity to take critical mitigation measures to reduce the risk of loss of life and property from future disasters is not lost during the reconstruction process following a disaster. HMGP is available, when authorized under the Presidential major disaster declaration, in areas of the State requested by the Governor.

**d. Pre-Disaster Mitigation Program**

The Pre-Disaster Mitigation (PDM) program is authorized by Section 203 of the Stafford Act, 42 USC 5133. The PDM program is designed to assist States and local communities to implement a sustained pre-disaster natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding from future major disaster declarations.

**e. Flood Mitigation Assistance Program**

The Flood Mitigation Assistance (FMA) program is authorized by Section 1366 of the National Flood Insurance Act (NFIA) of 1968, as amended with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP).

**f. Other Mitigation Grants**

Information on other grant programs is available on the Ohio EMA's Mitigation Information Portal (MIP)<sup>19</sup>.

---

<sup>19</sup> <https://www.ema.ohio.gov/mip/grants.aspx>



## Section IV – Hazard Identification and Analysis

### A. Overview

The Adams County Mitigation Planning Team identified hazards of credible threat and analyzed their impact using qualitative and quantitative methods. The team used the *FEMA Local Mitigation Planning Handbook, March 2013*, as a guide for conducting analysis.

### B. Hazard Identification

The Planning Team chose the natural hazards the Ohio EMA identified as those likely to impact the state of Ohio (as documented in the *2019 State of Ohio Hazard Mitigation Plan (SOHMP)*<sup>20</sup>, page 2-3) as the starting point for hazard identification. It then, based on a review of the community profile and historical records of hazards affecting south central Ohio, selected the natural hazards it considered to be credible threats to Adams County's assets. Eight of these hazards were identified for Hazard and Vulnerability Analysis.

Hazard from SOHMP	Significant Impact on Assets
Flooding	Yes
Winter Storms	No
Severe Summer Storms	Yes
Tornado	Yes
Drought	Yes
Earthquake	Yes
Dam/Levee Failure	Yes
Invasive Species	No – Day-to-day operations deal with these
Landslide	Yes
Land subsidence	Yes
Wildfire	No
Coastal Erosion	No – No coastline

The Planning Team identified the following additional hazards that have had or would have significant impact on Adams County:

- *Infectious Disease.* The biological hazard would potentially have immeasurable impact. Illness and even deaths would cause a ripple effect all aspects of personal lives – physical, social, economic – as well as the community as a whole – medical assets, economic, policies and procedures, security to name a few. This hazard was included in the ranking of hazards as well as in hazard analysis, hazard profile and action development.
- *Cyber Attack.* This man-made hazard has recently been experienced by the Adams County government information systems with significant impact on operations relying on these systems as well as loss of productivity to restore the systems and to recreate lost information. As it is worth noting for others who may use the information in this plan for other purposes, this hazard was included in the ranking of hazards but not hazard analysis, hazard profile or action development.
- *Power Outage.* This technological hazard has had significant impact on Adams County in past. Although the primary contributing hazards – most notably Severe Winter Storms, Severe Summer Storms, and Tornadoes – are already addressed, this

<sup>20</sup> [https://www.ema.ohio.gov/mip/planning\\_sohmp.aspx](https://www.ema.ohio.gov/mip/planning_sohmp.aspx)

hazard was included in the ranking of hazards but not hazard analysis, hazard profile or action development.

### C. Hazard and Vulnerability Analysis Methodology

The Planning Team profiled each of the 9 hazards identified. It collected and reviewed hazard information, assessed the impacts and the vulnerabilities of the community's assets.

The Planning Team chose a 30-year lookback period for occurrences as this this period provided the most consistent records for most hazards. Events recorded in National Centers for Environmental Information (NCEI)<sup>21</sup> data base as well as locally added events were considered occurrences. Criteria for NCEI event inclusion and categorization are contained in the *National Weather Service Instruction 10-1605*<sup>22</sup>

The team assigned risk factor values based on the following criteria and adjusting factors established by the Ohio EMA.

Risk Factor	Criteria	Adjusting Factor
Frequency	If a hazard/event does not apply it is given a value of NA. If a hazard/event resulted in no local disaster declarations, it scored a one. If the hazard/event resulted in one – two local disaster declarations, it has a Low Probability of occurrence and scored a two. If it resulted in three – five declarations, it has a Medium Probability and numerical score of three. If the hazard/event resulted in six – eight local disaster declarations, it has a High Probability and scored a four. If the hazard/event resulted in nine or more declarations, it should receive an Excessive Probability rating and a score of five. It is important to note that frequency was considered a key factor in determining the hazard profile. To that end, an Adjusted Frequency score was added for this factor and multiplied by 1.5 to weight the score more importantly than other factors.	1.5
Response	Average Response Duration may be defined as "time on the ground" or the time-period of response to a hazard, or event. Transportation accidents may last a few hours whereas a tire fire may last a week or a flood several weeks. Duration, therefore, may not always be indicative of the degree of damage but it remains an important planning factor.	1
Onset	Average Speed of Onset may affect all other factors due to lack of warning or time to prepare for impact. The lead-time required protecting lives and property varies greatly with each event. For instance, a winter storm may develop so slowly that there is time to alert crews and emplace plows, but flash floods can occur with no warning.	1
Magnitude	Average Magnitude is the geographic dispersion of the hazard. For instance, how much of your community would be impacted by a flood or hazardous material incident? Similar to the Frequency, this factor is deemed more important and therefore received a	1.25

<sup>21</sup> <http://www.NCEI.noaa.gov/stormevents/>

<sup>22</sup> <https://www.ncdc.noaa.gov/stormevents/pd01016005curr.pdf>

Risk Factor	Criteria	Adjusting Factor
	weighted value of 1.25 above the raw score. The score is based on the percent of land area impacted by an event.	
Business	The Impact on Business refers to enduring economic impact of the hazard on the community by an event. A score of one compares to a shutdown of critical facilities for less than 24 hours. Two equals a complete shutdown of critical facilities for one week. A score of three means a complete shutdown of critical facilities for at least two weeks. A score of four equals a complete shutdown of critical facilities for 30 days or more. This factor was developed and in keeping with the hazard analysis in the Ohio Standard Mitigation Plan developed by the Ohio EMA Mitigation Branch.	1
Human	This factor relates to the number of lives potentially lost to a particular hazard agent. This factor can vary between jurisdictions based on economic, geographic, and demographics of the particular populations. Therefore, some generalization need be inflected on this factor. This factor was developed and in keeping with the hazard analysis in the Ohio Standard Mitigation Plan developed by the Ohio EMA Mitigation Branch.	1
Property	This factor relates to the amount of property potentially lost to a particular hazard agent. This factor can vary between jurisdictions based on economics, geographic amount owned, and demographics of the particular populations. Therefore, some generalization need be inflected on this factor. This factor was developed and in keeping with the hazard analysis in the Ohio Standard Mitigation Plan developed by the Ohio EMA Mitigation Branch.	1

For consistency in analysis, the Planning Team used the property inventory and average values from the FEMA HAZUS-MH – Multi-hazard Risk Assessment Program for Analyzing Potential Losses simulations (addressed later in this plan) used in flooding and earthquake hazard analysis.

Structure Type	Inventory	Average Value	Total Value
Residential	12,461	\$145,364	\$1,811,380,804
Nonresidential	1,084	\$520,894	\$564,649,096
Critical	25	\$520,894	\$13,022,350
<b>Total</b>	<b>13,570</b>		<b>\$2,389,052,250</b>

To assist in estimating damage to structure in the absence of actual historical data, the team used the following formulas:

$$\text{Number (of Structures) At Risk} = \text{Inventory} \times \text{Percent At Risk}$$

$$\text{Number (of Structures) Damaged} = \text{Number At Risk} \times \text{Percent Damaged}$$

$$\text{Total (Monetary) Damages} = \text{Number Damaged} \times \text{Percent Damaged} \times \text{Average Value}$$

The team estimated the percent of total or actual numbers of structures at risk, the percent of these or actual number of damaged in a typical event and the percent of structure or actual

structural damage. Knowing the inventory and average value, total damages incurred for a typical event were then calculated. Percentages were used when hard estimates were not available.

## D. Hazard and Vulnerability Analysis Results

The following summarizes the analysis results. Details are contained in [Section V – Hazard Profiles, Analyses and Vulnerable Assets](#).

### 1. Hazard Analysis

The following table consolidates and ranks the analysis of each hazard:

Hazard	Frequency	Response	Onset	Magnitude	Business Impact	Human Impact	Property Impact	Adjusted Total
Flooding	6	3	2	2.5	2	2	2	19.5
Severe Summer Storm	4.5	3	3	3.75	1	2	1	18.25
Severe Winter Storm	4.5	3	2	2.5	1	2	1	16
Mud/Landslide	3	3	3	1.25	2	1	2	15.25
Drought	3	4	2	3.75	2	0	0	14.75
Tornado	3	2	3	1.25	1	2	2	14.25
Infectious Disease	3	3	1	0	3	4	0	14
Earthquake	1.5	2	1	2.5	1	3	2	13
Land Subsidence	1.5	3	2	1.25	0	1	1	9.75
Dam/Levee Failure	1.5	2	3	1.25	1	0	1	9.75
Cyber Attack*	1.5	3	4	0	0	0	0	8.5
Power Outage*	1.5	1	4	0	1	1	0	8.5

\* These hazards were included in the ranking of hazards but not hazard analysis, hazard profile or action development.

### 2. Vulnerability Analysis

The following table consolidates the estimated property impact analysis of each vulnerability:

Hazard	Structures at Risk				Damage in Thousands of Dollars			
	Residential (Res)	Non-Res	Critical	Total	Res	Non-Res	Critical	Total
Flooding	4611	401	9	5021	\$20,850	\$5,470		\$26,320
Severe Summer Storm	12461	1084	25	13570	\$131	\$10		\$141
Severe Winter Storm	12461	1084	25	13570	\$145	\$83		\$229
Mud/Landslide	0	0	0	0	\$73			\$73
Drought	0	0	0	0				\$0
Tornado	623	54	1	678	\$363	\$78		\$442
Infectious Disease	0	0	0	0				\$0
Earthquake	12461	1084	25	13570	\$17,710	\$14,832	\$18	\$32,560
Land Subsidence	125	11	0	135	\$73			\$73
Dam/Levee Failure	6	3	0	9	\$87	\$156		\$243

## **Section V – Hazard Profiles, Analyses and Vulnerable Assets**

### **A. Flooding**

#### **1. Description**

Flooding is an overflowing of water onto land that is normally dry. Floods can happen during heavy rains, when ocean waves come on shore, when snow melts too fast, or when dams or levees break. Flooding may happen with only a few inches of water, or it may cover a house to the rooftop. They can occur quickly or over a long period and may last days, weeks, or longer. Floods are the most common and widespread of all weather-related natural disasters.

Flash floods are the most dangerous kind of floods, because they combine the destructive power of a flood with incredible speed and unpredictability. Flash floods occur when excessive water fills normally dry creeks or riverbeds along with currently flowing creeks and rivers, causing rapid rises of water in a short amount of time. They can happen with little or no warning.

Areas near rivers are at risk from flash floods. Embankments, known as levees, are often built along rivers and are used to prevent high water from flooding bordering land. In 1993, many levees failed along the Mississippi River, resulting in devastating flash floods. The city of New Orleans experienced massive devastating flooding days after Hurricane Katrina came onshore in 2005 due to the failure of levees designed to protect the city.

Mountains and steep hills produce rapid runoff, which causes streams to rise quickly. Rocks and clay soils do not allow much water to infiltrate the ground. Saturated soil also can lead rapidly to flash flooding. Vacationing or recreating along streams or rivers can be a risk if there are thunderstorms in the area. A creek only 6 inches deep in mountainous areas can swell to a 10-foot-deep raging river in less than an hour if a thunderstorm lingers over an area for an extended period of time.

Additional high-risk locations include low water cross, recent burn [or logging] areas in mountains, and urban areas from pavement and roofs which concentrate rainfall runoff.

Ice jams and snowmelt can help cause flash floods. A deep snowpack increases runoff produced by melting snow. Heavy spring rains falling on melting snowpack can produce disastrous flash flooding. Melting snowpack may also contribute to flash floods produced by ice jams on creeks and rivers. Thick layers of ice often form on streams and rivers during the winter. Melting snow and/or warm rain running into the streams may lift and break this ice, allowing large chunks of ice to jam against bridges or other structures. This causes the water to rapidly rise behind the ice jam. If the water is suddenly released, serious flash flooding could occur downstream. Huge chunks of ice can be pushed onto the shore and through houses and buildings.

#### **2. Extent of Hazard**

The severity of flooding is measured in terms of inches of rain per hour, total inches per occurrence and the effect on community assets.

Significant events as recorded by NCEI and local sources are considered occurrences.

Major occurrences are those that caused injuries, deaths or total damage \$5,000 or greater.

### 3. Historical Occurrence

The following major occurrences were recorded by the National Centers for Environmental Information (NCEI)<sup>23</sup> and local records.

Event	Date	Injuries	Deaths	Property Damage	Crop Damage
Flood	1/23/1996			\$500,000	\$0
Flash Flood	5/14/1996			\$12,000	\$0
Flood	5/15/1996			\$1,000,000	\$0
Flash Flood	5/15/1996			\$20,000	\$0
Flash Flood	3/11/1997		2	\$8,000,000	\$0
Flood	3/11/1997			\$1,000,000	\$0
Flood	3/12/1997			\$4,000,000	\$0
Flash Flood	5/19/1997			\$100,000	\$0
Flash Flood	5/31/1997			\$20,000	\$0
Flash Flood	6/12/1997			\$10,000	\$0
Flash Flood	6/19/1997			\$10,000	\$0
Flash Flood	2/18/2000			\$50,000	\$0
Flash Flood	8/24/2000			\$10,000	\$0
Flash Flood	12/16/2000			\$20,000	\$0
Flash Flood	5/18/2001			\$10,000	\$0
Flood	7/10/2003			\$100,000	\$0
Flash Flood	8/22/2003			\$10,000	\$0
Flash Flood	5/21/2010			\$85,000	\$0
Flash Flood	4/23/2011			\$10,000	\$0
Flash Flood	6/18/2018			\$1,530,000	\$0

Available narratives of major events follow:

- **Flood – 1/23/1996**

By the 23rd many tributaries to the Ohio river had already crested and were receding back within their banks. However, a significant rain event occurred on the 23rd bringing over 2 inches of rain to South Central areas with lesser amounts to the north. Many tributaries were pushed back into flood on the 24th, and the flood crest moved downstream on the Ohio river. While most tributaries only experienced minor to moderate flooding, backwater flooding from the Ohio resulted in major flooding along some of the tributaries. The Little Miami River was flooded particularly bad just east of Cincinnati. Evacuations took place near the confluence of the Ohio and Little Miami rivers on the 24th as the Ohio river crest travelled through Cincinnati. Cincinnati eventually crested during the evening of the 24th at 57.3 feet, while flood stage is 52 feet. This was the highest crest in Cincinnati since March 1979.

- **Flash Flood – 5/15/1996**

Flash flooding caused extensive damage. Numerous roads were closed.

- **Flood – 5/15/1996**

Torrential rainfall of 3-4 inches in less than 12 hours caused the Turkey Creek and Scioto/Ohio Brush Creek to overflow their banks. The flooding affected approximately 6 mobile homes. Several washouts of roads, culverts, and low water bridges also cut

<sup>23</sup> <http://www.NCEI.noaa.gov/stormevents/>

off access to some residences. The Ohio Brush Creek was over flood stage for nearly 24 hours and reached a crest of 24 feet. The flood stage is 15 feet.

- **Flood – 3/11/1997**

Persistent heavy rainfall of over 10 inches in less than 36 hours caused the Ohio Brush Creek to rise rapidly out its banks. The river crested at 31.0 feet which is the second highest stage on record and the highest since 1962. More than 20 miles of SR 348 were covered and SRs 32 and 41 outside of Peebles were flooded. Also, water flooded onto SR 125 near West Union. Numerous homes and farms were flooded.

- **Flash Flood – 3/11/1997**

Estimated rainfall of 6 to 12 inches across the county in less than 36 hours caused area creeks and streams to rise out of their banks. Numerous roads were closed due to high water. Several rescue operations occurred. Five hundred homes were damaged beyond repair with 700 more having reparable damage. Two people were killed during this event. A boy was swept away while riding an all-terrain vehicle and a woman was killed when her car was swept off a bridge along State Route 32 near Lawshe. Her husband survived by clinging to a tree.

- **Flood – 3/2/1997**

Heavy rainfall occurred across Southern Ohio and Northern Kentucky on the 1st and 2nd with areas along the Ohio river receiving up to 12 inches of rainfall. The river rose rapidly reaching a crest of 59.8 feet at Portsmouth at 1000 pm on the 4th. Flood stage is 50.0 feet. Further downstream at Meldahl Dam, the river crested at 61.3 feet at 700 pm on the 6th. Flood stage is 51.0 feet. In Cincinnati, the river crested at 64.7 feet at 1100 pm on the 5th. Many towns were flooded from Portsmouth to Cincinnati and thousands of people were evacuated from their homes for several days.

- **Flash Flood – 6/2/1997**

A cut-off low pressure in the upper levels of the atmosphere remained across the Ohio valley from late on May 31st through June 2nd. Heavy showers fell across Southern and Central Ohio from the 31st through the morning hours of the 1st. In the afternoon of both the 1st and 2nd, additional heavy rainfall occurred with afternoon thunderstorm development mainly over Central and South-Central parts of the state. A few areas around Columbus received nearly 10 inches of rain over the 3-day period.

- **Flash Flood – 5/21/2010**

Severe thunderstorms developed on May 21st as an upper-level low moved across the area and encountered an unstable air mass. Surface winds were from the southeast which helped to add to low level shear and tornado development. Thunderstorms redeveloped over some of the same areas. Training of storms led to flash flooding across the region.

- **Flash Flood – 4/23/2011**

A complex of showers and thunderstorms moved through the area during the early morning hours.

- **Flash Flood – 6/8/2018**

Scattered thunderstorms developed ahead of an upper-level disturbance in a moist and unstable air mass. Some of the storms produce torrential rainfall with amounts as high as 4 to 5 inches.



#### 4. Probability of Future Occurrences

	Years	Events	Average Injuries	Average Deaths	Average Property Damage	Average Crop Damage	Annual Probability	Mean Time Between Occurrences (Months)
All Events	30	87	0	0.02	\$190,391	\$0	290%	4
Major Events	30	20	0	0.1	\$824,850	\$0	67%	18

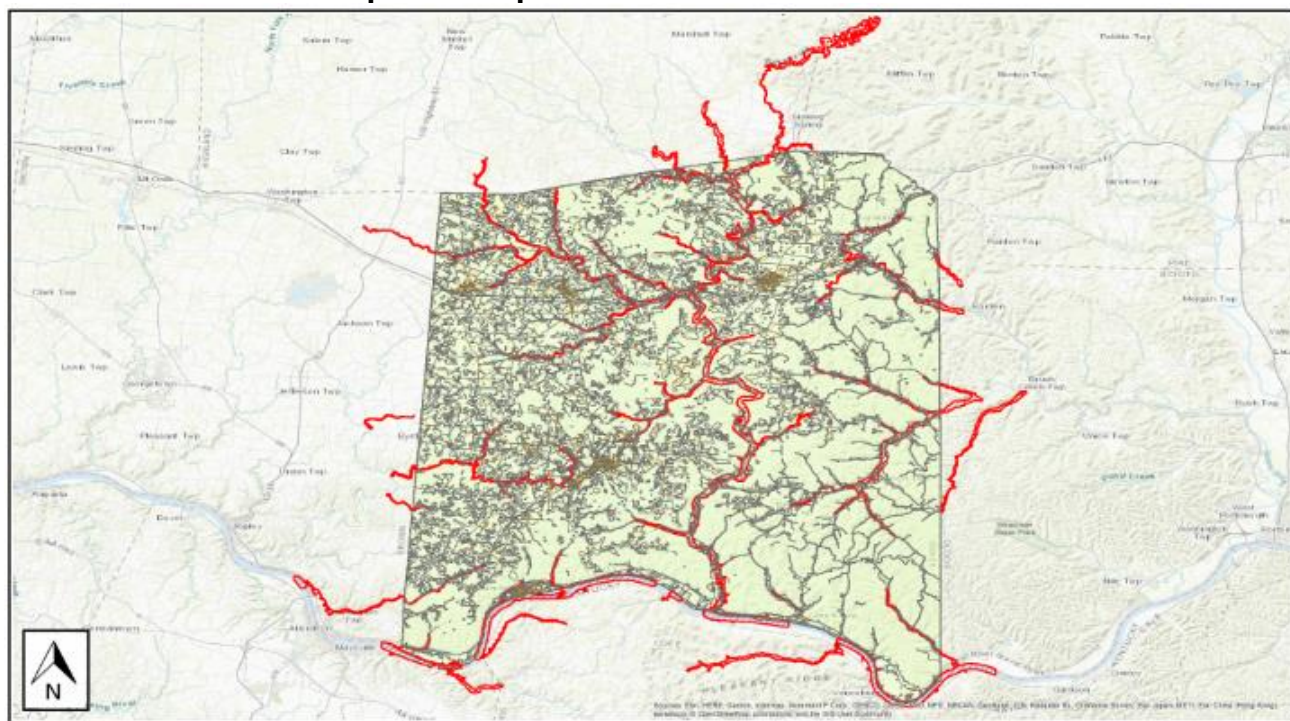
#### 5. Affected Locations

While major flooding affects the entire county, those areas in identified floodplains are the most susceptible.

However, areas not identified as being in a flood plain can experience flooding as well. The National Flood Insurance Administration estimates that one-third of the claims that they receive are for structures located outside of a mapped flood plain.

The FEMA HAZUS-MH – Multi-hazard Risk Assessment Program for Analyzing Potential Losses simulation<sup>24</sup> results for a 100-year flood affecting Adams County was used to estimate damages and impact on community assets.

**Expected Impacted Areas – 100 Year Flood**



Source: HAZUS-MH Simulation

A **Repetitive Loss Property** is any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any

<sup>24</sup> Provided by Ohio EMA, available in Adams County EMA Office



rolling ten-year period, since 1978. A repetitive loss property may or may not be currently insured by the NFIP.

A **Severe Repetitive Loss Property** any NFIP-insured residential property that has met at least 1 of the following paid flood loss criteria since 1978, regardless of ownership:

- 4 or more separate claim payments of more than \$5,000 each (including building and contents payments); or
- 2 or more separate claim payments (building payments only) where the total of the payments exceeds the current value of the property.<sup>25</sup>

Structures that flood frequently strain the National Flood Insurance Fund. In fact, the repetitive loss properties are the biggest draw on the Fund. Community leaders and residents are also concerned with the repetitive loss problem because residents' lives are disrupted and may be threatened by the continual flooding. The primary objective of the repetitive loss properties strategy is to eliminate or reduce the damage to property and the disruption to life caused by repeated flooding of the same properties.<sup>26</sup>

The Ohio EMA Mitigation Branch reports there are seven repetitive loss structures, two of which are classified as severe, in Adams County. Loss information through December 2020 is listed below:<sup>27</sup>

Community Name	Comm Nbr	Date Of Loss	Occu-pancy	Rated Flood Zone	Cumulative Building Payment	Cumulative Contents Payment	Total Losses	Total Paid	SRL Flag
Adams County	390001	2/19/2000	Single Family		\$55,568.22	\$0.00	4	\$55,568.22	Y
Manchester	390002	3/3/1997	Single Family	A20	\$19,853.54	\$0.00	1	\$19,853.54	Y
Adams County	390001	5/11/2011	Single Family	A	\$35,621.78	\$5,168.23	3	\$40,790.01	N
Adams County	390001	4/21/2002	Assmd Condo	A	\$13,936.85	\$21,352.25	2	\$35,289.10	N
Adams County	390001	5/22/2010	Single Family	X	\$29,438.50	\$0.00	2	\$29,438.50	N
Adams County	390001	2/19/2018	Single Family	AE	\$43,950.89	\$739.89	4	\$44,690.78	N
Adams County	390001	6/2/2016	Single Family	X	\$25,857.68	\$0.00	2	\$25,857.68	N

## 6. Analysis

Factor	Ranking
Frequency	High: 6-8 Declarations
Response	< 1 Week
Onset	12-24 Hours
Magnitude	10-25% Land Area
Business	1 Week
Human	Some Injuries
Property	10-25% Damaged

<sup>25</sup> [https://www.fema.gov/pdf/nfip/manual201205/content/20\\_srl.pdf](https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf)

<sup>26</sup> [https://www.fema.gov/txt/rebuild/repetitive\\_loss\\_faqs.txt](https://www.fema.gov/txt/rebuild/repetitive_loss_faqs.txt)

<sup>27</sup> Ohio EMA – 10/13/2021

## 7. Vulnerable Community Assets

Asset	Impact
People	Flooding potentially affects a large portion of the population, either directly or indirectly. This includes structural damages, isolation from essential services, need for relocation or sheltering, injuries and possibly death. Casualties. HAZUS-MH estimates no casualties
Economy	Flooded businesses would be out of business until clean up and repairs are completed and damaged inventory replaced. HAZUS-MH estimates \$ million in economic losses.
Infrastructure	The primary vulnerable infrastructure assets are roads, culverts and bridges, damaged by erosion. HAZUS-MH doesn't simulate these damages. There is potential for contaminating water supplies and inundating wastewater treatment facilities.
Structures	HAZUS-MH estimates the following structural damages.

Structure Type	Inven- tory	Average Value	At Risk		Damaged		Damages Total	
			%	Number	%	Number	%	
Residential	12,461	\$145,364	37	4,611		58		\$20,850,000
Nonresidential	1,084	\$520,894	37	401		3		\$5,470,000
Critical	25	\$520,894	37	9		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>61</b>		<b>\$26,320,000</b>

The Planning Team used the results of FEMA's Hazards United States Multi-Hazard (HAZUS-MH) 100-Year Flood Event simulation to estimate losses. This report was provided by Ohio EMA's Mitigation Branch. The following tables from the HAZUS-MH simulation report were used in making the above estimates:

Table 3: Expected Building Damage by Occupancy												
Occupancy	1-10		11-20		21-30		31-40		41-50		>50	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	0	0	0	0	0	0	0	0	0	0	0	0
Education	0	0	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	0	0	0	0	0	0	0	0	0	0
Religion	0	0	0	0	0	0	0	0	0	0	0	0
Residential	2	3	16	28	9	16	4	7	3	5	24	41
Total	2		16		9		4		3		24	

**Table 5: Expected Damage to Essential Facilities**

Classification	Total	# Facilities		
		At Least Moderate	At Least Substantial	Loss of Use
Emergency Operation Centers	0	0	0	0
Fire Stations	8	0	0	0
Hospitals	1	0	0	0
Police Stations	5	0	0	0
Schools	11	0	0	0

**Table 6: Building-Related Economic Loss Estimates**

(Millions of dollars)

Category	Area	Residential	Commercial	Industrial	Others	Total
<b><u>Building Loss</u></b>						
	Building	20.85	2.52	0.49	2.46	26.33
	Content	9.52	5.39	0.71	6.82	22.44
	Inventory	0.00	0.07	0.11	0.22	0.40
	<b>Subtotal</b>	<b>30.38</b>	<b>7.98</b>	<b>1.31</b>	<b>9.50</b>	<b>49.17</b>
<b><u>Business Interruption</u></b>						
	Income	0.26	3.52	0.01	2.12	5.90
	Relocation	4.38	0.71	0.01	0.90	6.00
	Rental Income	1.40	0.54	0.00	0.05	1.99
	Wage	0.62	3.30	0.03	6.29	10.24
	<b>Subtotal</b>	<b>6.66</b>	<b>8.06</b>	<b>0.05</b>	<b>9.36</b>	<b>24.13</b>
<b>ALL</b>	<b>Total</b>	<b>37.04</b>	<b>16.04</b>	<b>1.36</b>	<b>18.85</b>	<b>73.29</b>

## **B. Severe Summer Storm/Thunderstorm/Windstorm/Hail**

### **1. Description**

A thunderstorm is a rain shower during which you hear thunder. Since thunder comes from lightning, all thunderstorms have lightning. A thunderstorm is the result of convection. Usually created by surface heating, convection is upward atmospheric motion that transports whatever is in the air along with it—especially any moisture available.

Damaging winds are often called “straight-line” winds to differentiate the damage they cause from tornado damage. Strong thunderstorm winds can come from a number of different processes. Most thunderstorm winds that cause damage at the ground are a result of outflow generated by a thunderstorm downdraft. Damaging winds are classified as those exceeding 50-60 mph.

Damage from severe thunderstorm winds account for half of all severe reports in the lower 48 states and is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles.

Since most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft, anyone living in thunderstorm-prone areas of the world is at risk for experiencing this hazard. People living in mobile homes are especially at risk for injury and death. Even anchored mobile homes can be seriously damaged when winds gust over 80 mph.

Severe windstorms can have a devastating effect on a community. Winds can cause trees to fall and structures to fail. These can cascade into other impacts such as downed power lines, interrupting travel and power, and trees blocking roads and causing damage to close-by structures.

Hail is often produced by severe thunderstorms. Hail is a form of precipitation that occurs when updrafts in thunderstorms carry raindrops upward into extremely cold areas of the atmosphere where they freeze into balls of ice. Hail can damage aircraft, homes and cars, and can be deadly to livestock and people.

Hailstorms are a potentially damaging outgrowth of severe thunderstorms. Hailstorms frequently accompany thunderstorms, so their locations and spatial extents overlap. Hail can cause substantial damage to vehicles, roofs, landscaping, and other areas of the built environment. U.S. agriculture is typically the area most affected by hailstorms, which cause severe crop damage even during minor events.

Hail is usually pea-sized to marble-sized, but big thunderstorms can produce big hail.

### **2. Extent of Hazard**

A thunderstorm is classified as “severe” when it contains one or more of the following: hail one inch or greater or winds gusting in excess of 50 knots (57.5 mph). Additionally, rainfall rates greater than 2 inches per hour or one that produces hail indicates a severe thunderstorm.

The severity of hailstorms is measured in hail size. Hail of .75-inch diameter is considered to be damaging.

Significant events as recorded by NCEI and local sources are considered occurrences.

Major occurrences are those that caused injuries, deaths or total damage \$5,000 or greater.

### 3. Historical Occurrence

The following major occurrences were recorded by the National Centers for Environmental Information (NCEI)<sup>28</sup> and local records. Available follow the table.

Event	Date	Injuries	Deaths	Property Damage	Crop Damage
Thunderstorm Wind	2/21/1993	5		\$500,000	\$0
Thunderstorm Wind	4/15/1994		1	\$500,000	\$0
Thunderstorm Wind	5/14/1995			\$6,000	\$0
Thunderstorm Wind	4/23/1996			\$100,000	\$0
Thunderstorm Wind	5/18/1996			\$50,000	\$0
Thunderstorm Wind	8/27/1996			\$10,000	\$0
Thunderstorm Wind	6/10/1998			\$6,000	\$0
Thunderstorm Wind	7/19/1998			\$10,000	\$0
Thunderstorm Wind	4/19/1999			\$30,000	\$0
Thunderstorm Wind	7/30/1999			\$6,000	\$0
Thunderstorm Wind	8/24/1999			\$15,000	\$0
Thunderstorm Wind	10/13/1999			\$12,000	\$0
Thunderstorm Wind	4/13/2000			\$500,000	\$0
Thunderstorm Wind	7/13/2000			\$10,000	\$0
Thunderstorm Wind	8/19/2000			\$20,000	\$0
Thunderstorm Wind	11/19/2000			\$15,000	\$0
High Wind	12/11/2000			\$100,000	\$0
High Wind	3/19/2002			\$20,000	\$0
Thunderstorm Wind	6/14/2002			\$10,000	\$0
Thunderstorm Wind	8/18/2002			\$8,000	\$0
Thunderstorm Wind	8/22/2003			\$6,000	\$0
Hail	5/17/2004			\$10,000	\$0
Thunderstorm Wind	6/14/2005			\$20,000	\$0
Thunderstorm Wind	12/11/2006			\$10,000	\$0
Thunderstorm Wind	7/15/2007			\$36,000	\$0
Thunderstorm Wind	8/25/2007			\$15,000	\$0
Thunderstorm Wind	2/16/2008			\$58,000	\$0
Hail	6/10/2008			\$15,000	\$0
Thunderstorm Wind	6/10/2008			\$22,000	\$0
Thunderstorm Wind	6/16/2008			\$10,000	\$0
Thunderstorm Wind	7/20/2008			\$20,000	\$0
High Wind	9/14/2008			\$3,300,000	\$0
Thunderstorm Wind	6/14/2009			\$14,000	\$0
Thunderstorm Wind	3/23/2011			\$23,000	\$0
Thunderstorm Wind	3/12/2012			\$25,000	\$0
Thunderstorm Wind	6/29/2012			\$30,000	\$0
Thunderstorm Wind	7/11/2012			\$8,000	\$0
Thunderstorm Wind	7/26/2012			\$12,000	\$0
Thunderstorm Wind	8/19/2012			\$10,000	\$0
Thunderstorm Wind	12/22/2013			\$10,000	\$0

<sup>28</sup> <http://www.NCEI.noaa.gov/stormevents/>

Event	Date	Injuries	Deaths	Property Damage	Crop Damage
Thunderstorm Wind	5/14/2014			\$51,000	\$0
Hail	5/14/2014			\$560,000	\$0
Thunderstorm Wind	7/13/2015			\$7,000	\$0
Thunderstorm Wind	7/14/2015			\$6,000	\$0
Thunderstorm Wind	6/21/2016			\$6,000	\$0
Thunderstorm Wind	3/11/2017			\$25,000	\$0
Thunderstorm Wind	2/25/2018			\$10,000	\$0
Thunderstorm Wind	5/31/2018			\$7,000	\$0

Available narratives of major events follow:

- Thunderstorm Wind - 4/23/1996**  
 Barn destroyed.
- Thunderstorm Wind - 5/18/1996**  
 58 mph wind gust. Two barns destroyed, numerous trees downed, and three cows killed.
- Thunderstorm Wind - 8/27/1996**  
 Numerous trees and power lines downed.
- Thunderstorm Wind - 7/19/1998**  
 A fast-moving Mesoscale Convective System with numerous bow echo segments dropped from northern Indiana into the western half of Ohio causing widespread significant wind damage. During the early morning hours, the severe activity ceased and the storms began to subside.
- Thunderstorm Wind - 10/13/1999**  
 A cold front pushed east from Illinois and Indiana during the afternoon hours and combined with a vigorous upper level disturbance that dropped into the Ohio Valley from the lower Great Lakes region.
- Thunderstorm Wind - 8/19/2000**  
 Two clusters of thunderstorms caused significant damage on the 9th. During the morning hours, a large bow echo raced across the area causing widespread wind damage. During the afternoon and evening hours, a large cluster of storms formed causing widespread wind damage and hail along with some flooding.
- High Wind - 12/11/2000**  
 A strong low pressure system dragged a sharp cold front across the region dropping temperatures by 30 degrees. Very strong winds occurred along and behind the front with numerous locations receiving gusts over 58 mph. The highest recorded gust was 69 mph in Ostrander in Delaware county. Numerous trees, large limbs, and power lines were knocked down across the region. Some of the trees fell on cars and homes. A motel sign was blown onto a truck in Warren County. A church that was under construction collapsed due to the winds. One woman was killed in Clermont County when a 200-foot tree fell through her mobile home and landed on her.
- High Wind - 3/19/2002**  
 A widespread area of high winds blew down trees, power poles, and various other smaller structures and signs. At one time, approximately 100,000 people were without power. One man was killed when his semi-tractor overturned, and several others were injured in automobile accidents, and when trees fell on the buildings that they were in.

Two people were briefly trapped in a mobile home when a tree fell on it. The hardest hit area was just southwest of Columbus in Grove City where an 84 mph wind was recorded and several structures at the high school were damaged or destroyed.

- **Thunderstorm Wind - 12/11/2006**

A thin convective line moved across the forecast area during the early morning ahead of a strengthening low pressure system.

- **Thunderstorm Wind - 7/15/2007**

Severe thunderstorms developed over southern Ohio ahead of a cold front during the afternoon.

- **Thunderstorm Wind - 8/25/2007**

Severe thunderstorms developed ahead of a cold front across central and south central Ohio during the afternoon and evening.

- **Thunderstorm Wind - 2/16/2008**

A line of severe thunderstorms developed during the late evening ahead of a strong cold front. Persistent heavy rain caused flooding, especially across west central Ohio.

- **Hail - 6/10/2008**

A cold front sparked scattered convective storms ahead of it...producing large hail and some damaging winds during the evening of the 9th and overnight during the early morning hours of the 10th.

- **Thunderstorm Wind - 6/10/2008**

A cold front sparked scattered convective storms ahead of it...producing large hail and some damaging winds during the evening of the 9th and overnight during the early morning hours of the 10th.

- **Thunderstorm Wind - 6/16/2008**

A cold front passed over the Ohio Valley during the overnight hours of the 15th. Some bowing segments persisted through the afternoon of the 16th.

- **Thunderstorm Wind - 7/20/2008**

A complex of severe thunderstorms moved across the region during the evening.

- **High Wind - 9/14/2008**

The remnants of hurricane Ike raced northeast through the midwest and merged with a frontal boundary across the lower Ohio Valley Sunday morning. Abundant sunshine promoted deep mixing of the atmosphere, and warm, dry air aloft translated down to the surf

- **Thunderstorm Wind - 6/14/2009**

Scattered showers and thunderstorms developed throughout the day. Some of them became severe when a mid level short wave tracked through the region and gave additional lift to already existing storms.

- **Thunderstorm Wind - 3/23/2011**

An upper level jet stream tracking through the Ohio Valley combined with low pressure at the surface to produce severe thunderstorms during the afternoon of March 23rd. Several supercells developed producing large hail. There were also a few thunderstorm

- **Thunderstorm Wind - 3/12/2012**

Thunderstorms developed during the afternoon in a high wind shear environment ahead of a strengthening low pressure system. Many of these storms became severe,

with large hail, damaging thunderstorm winds, and tornadoes all being the main threats.

- **Thunderstorm Wind - 6/29/2012**

A very hot and potentially unstable airmass interacted with northwesterly flow aloft to produce a derecho across northern Illinois. This derecho then moved rapidly east southeast across the Ohio Valley producing widespread straight line wind damage. This

- **Thunderstorm Wind - 7/11/2012**

An upper level disturbance combined with daytime heating to produce numerous thunderstorms during the afternoon and evening. The main threats from these storms were large hail and damaging winds.

- **Thunderstorm Wind - 7/26/2012**

Strong upper level winds combined with an unstable airmass to produce widespread convection during the afternoon hours. The primary threats from these storms were damaging winds and large hail.

- **Thunderstorm Wind - 8/19/2012**

Disorganized convection developed ahead of a shortwave trough during the afternoon and evening hours. Some of these storms became severe with damaging winds and isolated large hail the primary threats.

- **Thunderstorm Wind - 12/22/2013**

Low pressure drew an unseasonably warm and moist air mass across the region. Convection organized ahead of the low and brought heavy rainfall and damaging winds to the area from the evening of the 21st into the morning of the 22nd. Some of the flooding li

- **Thunderstorm Wind - 5/14/2014**

Numerous thunderstorms developed along and ahead of a slow-moving cold front during the afternoon and evening. These storms were capable of producing damaging winds, large hail, and isolated tornadoes.

- **Hail - 5/14/2014**

Numerous thunderstorms developed along and ahead of a slow-moving cold front during the afternoon and evening. These storms were capable of producing damaging winds, large hail, and isolated tornadoes.

- **Thunderstorm Wind - 7/13/2015**

Showers and thunderstorms associated with an upper level disturbance pushed down into the Ohio Valley during the early afternoon hours.

- **Thunderstorm Wind - 7/14/2015**

A line of severe thunderstorms developed along a cold front that pushed south across the region.

- **Thunderstorm Wind - 6/21/2016**

Strong to severe thunderstorms developed along a cold front that was dropping south through the region.

- **Thunderstorm Wind - 3/11/2017**

An unseasonably warm and moist air mass was in place across the region during the morning hours of March 1st. Showers and thunderstorms developed across the Ohio Valley during the early morning hours as a strong low pressure system lifted northeast into the Great Lakes region. These storms produced heavy rain, large hail and several



tornadoes. A squall line then moved through the region during the mid morning hours ahead of an approaching cold front. These storms resulted in damaging winds and additional heavy rain.

- **Thunderstorm Wind - 2/25/2018**

Strong to severe thunderstorms, with very heavy rainfall, developed ahead of a cold front.

- **Thunderstorm Wind - 5/31/2018**

A complex of thunderstorms pushed east across the Ohio Valley during the afternoon hours. Several of the thunderstorms produced damaging wind gusts.

#### 4. Probability of Future Occurrences

	Years	Events	Average Injuries	Average Deaths	Average Property Damage	Average Crop Damage	Annual Probability	Mean Time Between Occurrences (Months)
All Events	30	215	0.02	0	\$30,070	\$0	717%	2
Major Events	30	47	0.11	0.02	\$131,170	\$0	157%	8

#### 5. Affected Locations

Severe summer storms affect the entire county.

#### 6. Analysis

Factor	Ranking
Frequency	Medium: 3-5 Declarations
Response	< 1 Week
Onset	6-12 Hours
Magnitude	25-50% Land Area
Business	< 24 Hours
Human	Some Injuries
Property	< 10% Damaged

#### 7. Vulnerable Community Assets

Asset	Impact
People	The primary impact on people would be isolation and not being able to travel at least on primary routes for several hours – perhaps more on township roads that may be washed out. In some cases county roads, state routes and US highways may also be rendered impassible due to erosion damage.
Economy	Loss of power affect businesses both in loss of sales and refrigeration. Heavy rain and hail may adversely affect crops.
Infrastructure	The primary vulnerable infrastructure assets are roads, culverts and bridges, damaged by erosion. Lightning may adversely affect electrical and communications systems.

Asset	Impact
Structures	All structures are at risk for rain water and hail damage. The Planning Team used the NWS's estimate of \$131,170 in damages per major event in this analysis.

### 8. Estimated Structural Damages

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364	100	12,461		9	10	\$130,827
Nonresidential	1,084	\$520,894	100	1,084		1	2	\$10,417
Critical	25	\$520,894	100	25		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>10</b>		<b>\$141,245</b>

## C. Severe Winter Storm

### 1. Description

A winter storm is an event in which the main types of precipitation are snow, sleet or freezing rain. Winter Storm hazards include wind chill, ice storms, heavy snow, and blizzard conditions.

Most deaths from winter storms are not directly related to the storm itself.

- People die in traffic accidents on icy roads.
- People die of heart attacks while shoveling snow.
- People die of hypothermia from prolonged exposure to cold.

Everyone is potentially at risk during winter storms. The actual threat to you depends on your specific situation. Recent observations show that:

Of injuries related to ice and snow:

- About 70% occur in automobiles.
- About 25% are people caught out in the storm.
- Majority are males over 40 years old.

Of injuries related to exposure to cold:

- 50% are people over 60 years old.
- Over 75% are males.
- About 20% occur in the home.

Three basic ingredients are necessary to make a winter storm:

- Cold air. Below freezing temperatures in the clouds and near the ground are necessary to make snow and/or ice.
- Lift. Something to raise the moist air to form the clouds and cause precipitation. An example of lift is warm air colliding with cold air and being forced to rise over the cold dome. The boundary between the warm and cold air masses is called a front. Another example of lift is air flowing up a mountainside.
- Moisture. To form clouds and precipitation. Air blowing across a body of water, such as a large lake or the ocean, is an excellent source of moisture.

The severity may be measured in inches of snow or ice, but it's more the combination of freezing precipitation with the ambient and precipitation conditions just before the storm as well as the duration of freezing temperatures with temperatures hovering around freezing being an enhancer to the severity.

Wet Snow and Freezing Rain can weigh down power lines, tree limbs and roofs of structures. Wet snow compacts and can be difficult to dispose of.

Ice results for rain freezing or snow compacting. In addition to the effects of wet snow and freezing rain, ice can build up over time. As the temperature drops, it becomes harder and difficult to remove with snowplows; heavy equipment is usually needed. As the temperature rises above freezing, ice left on gravel roads, as are most township roads, will melt and seep into the roadbed causing the "bottom to drop out."

Dry Snow is usually not a significant problem as it can be plowed away.

There may also be flooding if the snow/ice accumulation is significant and the temperatures warm quickly.

Severe winter storms are those winter storms that have a significant impact. Source: NOAA<sup>29</sup>.

## 2. Extent of Hazard

The severity of winter storms is measured in terms of snowfall, wind and temperature. Generally, a severe winter storm adds at least 6 new inches of snow, has winds of 40 mph or greater, causes ice accumulation of ½ inch or more or has a wind chill factor or less than 0 degrees.

Any of these are considered occurrences.

Major occurrences are those that caused injuries, deaths or total damage \$5,000 or greater.

## 3. Historical Occurrence

The following major occurrences were recorded by the National Centers for Environmental Information (NCEI)<sup>30</sup> and local records.

Event	Date	Injured	Deaths	Property Damage	Crop Damage
Cold/Wind Chill	2/4/1996	0	0	\$15,000	\$0
Winter Storm	2/3/1998	0	0	\$200,000	\$0
Ice Storm	2/16/2003	0	0	\$1,000,000	\$0
Winter Storm	1/27/2009	0	0	\$25,000	\$0
Extreme Cold/Wind Chill	1/6/2014	0	0	\$100,000	\$0
Extreme Cold/Wind Chill	1/27/2014	0	0	\$50,000	\$0
Extreme Cold/Wind Chill	2/18/2015	0	0	\$100,000	\$0

Available narratives of major events follow:

- **Winter Storm - 1/16/1996**

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 area.

- **Cold/Wind Chill - 2/11/1996**

Arctic high pressure brought the coldest air of the season to the Ohio Valley. Cincinnati broke its record low on the 4th with a temperature of 11 below zero. Cincinnati also experienced its record low maximum temperatures of 7 and 6 degrees on the 3rd day.

- **Frost/Freeze - 4/16/2007**

Unseasonably warm temperatures for an extended period of time in March allowed much of the Ohio Valley to begin its agricultural growing season early. In early April, a cold snap with low temperatures dropping into the low 20s threatened agricultural interests across the region. The full effect of these weather extremes is still yet to be known and will not be known until the fall harvest can be compared with yields from previous years. The initial estimate of 16.74 million in crop damage was split evenly between 31 Ohio counties.

<sup>29</sup> <http://www.nssl.noaa.gov/education/svrwx101/winter/>

<sup>30</sup> <http://www.NCEI.noaa.gov/stormevents/>

#### 4. Probability of Future Occurrences

	Years	Events	Average Injuries	Average Deaths	Average Property Damage	Average Crop Damage	Annual Probability	Mean Time Between Occurrences (Months)
<b>All Events</b>	30	63	0	0	\$23,683	\$0	210%	6
<b>Major Events</b>	30	7	0	0	\$212,857	\$0	23%	51

#### 5. Affected Locations

Severe winter storms affect the entire county.

#### 6. Analysis

Factor	Ranking
Frequency	Medium: 3-5 Declarations
Response	< 1 Week
Onset	12-24 Hours
Magnitude	10-25% Land Area
Business	< 24 Hours
Human	Some Injuries
Property	< 10% Damaged

#### 7. Vulnerable Community Assets

Asset	Impact
People	The primary impact on people would be isolation and not being able to travel at least on primary routes for about 12 hours after the storm subsided. Power outages would also be widespread.
Economy	Loss of power affect businesses both in loss of sales and refrigeration.
Infrastructure	Electricity is likely to be out for a period of time. As this time increases, other utilities dependent on power will also likely fail.
Structures	Older structures and those with flat roofs would be most at risk by the weight of snow and ice on their roofs. The NWS's estimate of \$212,857 in damages per major event was used in this analysis.

#### 8. Estimated Structural Damages

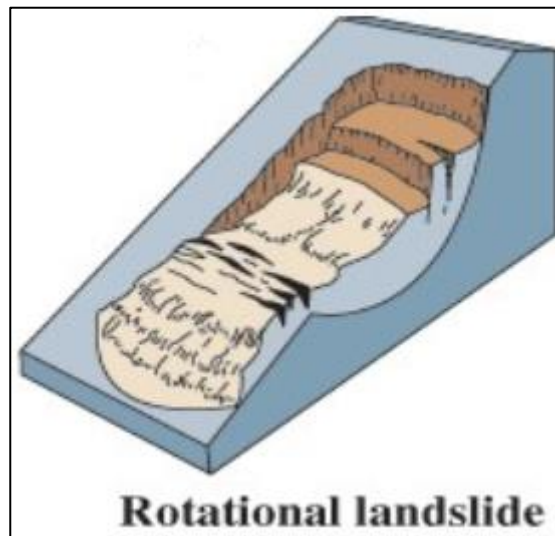
Structure Type	Inventory	Average Value	At Risk %	At Risk Number	Damaged %	Damaged Number	Damages %	Damages Total
Residential	12,461	\$145,364	100	12,461		10	10	\$145,364
Nonresidential	1,084	\$520,894	100	1,084		2	8	\$83,343
Critical	25	\$520,894	100	25		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>12</b>		<b>\$228,707</b>

## D. Landslides

### 1. Description

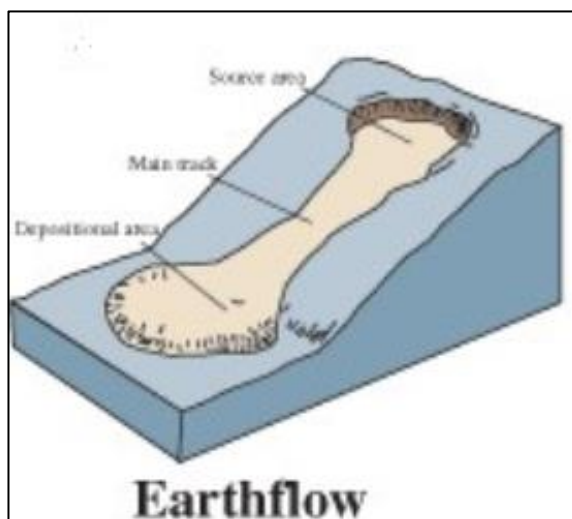
Per the Ohio Department of Natural Resources – Division of Geological Survey GeoFacts publication, a landslide is the downward and outward movement of soil and rock material on slopes. There are three main types of landslides that occur in Ohio<sup>31</sup>:

**Rotational Slump:** the movement of a mass of weak rock or sediment as a block unit along a curved slip plane. In Ohio, these types of slides commonly involve hundreds of thousands of cubic yards of material and extend for hundreds of feet. The crown or head, located in the upper section of the ground surface, consists of one or more rupture zones (scarps) that form a stair-step pattern of displaced blocks. The surfaces of these blocks are commonly rotated backward (reverse slope) and form depressions where water may accumulate, creating small ponds or swampy areas. Trees on these blocks may be inclined upslope, toward the top of the hill. The lower, downslope



end (toe) of a rotational slump is a fan shaped, bulging mass of material characterized by radial ridges and cracks. Trees on this portion of the landslide may be inclined at strange angles, giving rise to the descriptive terms "drunken" or "staggering" forest. Rotational slumps may develop comparatively slowly and commonly require several months or even years to reach stability; however, on occasion, they may move rapidly, achieving stability in only a few hours.

**Earthflow:** involves rock, sediment, or weathered surface materials moving downslope in a mass. The most common form of earth movement in Ohio, earthflow involves a smaller area than a rotational slump and forms a hummocky topography of ridges and swales. Trees may be inclined at odd angles throughout the length of an earthflow. Earthflows are most common in weathered surface materials, do not necessarily indicate weak rock, and are also common in unconsolidated glacial sediments. The rate of movement of an earthflow is generally quite slow.



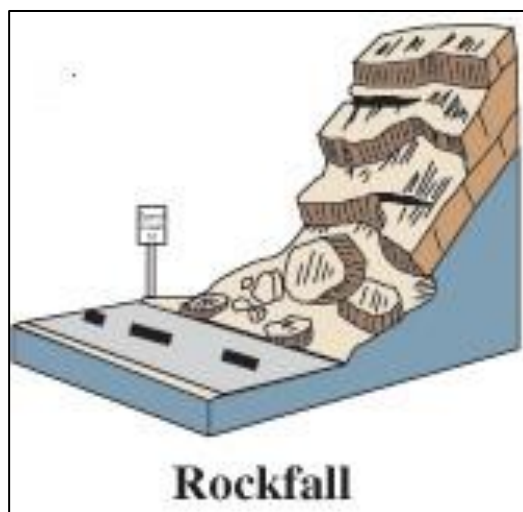
**Rockfall:** an extremely rapid, potentially dangerous downslope movement of earth materials. Large blocks of massive bedrock suddenly become detached from a cliff or steep hillside and free fall in a rolling, bounding, or sliding manner downslope. Most rockfalls in Ohio involve massive beds of sandstone or limestone. Surface water seeps into joints or cracks in the rock, increasing its weight and causing expansion of joints in

<sup>31</sup> <http://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/GeoFacts/geof08.pdf>

freezing temperatures, thus prying blocks of rock away from the main cliff. Weak and easily eroded clay or shale beneath the massive bed is an important contributing factor to rockfall. All illustrations were provided by the USGS.

One or more of the following conditions contribute to the occurrence of landslide events:

- **Steep slope:** All landslides move downslope under the influence of gravity. Therefore, steep slopes, cliffs, or bluffs are a required element leading to a landslide, especially in conjunction with one or more of the conditions listed below.
- **Jointed rocks:** Fractures in rocks allow surface moisture to penetrate and weaken it. When the moisture freezes, it pries the rock masses apart at the joint.
- **Fine-grained, permeable rock or sediment:** Fine rock particles are particularly conducive to landslide development because large amounts of moisture can enter them easily, increasing the material's weight, reducing the bonding strength of individual grains, and dissolving grain cementing materials.
- **Clay or shale units subject to lubrication:** Groundwater penetration of clay or shale can lead to a loss of binding strength between individual mineral grains and subsequent failure.
- **Large amounts of water:** Periods of heavy rainfall, excess snowmelt, or other events where water is accumulated saturate the zone above the normal water table and cause a landslide.



In addition to the conditions noted above, a landslide requires a triggering mechanism to initiate downslope movement. Several events or circumstances, many of them human-caused, can trigger landslides, including:

- Vibrations such as those from human-causes like blasting, the passing of a heavy truck, or from natural events like earthquakes, although no such occurrence has been documented in Ohio.
- Over steepened slopes caused by undercutting by stream or wave erosion, by human construction activities, or by the addition of fill material to the upper portion of a slope, disturb the equilibrium of a stable slope and cause the angle of stability to be exceeded.
- Increased weight on a slope caused by the addition of large amounts of fill, the construction of a building or other structure, or an unusual increase in precipitation, either from heavy rains or from artificial alteration of drainage patterns.
- Removal of vegetation and trees because of the loss of roots, which tend to hold the rock or sediment in place and soak up excess moisture.

According to the Ohio Department of Natural Resources<sup>32</sup>, the causes of landslides are steep slopes; jointed rocks; fine-grained, permeable rock or sediment; and clay or shale units subject to lubrication (ground water).

<sup>32</sup> <http://geosurvey.ohiodnr.gov/portals/geosurvey/PDFs/GeoFacts/geof08.pdf>



Ohio Department of Transportation (ODOT) assesses the risk (probability of additional movement x probability of significant impact to an ODOT asset or adjacent property or features) of landslide sites as follows<sup>33</sup>:

**Table 300-06. Probability Table**

Probability of Additional Movement (A)	Probability of Significant Impact to an ODOT asset or adjacent property or features (B)			
	Very High (4)	High (3)	Moderate (2)	Low (1)
Very High (4)	Very High 16	Very High 12	High 8	Moderate 4
High (3)	Very High 12	High 9	High 6	Moderate 3
Moderate (2)	High 8	High 6	Moderate 4	Low 2
Low (1)	Moderate 4	Moderate 3	Low 2	Low 1

The Preliminary Score is calculated by multiplying Column A (Probability of Additional Movement) by Column B (Probability of Significant Impact to the Roadway, Structures, Adjacent Property or Feature).

**Table 300-07. Tier Based on Tier Determination Score**

Tier Determination Score	Tier Action
1 or 2	<b>Tier 1 Site</b> No Detailed Rating Needed
3 or 4	<b>Tier 2 Site</b> Detailed Rating Needed
6, 8, or 9	<b>Tier 3 Site</b> Detailed Rating Needed
12 or 16	<b>Tier 4 Site</b> Detailed Rating Needed

ODOT assesses the risk (probability of additional movement x probability of significant impact to an ODOT asset or adjacent property or features) of landslide sites as follows<sup>34</sup>:

**Table 300-07. Probability Table**

Potential of Rockfall Occurrence (A)	Potential of Rockfall to Impact Roadway (B)			
	Very High (10)	High (8)	Moderate (4)	Low (1)
Very High (10)	Very High 20	Very High 18	High 14	Moderate 11
High (8)	Very High 18	High 16	High 12	Moderate 9
Moderate (4)	High 12	High 12	Moderate 8	Low 5
Low (1)	Moderate 11	Moderate 9	Low 5	Low 2

The Preliminary Score is calculated by multiplying Column A (Probability of Additional Movement) by Column B (Probability of Significant Impact to the Roadway, Structures, Adjacent Property or Feature).

<sup>33</sup> [https://www.transportation.ohio.gov/wps/wcm/connect/gov/3ab29238-940c-4133-a0ca-63117386246f/Manual\\_of\\_Landslide\\_Inventory.pdf?MOD=AJPERES&CONVERT\\_TO=url&CACHEID=ROOTWORLDKSPACE.Z18\\_K9I401S01H7F40QBNJU3S01F56-3ab29238-940c-4133-a0ca-63117386246f-nUMRoKz](https://www.transportation.ohio.gov/wps/wcm/connect/gov/3ab29238-940c-4133-a0ca-63117386246f/Manual_of_Landslide_Inventory.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORLDKSPACE.Z18_K9I401S01H7F40QBNJU3S01F56-3ab29238-940c-4133-a0ca-63117386246f-nUMRoKz)

<sup>34</sup> [https://www.transportation.ohio.gov/wps/wcm/connect/gov/6bf9a042-f48c-4eac-ad0f-2c8e612ee259/Rock\\_Slope\\_Inventory\\_Manual.pdf?MOD=AJPERES&CONVERT\\_TO=url&CACHEID=ROOTWORLDKSPACE.Z18\\_K9I401S01H7F40QBNJU3S01F56-6bf9a042-f48c-4eac-ad0f-2c8e612ee259-nUMS5-r](https://www.transportation.ohio.gov/wps/wcm/connect/gov/6bf9a042-f48c-4eac-ad0f-2c8e612ee259/Rock_Slope_Inventory_Manual.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORLDKSPACE.Z18_K9I401S01H7F40QBNJU3S01F56-6bf9a042-f48c-4eac-ad0f-2c8e612ee259-nUMS5-r)



**Table 300-08. Tier Type Based on Tier Determination Score**

Tier Determination Score	Tier Type Action
2 to 5	<b>Tier 1 Site</b> No Detailed Rating Needed
8 to 11	<b>Tier 2 Site</b> Detailed Rating Needed
12 to 16	<b>Tier 3 Site</b> Detailed Rating Needed
18 to 20	<b>Tier 4 Site</b> Detailed Rating Needed

## 2. Extent of Hazard

Landslides are measured by a count of occurrences that cause damage to structures or infrastructure or restrict travel.

Any landslide that impacts people, structures or infrastructure (such as roads) is considered an occurrence.

## 3. Historical Occurrence

Adams County typically experiences one landslide per year that affect roadways. More are averted by identification and neutralizing the hazard by various techniques.

## 4. Probability of Future Occurrences

As logging continues throughout the county, the probability of more occurrences increases. With this increased potential, the Planning Team estimates a 75% chance of an occurrence in any given year.

## 5. Affected Locations

Locations along steep hillsides are most at risk. This is primarily along US 52 and the Ohio River.

Landslides. ODOT reports the following statistics for Adams County<sup>35</sup>:

Tier 1	Tier 2	Tier 3	Tier 4	New	Inspection Due	Remediated	Progressing
220	52	26	4	3	83	0	3

Refer to the Landslide Locations map for plot of locations.

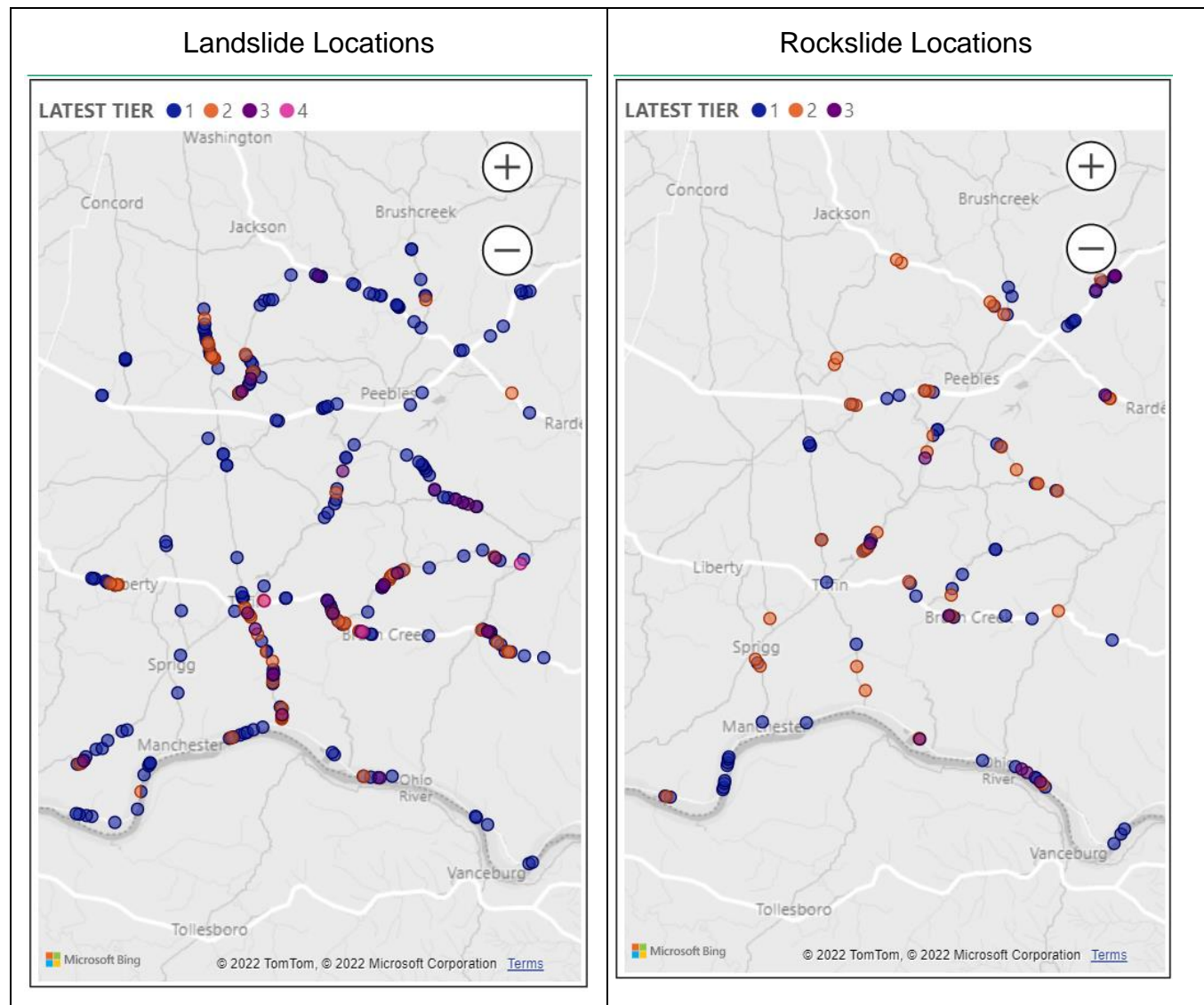
Rockslides. ODOT reports the following statistics for Adams County<sup>36</sup>:

Tier 1	Tier 2	Tier 3	Tier 4	New	Inspection Due	Remediated	Progressing
68	37	12	0	0	56	0	0

Refer to the Rockslide Locations map for plot of locations.

<sup>35</sup> <https://app.powerbigov.us/view?r=eyJrljoiNGE2YWM5YjgtMDE3Zi00OGUxLWExNDAyYjU5ZmY3OTIzNmNmliwidCI6IjUwZjhmY2M0LTk0ZDgtNGYwNy04NGViLTM2ZWQ1N2M3YzhhMiJ9&pageName=ReportSectionb3fbde310610830ed6c6>

<sup>36</sup> <https://app.powerbigov.us/view?r=eyJrljoiNGE2YWM5YjgtMDE3Zi00OGUxLWExNDAyYjU5ZmY3OTIzNmNmliwidCI6IjUwZjhmY2M0LTk0ZDgtNGYwNy04NGViLTM2ZWQ1N2M3YzhhMiJ9&pageName=ReportSectionb3fbde310610830ed6c6>



## 6. Analysis

Factor	Ranking
Frequency	Low: 1-2 Declarations
Response	< 1 Week
Onset	6-12 Hours
Magnitude	10% Land Area
Business	1 Week
Human	Minor Injuries
Property	10-25% Damaged

## 7. Vulnerable Community Assets

Asset	Impact
People	No impact.
Economy	Little or no measurable impact.
Infrastructure	Roads and bridges below and above slides would be impacted.

Asset	Impact
Structures	Impacted structures would likely suffer 50% of value in damages.

### 8. Estimated Structural Damages

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364				1	50	\$72,682
Nonresidential	1,084	\$520,894				0		\$0
Critical	25	\$520,894				0		\$0
<b>Totals</b>	<b>13,570</b>					<b>1</b>		<b>\$72,682</b>

## E. Drought

### 1. Description

Drought is characterized by a period of extreme dry weather usually complicated by warm temperatures. It is a deficiency in precipitation over an extended period, usually a season or more, resulting in a water shortage causing adverse impacts on vegetation, animals, and/or people. It is a normal, recurrent feature of climate that occurs in virtually all climate zones, from very wet to very dry. Drought is a temporary aberration from normal climatic conditions, thus it can vary significantly from one region to another. Drought is different than aridity, which is a permanent feature of climate in regions where low precipitation is the norm, as in a desert. Human factors, such as water demand and water management, can exacerbate the impact that drought has on a region. Because of the interplay between a natural drought event and various human factors, drought means different things to different people. In practice, drought is defined in a number of ways that reflect various perspectives and interests. Below are three commonly used definitions:

*Meteorological Drought* is usually defined based on the degree of dryness (in comparison to some “normal” or average) and the duration of the dry period. Drought onset generally occurs with a meteorological drought.

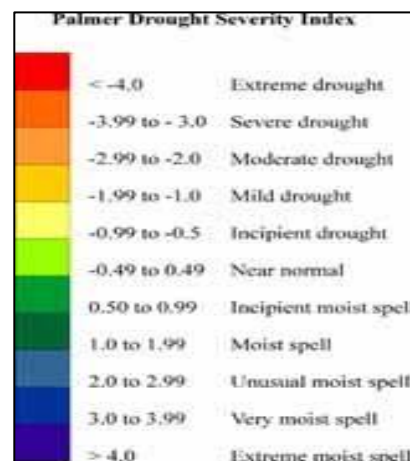
*Agricultural Drought* links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, soil water deficits, reduced ground water or reservoir levels needed for irrigation, and so forth.

*Hydrological Drought* usually occurs following periods of extended precipitation shortfalls that impact water supply (i.e., streamflow, reservoir and lake levels, ground water), potentially resulting in significant societal impacts. Because regions are interconnected by hydrologic systems, the impact of meteorological drought may extend well beyond the borders of the precipitation-deficient area. Source: NOAA<sup>37</sup>

### 2. Extent of Hazard

Drought severity is measured using the Palmer Drought Severity Index (PDSI). The PDSI uses readily available temperature and precipitation data to estimate relative dryness. It is a standardized index that spans -10 (dry) to +10 (wet). It has been reasonably successful at quantifying long-term drought. This table translates PDSI indices to plain language.

Droughts declared by the federal or state officials are considered occurrences.



### 3. Historical Occurrence

The following occurrences within the past 30 years caused damage to community assets. Primary Source: National Centers for Environmental Information (NCEI)<sup>38</sup>.

- **Summer 1999 Drought**

Drought conditions existed in Adams County for a five-month period during the summer of 1999.

<sup>37</sup> <http://www.nws.noaa.gov/os/brochures/climate/DroughtPublic2.pdf>

<sup>38</sup> <http://www.NCEI.noaa.gov/stormevents/>

*May 1999.* After a dry April, drought conditions resurfaced again during May, after being alleviated during the winter months. Total rains during May were only 1.25 to 2.5 inches. The community of Adams had only 1.3 inches for the entire month, McArthur had 1.5 inches, while South Point measured 1.9 inches.

*June 1999.* The drought continued to spread and strengthen in southeast Ohio. A deterioration in stream flow and soil moisture was noted. Some showers at the end of the month temporarily helped the top soil and the crops. Only 1 to 2 inches of rain fell in most areas during the entire month of June.

*July 1999.* The drought strengthened during the first half of the month, then eased slightly during the last 2 weeks. The worst drought conditions remained in Athens, Lawrence, Gallia, Meigs, and Adams Counties. In Adams County, filling stations were set-up for families that had problems with their wells.

The extreme heat depleted much of the moisture from the scattered showers.

*August 1999.* The drought eased during the month of August across southeast Ohio. Monthly rains were 3 to 6 inches. Temperatures were not as hot, as those felt during July. However, the drought still lingered at month's end.

*September 1999.* Drought severity either increased or remain about constant during the month. The rainfall during September was mostly between 1 to 2 inches

*October 1999.* The drought severity eased as monthly rainfall was near normal. Amounts of 2.5 to 3.0 inches were common. Ground water shortages were still a concern at the end of the month.

- **Summer 2002 Drought**

Two months moderate; two months severe. The emerging drought from August peaked during the first 2 weeks of September, as hot and dry conditions lingered. Rains of 1.5 to 2 inches, plus cooler temperatures, dampened the drought by the fourth week of the month.

- **Fall 2007 Drought**

Three months moderate; one month severe. In September, drought conditions crept north, as the month averaged warmer and drier than normal. The monthly rainfall was mostly between 1 and 2 inches.

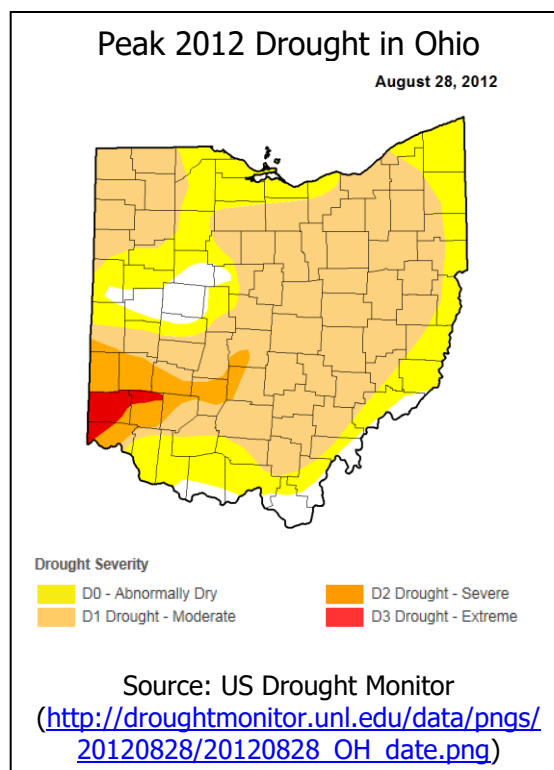
A rare October heat wave, during the 1st and 2nd weeks of the month, helped peak the severity of the drought. With the lowering of the water table, wells were becoming less productive. Deer were dying from the effects of the drought and a dry weather disease.

Much needed and widespread rain finally arrived on the 23rd and the 24th. Rain amounts of 2 to 3 inches were common. As the growing season ended and the autumn foliage peaked, drought conditions began to abate or ease.

After peaking in early October, drought conditions continued to ease during the month of November. Monthly rainfall of 3 to 4 inches was common. By the end of November, the drought of 2007 was also coming to an end across southeast Ohio.

### • 2012 North American Drought

The 2012-2013 North American Drought was an expansion of the 2010-2012 United States drought which began in the spring of 2012, when the lack of snow in the United States caused very little melt water to absorb into the soil. The drought includes most of the United States and included Ohio. Among many counties, Adams County was designated with moderate drought conditions by mid-June. It has been equaled to similar effects as droughts in the 1930s and 1950s but it has not been in place as long. However, the drought has inflected, and is expected to continue to inflict, catastrophic economic ramifications. In most measures, the drought has exceeded the 1988-1989 North American Drought, which is the most recent comparable drought.



On July 30, 2012, the Governor of Ohio sent a memorandum to the United States Department of Agriculture's (USDA) Ohio State Executive Director requesting primary county natural disaster designations for eligible counties due to agricultural losses caused by drought and additional disasters during the 2012 crop year. The USDA reviewed and Loss Assessment Reports and determined that there were sufficient production losses in 85 counties to warrant a Secretarial disaster designation. On September 5, 2012, Adams County was one of those designated counties. Source: Ohio EMA.

*The 2012 North American Drought* is the largest drought since the 1950's as reported by NOAA's National Climatic Data Center National Drought Report of 15 August 2012<sup>39</sup>. At its peak in Ohio, Adams County experienced "Moderate Drought Severity" for four months. The University of Illinois at Urbana-Champaign reported a slightly elevated crop insurance loss ratio of 1.02 for 2012, indicating little insurance-reported crop loss during this period<sup>40</sup>. The US Department of Agriculture (USDA) reports a significant drop in crop production in 2012 for Adams County. By 2020, the crop production (measured in bushels) increased beyond pre-drought levels.<sup>41</sup>

Commodity	2011 (Base)	2012	Delta	2020	Delta
Corn	1,885,000	1,247,000	-34%	2,156,000	14%
Soybeans	972,000	925,000	-5%	1,632,000	68%
Wheat	83,900	39,200	-53%	88,400	5%

<sup>39</sup> <http://www.NCEI.noaa.gov/sotc/drought/201207#det-reg>

<sup>40</sup> <http://farmdocdaily.illinois.edu/2013/03/drought-crop-insurance-loss-2012.html>

<sup>41</sup> <https://quickstats.nass.usda.gov/results/D17E5610-546D-3D5E-9E97-9FAA828C132C>

#### 4. Probability of Future Occurrences

According to NOAA drought information, Adams County is in a low risk of drought area. With 4 events in 30 years, there is a 13% chance of an occurrence in any given year.

#### 5. Affected Locations

Drought affects the entire county. The Adams County Health Department estimates that less than 5% of the county's population is dependent on private wells and that the county can provide for the needs of this population during a drought. Public water supplies are generally considered to be adequate to withstand periods of drought. The greatest impact would be on water supplies for livestock and crops.

#### 6. Analysis

Factor	Ranking
Frequency	Low: 1-2 Declarations
Response	< 1 Month
Onset	12-24 Hours
Magnitude	25-50% Land Area
Business	1 Week
Human	No Impact
Property	No Impact

#### 7. Vulnerable Community Assets

Asset	Impact
People	People relying on private wells may need to find alternate sources of potable water. 5% of the county's population is dependent on private wells.
Economy	Agricultural impact - crops and livestock. Water-dependent businesses such as car washes.
Infrastructure	No impact.
Structures	No impact.

#### 8. Estimated Structural Damages

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364		0		0		\$0
Nonresidential	1,084	\$520,894		0		0		\$0
Critical	25	\$520,894		0		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>0</b>		<b>\$0</b>



## F. Tornado

### 1. Description

A tornado is a narrow, violently rotating column of air that extends from the base of a thunderstorm to the ground. Because wind is invisible, it is hard to see a tornado unless it forms a condensation funnel made up of water droplets, dust and debris. Tornadoes are the most violent of all atmospheric storms.

Source: NOAA<sup>42</sup>

### 2. Extent of Hazard

The severity of winds storms is measured in wind speed. Severe windstorms are those whose sustained winds are at least 40 mph and gusts exceed 57 mph.

The severity of tornadoes is measured by the damage it caused and relates it back to estimated three-second wind speed. The Enhanced Fujita Scale is used to rate tornadoes.

Significant events as recorded by NCEI and local sources are considered occurrences.

Major occurrences are those that caused injuries, deaths or total damage \$5,000 or greater.

EF 0	65-85 mph
EF 1	86-110 mph
EF 2	111-135 mph
EF 3	136-165 mph
EF 4	166-200 mph
EF 5	Over 200 mph

### 3. Historical Occurrence

The following major occurrences were recorded by the National Centers for Environmental Information (NCEI)<sup>43</sup> and local records. Available narratives follow the table.

Event	Date	Injuries	Deaths	Property Damage	Crop Damage
Tornado	8/17/1997	0	0	\$100,000	\$0
Tornado	11/10/2002	0	0	\$100,000	\$0
Tornado	5/31/2004	0	0	\$10,000	\$0
Tornado	4/26/2007	0	0	\$70,000	\$0
Tornado	5/21/2010	0	0	\$135,000	\$0
Tornado	3/2/2012	2	1	\$2,230,000	\$25,000

Available narratives of major events follow:

- **Tornado – 4/26/2007**

Scattered thunderstorms developed across south central Ohio ahead of a cold front during the evening. An intense supercell developed in northeast Kentucky and crossed the Ohio River into south central Ohio. The supercell traversed Brown, Adams, Pike and Ross counties and produced three tornadoes.

- **Tornado – 5/21/2010**

Severe thunderstorms developed on May 21st as an upper level low moved across the area and encountered an unstable air mass. Surface winds were from the southeast which helped to add to low level shear and tornado development.

<sup>42</sup> <http://www.nssl.noaa.gov/education/svrwx101/wind/>

<sup>43</sup> <http://www.NCEI.noaa.gov/stormevents/>



Thunderstorms redeveloped over some of the same areas. Training of storms led to flash flooding across the region.

- **Tornado – 3/2/2012**

Thunderstorms developed during the afternoon in a high wind shear environment ahead of a strengthening low pressure system. Many of these storms became severe, with large hail, damaging thunderstorm winds, and tornadoes all being the main threats.

#### 4. Probability of Future Occurrences

	Years	Events	Average Injuries	Average Deaths	Average Property Damage	Average Crop Damage	Annual Probability	Mean Time Between Occurrences (Months)
All Events	30	7	0.29	0.14	\$378,571	\$3,571	23%	51
Major Events	30	6	0.33	0.17	\$440,833	\$4,167	20%	60

#### 5. Affected Locations

Tornadoes can affect the entire county.

#### 6. Analysis

Factor	Ranking
Frequency	Low: 1-2 Declarations
Response	< 1 Day
Onset	6-12 Hours
Magnitude	10% Land Area
Business	< 24 Hours
Human	Some Injuries
Property	10-25% Damaged

#### 7. Vulnerable Community Assets

Asset	Impact
People	The primary impact on people would be isolation and not being able to travel at least on primary routes for about 12 hours after the storm subsided. Power outages would also be widespread.
Economy	Loss of power affect businesses both in loss of sales and refrigeration.
Infrastructure	The primary impact on people would be isolation and not being able to travel at least on primary routes for about 12 hours after the storm subsided. Power outages would also be widespread.
Structures	Buildings under construction and mobile homes are highly susceptible to high winds could be damaged or destroyed. Buildings adjacent to large trees may be damaged by falling trees. Roofs and siding could also be damaged. Much of insured damages are not reported. The Planning Team used the NWS's estimate of \$330,625 in damages per major event was used in this analysis.

**8. Estimated Structural Damages**

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364	5	623		5	50	\$363,410
Nonresidential	1,084	\$520,894	5	54		2	7.5	\$78,134
Critical	25	\$520,894	5	1		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>5</b>		<b>\$441,544</b>

## G. Infectious Disease

### 1. Description

Disease outbreaks are usually caused by an infection, transmitted through person-to-person contact, animal-to-person contact, or from the environment or other media. Occasionally the cause of an outbreak is unknown, even after thorough investigation.

A number of environmental factors influence the spread of communicable diseases that are prone to cause epidemics. The most important of these are:

- water supply
- sanitation facilities
- food
- climate

A lack of safe water, inadequate excreta disposal facilities, poor hygiene, poor living conditions and unsafe food can all cause diarrheal diseases. These diseases are a major cause of suffering and death in an emergency situation.

Climate can affect disease transmission in a variety of ways. The distribution and population size of disease vectors can be heavily affected by local climate. Flooding after heavy rains can result in sewage overflow and widespread water contamination. In addition, there is some evidence to suggest that pathogens can be spread from one region to another along air streams or by wind.

Occasionally, an outbreak is seen in a population for which the cause is unclear. Such an outbreak may be due to a new or modified pathogen, a natural toxin, or it may be due to an initially undetected release of a chemical agent or over-exposure to ionizing radiation.

Source: World Health Organization<sup>44</sup>

For transmission to occur, there must be a source (typically an infected person), susceptible person and a mode of transmission. Typical modes of transmission are:

- Contact moves germs by touching germs present on surfaces and then carry the germs on their hands and spread to a susceptible person when proper hand hygiene is not performed before touching the susceptible person.
- Sprays and splashes occur when an infected person coughs or sneezes, creating droplets which carry germs short distances (within approximately 6 feet). These germs can land on a susceptible person's eyes, nose, or mouth and can cause infection. Close range inhalation occurs when a droplet containing germs is small enough to breathe in but not durable over distance.
- Inhalation occurs when germs are aerosolized in tiny particles that survive on air currents over great distances and time and reach a susceptible person. Airborne transmission can occur when infected patients cough, talk, or sneeze germs into the air.
- Sharps injuries can lead to infections when bloodborne pathogens enter a person through a skin puncture by a used needle or sharp instrument.

Source: Centers for Disease Control and Prevention<sup>45</sup>

---

<sup>44</sup> [https://www.who.int/environmental\\_health\\_emergencies/disease\\_outbreaks/communicable\\_diseases/en/](https://www.who.int/environmental_health_emergencies/disease_outbreaks/communicable_diseases/en/)

<sup>45</sup> <https://www.cdc.gov/infectioncontrol/spread/index.html>

A pandemic is a disease outbreak that spreads across countries or continents. The most common and anticipated is an influenza pandemic. This is a global outbreak of a new influenza A virus that is very different from current and recently circulating human seasonal influenza A viruses. Influenza A viruses are constantly changing, making it possible on very rare occasions for non-human influenza viruses to change in such a way that they can infect people easily and spread efficiently from person to person.

## 2. Extent of Hazard

A major pandemic is measured by a count of occurrences that result in emergency or disaster declaration.

## 3. Historical Occurrences

**1918-1920 – Spanish Flu.** The 1918 Influenza (Spanish Flu) pandemic which lasted globally for two years. There are wildly conflicting estimates about how many people caught the flu and how many people died from it. The lack of records from the time (either due to wartime censorship or shortages) makes it hard to tell. The smallest estimate is that 17 million people died. The highest estimate is that 100 million people died, or 5% of the global population. The flu pandemic is believed to have infected 500 million people, or over a quarter of the world.

**1949-1952 - Polio.** Over 6,000 people die from polio in the United States, out of a reported 100,000 cases. This, followed by the development of the polio vaccine, prompts one of the first major drives to inoculate children in the U.S.

**1957 – Asian Flu.** The "Asian Flu," H2N2, comes to the United States from China. It originates from a mutant flu strain carried by ducks. It arrives in the U.S. in June. This influenza pandemic kills 116,000 people in the United States.

**1968 – Hong Kong Flu.** The "Hong Kong Flu" is the third of the three influenza pandemics of the 1900s. This flu had a much lower mortality rate than the other two, but still resulted in 33,000 deaths in the U.S.

**1981-2007 – HIV/AIDS.** Human immunodeficiency viruses (HIV) and the symptomatic Acquired Immunodeficiency Syndrome (AIDS) spreads across the country, especially infecting high rates of homosexual people, lower income people, and drug addicts. Treatment for the disease receives little funding and attention due to the groups it affects. The FDA approves new tests that can quickly detect HIV, and new treatments. In 2007, Timothy Ray Brown becomes the first man cured of HIV. By this time, at least 600,000 people have died of HIV/AIDS in the U.S. alone.

**2009 – Swine Flu.** In April, H1N1, also known as Swine Flu, broke out and quickly spread to more than 150 countries. The CDC reported that between April and October 22 million Americans had contracted the virus, 98,000 required hospitalization, and about 3,900 people died from H1N1-related causes. The WHO estimated that the final death toll worldwide ending up reaching nearly 300,000.

**2020-Present – COVID-19.** A new coronavirus, identified just as the novel coronavirus and then the 2019 Corona Virus Disease (COVID-19), claimed its first official victim in China. At least one American traveler returning from Wuhan contracted the disease before the city is isolated. The coronavirus outbreak reached the United States; the first U.S. victim died from the disease, prompting widespread panic. The coronavirus outbreak in the U.S. is officially declared a national emergency. The Director-General of

the World Health Organization (WHO) declared the disease to have grown from epidemic proportions to a pandemic. At the urging of health officials, different states began enforcing restrictions on businesses and public gatherings to contain the disease. The economy came to a virtual standstill and unemployment soared. Local, regional, state and federal health systems and government agencies are being stressed with rapidly changing conditions. The full effects and implications on how this virus will affect community assets will not be known for so time to come.

Of these occurrences, only the Spanish Flu and COVID-19 are considered major events.

#### 4. Probability of Future Occurrences

The estimated risk of the future occurrence of a major infectious disease outbreak is once every 100 years or 1% in a given year.

#### 5. Affected Locations

The entire county would be affected.

#### 6. Analysis

Factor	Ranking
Frequency	Low: 1-2 Declarations
Response	< 1 Week
Onset	> 24 Hours
Magnitude	No Impact
Business	>= 2 Weeks
Human	Multiple Deaths
Property	No Impact

#### 7. Vulnerable Community Assets

Asset	Impact
People	Many people will develop life-threatening conditions; many will also die. Measures to contain the spread the disease may cause emotional hardships for many.
Economy	In a major pandemic, portions or even most all of the economy may be shutdown - even for a short period of time would cause ripple and long-term impacts.
Infrastructure	No direct impact.
Structures	No direct impact.

#### 8. Estimated Structural Damages

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364		0		0		\$0
Nonresidential	1,084	\$520,894		0		0		\$0
Critical	25	\$520,894		0		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>0</b>		<b>\$0</b>

## H. Earthquake

### 1. Description

An earthquake is caused by a sudden slip on a fault. The tectonic plates are always slowly moving, but they get stuck at their edges due to friction. When the stress on the edge overcomes the friction, there is an earthquake that releases energy in waves that travel through the earth's crust and cause the shaking that we feel. Source: USGS<sup>46</sup>

Ohio is located near the New Madrid fault. Adams County is in the part of Ohio that is designated with a Modified Mercalli Intensity (MMI) of VIII, which anticipates moderate damage. In spite of this, there has been little seismic activity near Adams County.

### 2. Extent of Hazard

Earthquakes are typically measured on the Richter scale. The analyzed profile is a magnitude 5.0 earthquake with the epicenter in the Village of West Union scenario as modeled by the *Hazards U.S. Multi-Hazard* (HAZUS-MH) simulation performed and provided by Ohio EMA. The HAZUS-MH report used in this analysis is available from the Adams County EMA.

The impact of earthquakes is measured on the Modified Mercalli Scale. The table at the right depicts the scale and its relationship to the Richter Scale.

Any recorded earthquake of magnitude 3 or more is considered an occurrence.

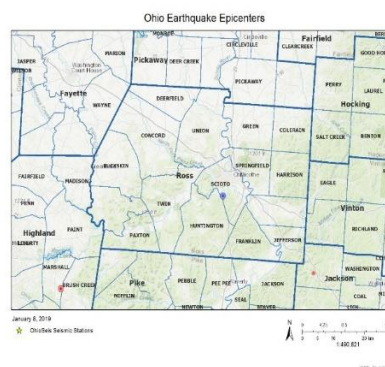
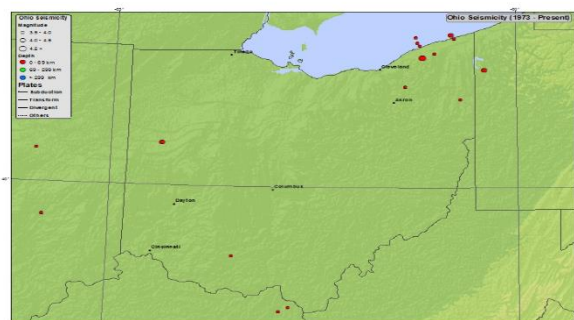
Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly; vibration like passing truck	2.5
IV	Felt indoors by many, outdoors by few, at night some may awaken; dishes, windows, doors disturbed; autos rock noticeably	3
V	Felt by most people; some breakage of dishes, windows, and plaster; disturbance of tall objects	3.5
VI	Felt by all, many frightened and run outdoors; falling plaster and chimneys, damage small	4
VII	Everybody runs outdoors; damage to buildings varies depending on quality of construction; noticed by drivers of autos	4.5
VIII	Panel walls thrown out of frames; fall of walls, monuments, chimneys; sand and mud ejected; drivers of autos disturbed	5
IX	Buildings shifted off foundations, cracked, thrown out of plumb; ground cracked; underground pipes broken	5.5
X	Most masonry and frame structures destroyed; ground cracked, rails bent, landslides	6
XI	Few structures remain standing; bridges destroyed, fissures in ground, pipes broken, landslides, rails bent	6.5
XII	Damage total; waves seen on ground surface, lines of sight and level distorted, objects thrown up in air	7

### 3. Historical Occurrence

The USGS map below indicates 40 years of no seismic activity over a magnitude of 3.5 centered in southeast Ohio. The second map from the Ohio Department of Natural Resources extends back into the 1800s, showing seismic activity in Adams County only in 1899.

Ohio

Seismicity Map - 1973 to March 2012



<sup>46</sup> <http://www.usgs.gov/fag/categories/9827/3343>

#### 4. Probability of Future Occurrences

The USGS reports a 2% probability that Adams County will be faced with a peak ground acceleration (PGA) of .06 within 50 years. While the USGS hasn't drawn a direct correlation between PGA and magnitude, the Laboratorio de Ingeniería Sísmica, Instituto de Investigaciones en Ingeniería, Universidad de Costa Rica<sup>47</sup>, published research<sup>48</sup> estimating this relationship. A PGA of 2 to 3 relates to a Modified Mercalli Intensity of II and magnitude of 2, characterized as "Felt only by a few persons at rest, especially on upper floors of buildings." Source: USGS<sup>49</sup>.

There is less than a 1% probability of a significant damaging occurrence in any given year.

#### 5. Affected Locations

Earthquakes would affect the entire county.

#### 6. Analysis

The Planning Team used the results of FEMA's Hazards United States Multi-Hazard (HAZUS-MH) 5.0 Magnitude, 5km Depth, West Union Epicenter Event simulation to estimate losses. This report was provided by Ohio EMA's Mitigation Branch.

Factor	Ranking
Frequency	None: No Declarations
Response	< 1 Day
Onset	> 24 Hours
Magnitude	10-25% Land Area
Business	< 24 Hours
Human	Multiple Severe Injuries
Property	10-25% Damaged

#### 7. Vulnerable Community Assets

Asset	Impact
People	Causalities. HAZUS-MH estimates that 75 people would receive minor injuries, 17 people would receive greater non-life-threatening injuries, 2 people would receive life-threatening injuries and 4 people would die. Displaced and Sheltered. HAZUS-HM estimates less than 121 households would be displaced and 85 people would seek shelter in public shelters
Economy	HAZUS-MH estimates a total economic loss of \$229.73 million and transportation/utility losses of \$6.5 million. Loss of rail access to area businesses would severely impact supply of goods.

<sup>47</sup> <http://www.lis.ucr.ac.cr/index.php?id=Inicio>

<sup>48</sup> [https://www.researchgate.net/publication/228755080\\_Relationship\\_Between\\_Peak\\_Ground\\_Acceleration\\_and\\_Modified\\_Mercalli\\_Intensity\\_in\\_Costa\\_Rica#:~:text=The%20first%20relationship%20between%20Modified%20Mercalli%20Intensity%20%28MMI%29,%3C%207.7%29%20that%20occurred%20between%201983%20and%202004.](https://www.researchgate.net/publication/228755080_Relationship_Between_Peak_Ground_Acceleration_and_Modified_Mercalli_Intensity_in_Costa_Rica#:~:text=The%20first%20relationship%20between%20Modified%20Mercalli%20Intensity%20%28MMI%29,%3C%207.7%29%20that%20occurred%20between%201983%20and%202004.)

<sup>49</sup> <http://earthquake.usgs.gov/learn/topics/mercalli.php>



Asset	Impact
Infrastructure	HAZUS-HM estimates all infrastructure would be unaffected or operational within one day. It also estimates that all utilities would be undamaged or operational within 7 days, the exception being electric service: 10% of households would be without after a week, 2% after one month and only 6 after 3 months.
Structures	HAZUS-MH estimates the following structural damages.

## 8. Estimated Structural Damages

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages Total	
			%	Number	%	Number	%	
Residential	12,461	\$145,364	100	12,461		5,188		\$17,710,000
Nonresidential	1,084	\$520,894	100	1,084		5,771		\$14,832,009
Critical	25	\$520,894	100	25		7		\$17,991
<b>Totals</b>	<b>13,570</b>					<b>10,966</b>		<b>\$32,560,000</b>

The following tables from the HAZUS-MH simulation report were used in making the above estimates:

Table 3: Expected Building Damage by Occupancy										
	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	84	1.07	29	1.08	36	1.76	20	2.45	6	2.74
Commercial	283	3.63	115	4.26	131	6.43	65	7.86	20	9.35
Education	10	0.13	5	0.18	6	0.30	3	0.35	1	0.44
Government	15	0.20	7	0.25	8	0.41	4	0.44	1	0.54
Industrial	82	1.05	30	1.12	37	1.79	20	2.36	6	2.69
Other Residential	1,328	17.04	667	24.75	917	45.02	470	56.50	108	50.46
Religion	45	0.57	16	0.60	15	0.72	7	0.89	2	1.05
Single Family	5,946	76.30	1,825	67.76	888	43.58	243	29.16	70	32.73
<b>Total</b>	<b>7,793</b>		<b>2,694</b>		<b>2,037</b>		<b>832</b>		<b>215</b>	

Table 5: Expected Damage to Essential Facilities				
Classification	Total	# Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on day 1
Hospitals	1	1	0	0
Schools	11	4	0	4
EOCs	0	0	0	0
Police Stations	5	1	0	3
Fire Stations	8	1	0	5



**Table 6: Expected Damage to the Transportation Systems**

System	Component	Number of Locations_				
		Locations/ Segments	With at Least Mod. Damage	With Complete Damage	With Functionality > 50 %	
					After Day 1	After Day 7
Highway	Segments	24	0	0	24	24
	Bridges	69	0	0	69	69
	Tunnels	0	0	0	0	0
Railways	Segments	16	0	0	16	16
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	0	0	0	0	0
Ferry	Facilities	0	0	0	0	0
Port	Facilities	4	0	0	4	4
Airport	Facilities	1	1	0	1	1
	Runways	1	0	0	1	1

Table 11: Building-Related Economic Loss Estimates							
(Millions of dollars)							
Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
<b>Income Losses</b>							
	Wage	0.00	0.84	8.02	0.30	0.81	9.96
	Capital-Related	0.00	0.36	6.29	0.18	0.18	7.01
	Rental	2.52	1.56	3.09	0.08	0.35	7.61
	Relocation	8.77	3.71	5.72	0.39	2.73	21.32
	<b>Subtotal</b>	<b>11.28</b>	<b>6.47</b>	<b>23.12</b>	<b>0.95</b>	<b>4.07</b>	<b>45.89</b>
<b>Capital Stock Losses</b>							
	Structural	12.09	5.62	8.50	1.43	4.92	32.56
	Non_Structural	47.17	18.87	24.18	4.48	9.25	103.94
	Content	19.14	4.46	13.83	3.02	5.62	46.07
	Inventory	0.00	0.00	0.35	0.66	0.24	1.25
	<b>Subtotal</b>	<b>78.39</b>	<b>28.95</b>	<b>46.86</b>	<b>9.59</b>	<b>20.03</b>	<b>183.83</b>
	<b>Total</b>	<b>89.68</b>	<b>35.42</b>	<b>69.98</b>	<b>10.54</b>	<b>24.10</b>	<b>229.73</b>

## I. Land Subsidence

### 1. Description

Subsidence is the motion of the Earth's surface as it shifts downward relative to a benchmark (often sea-level) of the surrounding terrain. There are a number of causes for this effect. In Ohio, the two primary causes are abandoned underground mines (AUMs) and karst.

Underground mining of coal began in the early 1800's and continues to current day. In the 1900s, underground salt, limestone, and gypsum mining began. All mining activities create voids under the Earth's surface. Several key factors determining the potential for these voids to collapse include depth, mining technique used, types of rock and/or soils, and development on the ground surface. Abandoned underground coal mines in Ohio have the added environmental impact of discharging acidic water. If acidic mine water is discharged into creeks or streams, it can alter the chemical composition of the water habitat and cause considerable harm to sensitive aquatic life.

Per the ODNR, Division of Geological Survey, karst is a little-known, but unique and important landform that can be found throughout the state of Ohio. Regions that contain sinkholes and other solutional features, such as caves, springs, disappearing streams, and enlarged fractures, are known as karst terrains. Sinkholes form as bedrock dissolves and surface materials erode or collapse into the resulting voids. Sinkholes are the main hazard associated with karst landforms in Ohio, and there are thousands of them in the state.

The last form of land subsidence in Ohio is associated with soils, which dramatically expand when wet and contract when dry. Structures built on these soils can experience significant shifting as the ground saturates and dries.

The current landscape in the karst region of Ohio was created by glaciers as they advanced from the north reaching to the Ohio River roughly 14,000 years ago. When the last glacier receded, it left behind a layer of unconsolidated material in a wide range of depths. The shallower the loose material layer, the greater the chance of water penetrating to the underlying bedrock, resulting in a void or ground deformation occurring. This is represented by the probable karst areas on the map which group into two significant clusters. In the south, the greatest impacted counties include Brown, Adams, and Highland. In the north, the greatest impacted counties include Seneca, Huron, Erie, Sandusky, and Ottawa.<sup>50</sup>

Ohio Department of Transportation (ODOT) assesses the risk (probability of additional movement x probability of significant impact to an ODOT asset or adjacent property or features) of abandoned underground mine sites as follows<sup>51</sup>:

---

<sup>50</sup> <https://ohiomitigationplan.ohio.gov/wps/portal/gov/ema-mp/section-2>

<sup>51</sup> [https://www.transportation.ohio.gov/wps/wcm/connect/gov/4dc4d4cf-25b4-45d9-86e2-475f05ea4536/AUMIRA\\_Manual.pdf?MOD=AJPERES&CONVERT\\_TO=url&CACHEID=ROOTWORKSPACE.Z18\\_M1HGGIK0N0JO00QO9DDDDM3000-4dc4d4cf-25b4-45d9-86e2-475f05ea4536-nUMQw0A](https://www.transportation.ohio.gov/wps/wcm/connect/gov/4dc4d4cf-25b4-45d9-86e2-475f05ea4536/AUMIRA_Manual.pdf?MOD=AJPERES&CONVERT_TO=url&CACHEID=ROOTWORKSPACE.Z18_M1HGGIK0N0JO00QO9DDDDM3000-4dc4d4cf-25b4-45d9-86e2-475f05ea4536-nUMQw0A)

Table 500 - 01: Risk Assessment Site Groups

Tier	Group Designation:	Group Description:
4	Surface Deformation Group	Sites with evidence of surface deformation, such as areas of surface settlement and subsidence or irregular drainage conditions which may be mine-related, and may exist or may have historically been observed in the R/W or within view of the R/W.
3	Vertical Shaft Group	Sites with evidence that Vertical Shaft mine opening(s) exist or have historically been observed or recorded as being in the R/W or within view of the R/W.
2	Mine Opening Group	Sites with evidence that Slope or Drift mine opening(s) exist or have historically been observed or recorded as being in the R/W or within view of the R/W.
1(A)	High Rating Group	The ten sites per District having the highest Initial Site Evaluation rating score not already in one of the higher priority site groups.
1	Low Rating Group	All other rated sites.
0	Eliminated Sites Group	Sites eliminated (screened) from further evaluation through the verification that an AUM does not exist in the area in question.

## 2. Extent of Hazard

An event that causes injury, death, or damage to structures is considered an occurrence. Major occurrences are those that caused injuries, deaths or total damage \$5,000 or greater.

## 3. Historical Occurrence

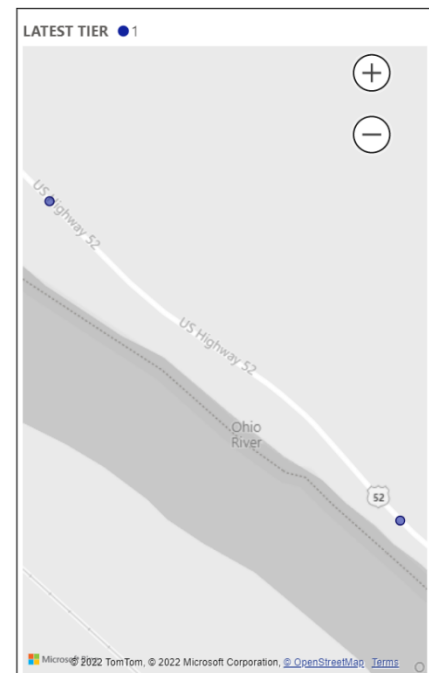
The Planning Team estimates one major occurrence per year.

## 4. Probability of Future Occurrences

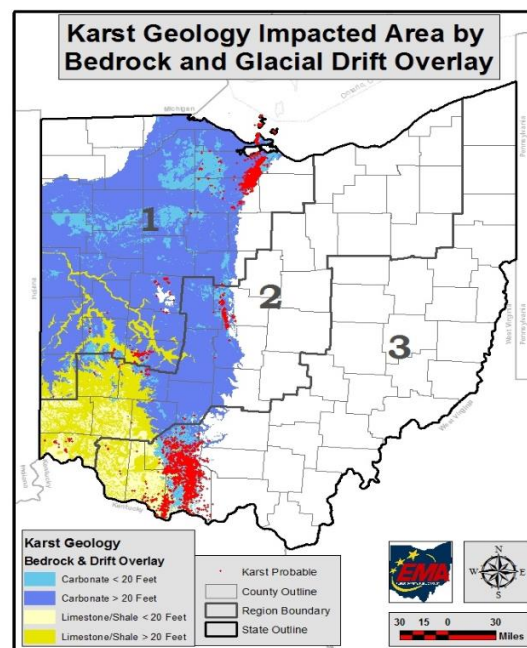
Time and development increase the probability of occurrences. The Planning Team estimates a 75% probability in a given year of a major occurrence.

## 5. Affected Locations

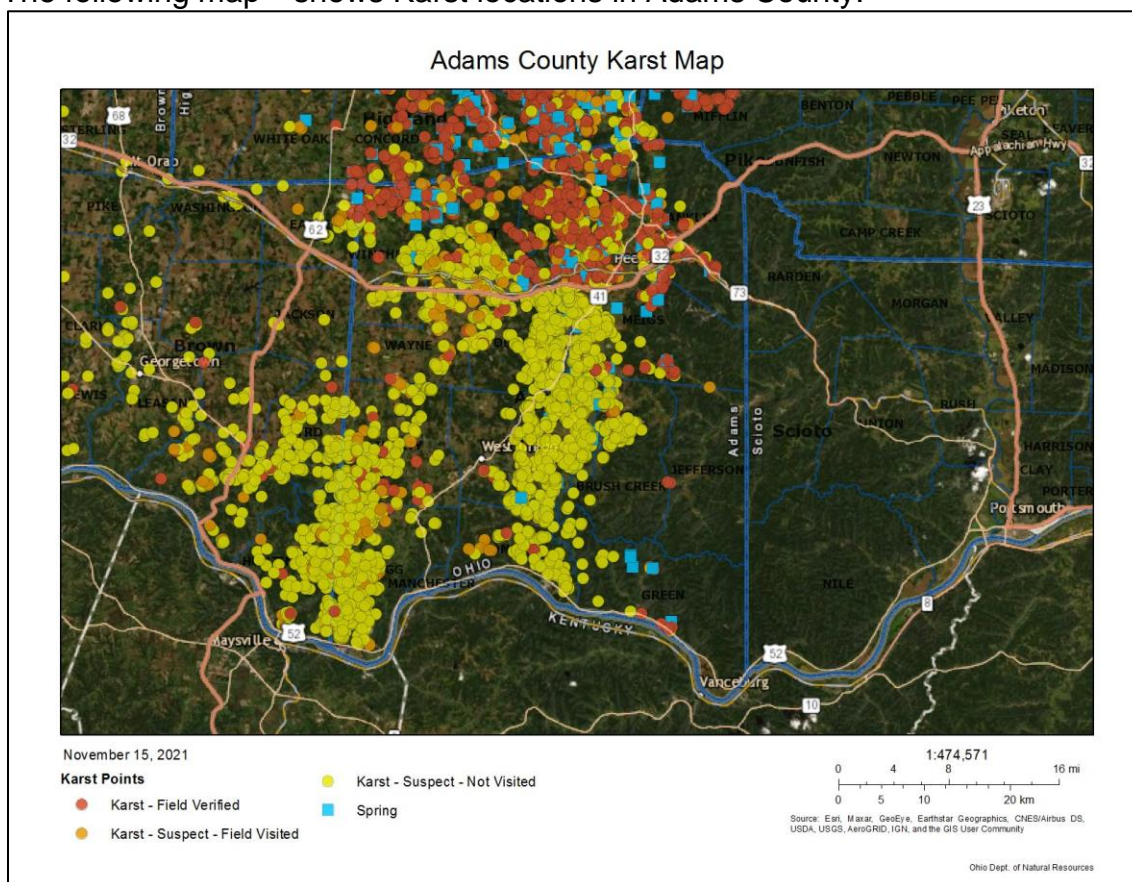
Abandoned Underground Mines. ODOT reports 2 Tier 1 sites, both being active, inspected and not remediated. See map at right.



Karst. All but extreme eastern Adams County identified Karst locations. The map<sup>52</sup> at right shows the areas of Karst Geology in Ohio.



The following map<sup>53</sup> shows Karst locations in Adams County.



Verified locations are mostly north of SR 32 in the northern part of the county. There are numerous uninvestigated suspected locations in the central and extreme west portions of the county.

<sup>52</sup> <https://ohiomitigationplan.ohio.gov/wps/portal/gov/ema-mp/section-2>

<sup>53</sup> [https://gis.ohiodnr.gov/website/dgs/karst\\_interactivemap/](https://gis.ohiodnr.gov/website/dgs/karst_interactivemap/)

## 6. Analysis

Factor	Ranking
Frequency	None: No Declarations
Response	< 1 Week
Onset	12-24 Hours
Magnitude	10% Land Area
Business	No Impact
Human	Minor Injuries
Property	< 10% Damaged

## 7. Vulnerable Community Assets

Asset	Impact
People	Little or no impact.
Economy	Subsiding/subsided business locations would be adversely affected.
Infrastructure	Subsiding/subsided roads and other infrastructures would be adversely affected. Underground mines contain potentially contaminated water that may be released into the aquifer.
Structures	Impacted structures would likely suffer 50% of value in damages.

## 8. Estimated Structural Damages

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364	1	125		1	50	\$72,682
Nonresidential	1,084	\$520,894	1	11		0		\$0
Critical	25	\$520,894		0		0		\$0
<b>Totals</b>	<b>13,570</b>					<b>1</b>		<b>\$72,682</b>



## J. Dam Failure

### 1. Description

A dam is defined as an artificial barrier that is usually constructed across a stream channel to impound water. A dam failure is defined as an uncontrolled release of that impounded water. The causes of dam failures can be divided into three groups: dam overtopping, excessive seepage, and structural failure of a component. Despite efforts to provide sufficient structural integrity and to perform inspection and maintenance, problems can develop that can lead to failure. While most dams have storage volumes small enough that failures would have little or no consequences, dams with large storage amounts could cause significant flooding downstream.

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

- Prolonged periods of rainfall and flooding.
- Inadequate spillway capacity, resulting in excess overtopping flows.
- Internal erosion caused by embankment or foundation leakage or piping.
- Improper maintenance, including failure to remove trees, repair internal seepage problems, replace lost material from the cross section of the dam and abutments, or maintain gates, valves, and other operational components.
- Improper design, including the use of improper construction materials and construction practices.
- Improper operation, including the failure to remove or open gates or valves during high flow periods.
- Failure of upstream dams on the same waterway that release water to a downstream dam.
- Earthquakes, which typically cause longitudinal cracks at the tops of the embankments that can weaken entire structures.

Levee failure is also included in this hazard; there are no levees in Adams County.

In Ohio, dams are classified by size and potential impact of failure: Class I, II, III and IV. Refer to OAC 1501:21-13-01(A)<sup>54</sup>

The following lists Class I, II and III dams in Adams County and their hazard ratings as listed in the US Army Corps of Engineers' National Inventory of Dams<sup>55</sup>:

Class	Dam Name	NIDID	Hazard Potential	River	City/ Distance (mi)	EAP Approval Date
I	Adams Lake Dam	OH00259	High	Lick Fork	Dunkinsville 4.5	1/27/2017
I	Killen Station Ash Disposal Dike	OH01127	High	Ohio River	1	Yes
I	Mineral Springs Resort Lake Dam	OH00254	High	Cedar Fork	Rarden 11.2	6/14/2018
II	Jm Stuart Station Ash Pond No. 10 Dam	OH03030	Significant	Three Mile Creek	3.2	
II	Jm Stuart Station Ash Pond No. 3a Dam	OH03183	Significant	Ohio River	3.2	

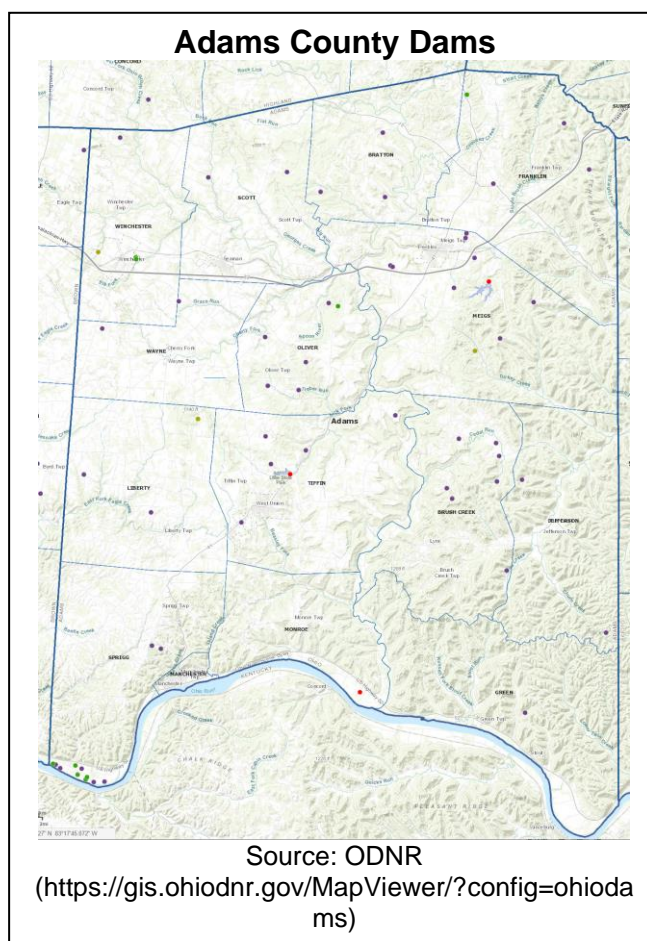
<sup>54</sup> <http://codes.ohio.gov/oac/1501:21-13-01>

<sup>55</sup> <https://nid.sec.usace.army.mil/ords/f?p=105:18:15360365863343::NO::>

Class	Dam Name	NIDID	Hazard Potential	River	City/ Distance (mi)	EAP Approval Date
II	Jm Stuart Station Ash Pond No. 5 Dam	OH03182	Significant	Ohio River		
II	Jm Stuart Station Ash Pond No. 6 Dam	OH03184	Significant	Ohio River		
II	Jm Stuart Station Ash Pond No. 7 Dam	OH03181	Significant	Ohio River		
II	Laycock Farm Pond No. 1 Dam	OH00255	Significant	Spoon River	Lawshe 2.5	
II	Winchester WWT Lagoon No. 2	OH03127	Significant	Elk Fork		8/5/2017
II	Winchester WWT Lagoon No. 3	OH03128	Significant	Elk Fork		8/5/2017
II	Woodland Altars Lake Dam	OH01118	Significant	Baker Fork Creek	Marble Furnace 12	
III	Cave Hill Lake Dam	OH00253	Low	East Fork Eagle Creek	Neel	
III	Fish Lake Dam	OH01121	Low	Turkey Creek	Otway 14.2	
III	Winchester Lake Dam	OH00257	Low	Turkey Run	Lawshe 17	

The Planning Team ascertained that the following ash ponds associated with decommissioned power generation plants have been or are in the process of being drained and no longer pose a threat of dam failure:

- Killen Station Ash Disposal Dike
- Jm Stuart Station Ash Pond No 3a
- Jm Stuart Station Ash Pond No 5
- Jm Stuart Station Ash Pond No 6
- Jm Stuart Station Ash Pond No 7
- Jm Stuart Station Ash Pond No 10





## 2. Extent of Hazard

An occurrence would be indicated by a failure of a Class I or II dam.

## 3. Historical Occurrence

There have been no Class I or II dam failures in Adams County. According to the Stanford University's National Performance of Dam Program (NPDP) Dam Incident database<sup>56</sup>, the following incident has occurred:

ID	Dam Name	Date	Incident Type	Dam Failure
OH00259	Adams Lake Dam	12/21/1992	Piping	No

No other information is available on this incident.

## 4. Probability of Future Occurrences

In the American Society of Civil Engineers *2009 Ohio Infrastructure Report Card – Dams Fact Sheet*<sup>57</sup>, Ohio dams received a grade of C. One third of Ohio's dams were rated Poor or worse and 60% were rated Fair or worse. Based on these high-level ratings, no direct conclusions could be drawn about the failure of Adams County's Class I and II dams. Because of this report, the planning team couldn't assign a value of zero; the probability of a failure in a given year is less than 1%.

## 5. Affected Locations

The following locations and assets may be affected by the failure of a Class I or II dam:

### a. Class I Dams

#### *Adams Lake Dam*

6 homes; 14 residents

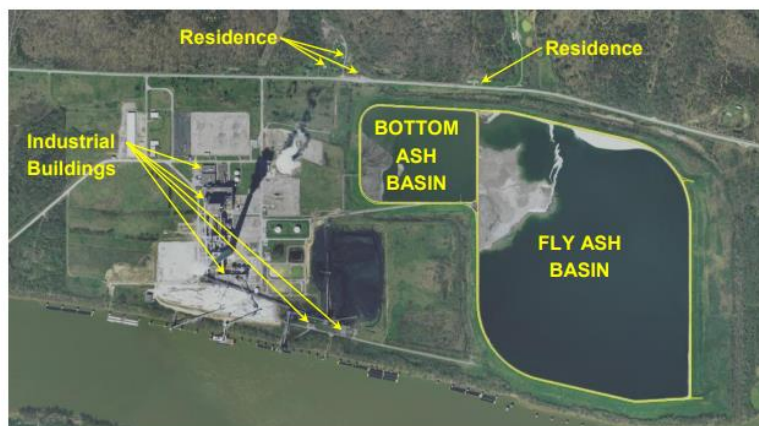
SR 41 – water over several low areas and one bridge

#### *Killen Station Ash Disposal Dike*

4 homes; 2 residents

5 onsite structures

The aerial photo below shows the dam and downstream areas that could be impacted by a failure of the dam. In addition to these areas communities sourcing water supplies from the river may also be impacted.



<sup>56</sup> [http://npdp.stanford.edu/dam\\_incidents](http://npdp.stanford.edu/dam_incidents)

<sup>57</sup> [http://ohioasce.org/sites/default/files/2009 Dams Fact Sheet.pdf](http://ohioasce.org/sites/default/files/2009%20Dams%20Fact%20Sheet.pdf)

*Mineral Springs Resort Lake Dam*

3 local roads – potential wash out

SR 73 – water over roadway

**b. Class II Dams***Laycock Farm Pond No. 1 Dam*

3 commercial structures

*Winchester WWT Lagoon No. 2 & 3*

Potential contamination of Elk Fork

*Woodland Altars Lake Dam*

SR 41 – water over roadway at base of dam

**6. Analysis**

Factor	Ranking
Frequency	None: No Declarations
Response	< 1 Day
Onset	6-12 Hours
Magnitude	10% Land Area
Business	< 24 Hours
Human	No Impact
Property	< 10% Damaged

**7. Vulnerable Community Assets**

Asset	Impact
People	Little or no impact; warning is expected to be sufficient for complete evacuation.
Economy	Little or no measurable impact.
Infrastructure	Roads and bridge in the inundation path may be damaged.
Structures	The Planning Team decided to use a combined failure scenario for analysis with all structures at risk damaged and a 10% damage to structures.

**8. Estimated Structural Damages**

Structure Type	Inventory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	12,461	\$145,364		6	100	6	10	\$87,218
Nonresidential	1,084	\$520,894		3	100	3	10	\$156,268
Critical	25	\$520,894		0	100	0	10	\$0
<b>Totals</b>	<b>13,570</b>			<b>9</b>		<b>9</b>		<b>\$243,486</b>

## Section VI – Mitigation Goals and Actions

### A. Overview

The Adams County Mitigation Planning Team identified hazards of credible threat and analyzed their impact using qualitative and quantitative methods. The team used the *FEMA Local Mitigation Planning Handbook, March 2013*, as a guide for conducting analysis.

### B. Non-Participating Jurisdictions

The Villages of Manchester, Peebles, Rome, and Seaman did not participate in the planning process and are not eligible for federal mitigation funding.

### C. Identification and Analysis Methodology

The Planning Team profiled each hazard. It collected and reviewed hazard information, assessed the impacts and the vulnerabilities of the community's assets. The team assigned risk factor values based on the criteria and adjusting factors established by the Ohio EMA.

The team then estimated structures at risk and associated damages.

### D. Goals

The Planning Team selected the following mitigation goals:

- Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure
- Provide timely warning
- Enhance emergency response capability
- Create self sufficiency
- Increase public awareness

### E. Actions

The Planning Team then reviewed actions from the previous mitigation plan and added three actions.

- Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure
  - Upgrade undersized storm water drainage systems.
  - Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
  - Rehabilitate dams known to be of high hazard potential.
  - Mitigate flood-prone structures through acquisition, relocation, and/or retrofitting.
- Provide timely warning
  - Enhance public warning systems.
  - Provide NOAA All-Hazards Warning Radios for all critical facilities.
- Enhance emergency response capability
  - Upgrade the public safety countywide communications system.
  - Install dry hydrants throughout the county.
  - Develop and implement a volunteer management program.
- Create self sufficiency
  - Install back-up generators for shelters and critical facilities.
  - Identify/upgrade facilities to be shelters.
  - Identify temporary facilities for non-life-threatening emergencies.
  - Identify alternate potable water sources and develop a distribution system.
  - Construct community and residential safe rooms.

- Encourage participation from all jurisdictions for future plan updates.
- Increase public awareness
- Develop and conduct public education program.

## F. Cost-Benefit Review

Cost-Benefit Review is used to determine the relative feasibility of mitigation actions, thus establishing a prioritized list. The Planning Team used *Using Benefit-Cost Review in Mitigation Planning – State and Local Mitigation Planning How-To Guide Number Five – FEMA 386-5, May 2007*<sup>58</sup>, to conduct this review. Using qualitative methods (Method A), this Cost-Benefit Review methodology was emphasized in the prioritization process.

### 1. Review Benefits and Costs

This step is documented with each selected mitigation action. Refer to *Mitigation Action Analysis* section.

### 2. Prioritize Actions

The following summarizes the benefits and costs of each mitigation action and reflects the priority assigned by the Planning Team. Guiding criteria was:

- Impact on public safety (isolation and injuries)
- Impact on property damage
- Impact on other mitigation actions
- Acceptability of implementation by elected officials and voters

Priority	Mitigation Action	Benefits	Costs
1	Enhance public warning systems.	Increased public awareness Increased public safety	Unknown
2	Upgrade the public safety countywide communications system.	Increased public safety Enhanced response and recovery operations	Unknown
3	Upgrade undersized storm water drainage systems.	Increased public safety Decreased damage to infrastructure	Unknown
4	Install back-up generators for shelters and critical facilities.	Decreased impact of utility outages Increased public safety	\$25k per site
5	Identify alternate potable water sources and develop a distribution system.	Water available during droughts	Staff costs
6	Mitigate flood-prone structures through acquisition, relocation, and/or retrofitting.	Decreased isolation Increased public safety Decreased response and recovery costs Community-owned green space Decreased response and recovery costs	Buy-in and funding by elected officials and property owners

<sup>58</sup> [http://www.fema.gov/media-library-data/20130726-1606-20490-3557/how\\_to\\_5\\_final\\_may\\_2007.pdf](http://www.fema.gov/media-library-data/20130726-1606-20490-3557/how_to_5_final_may_2007.pdf)

Priority	Mitigation Action	Benefits	Costs
7	Provide NOAA All-Hazards Warning Radios for all critical facilities.	Increased public safety Increased attractiveness to new businesses, visitors and residents	\$50 x 50 radios
8	Identify/upgrade facilities to be shelters.	Locally accessible shelters Increased public safety Increased self-sufficiency	Unknown
9	Install dry hydrants throughout the county.	Decreased structural damage by fire Decreased response time Increased attractiveness to new businesses and residents	Unknown
10	Develop and conduct public education program.	Increased public awareness and preparedness	Staff costs
11	Identify temporary facilities for non-life threatening emergencies.	Increased public safety and health during health emergencies	Staff costs
12	Construct community and residential safe rooms.	Increased public safety Decreased response and recovery costs	Chief Elected Official/Home-Owner buy-in and funding
13	Develop and implement a volunteer management program.	Relieving Incident Commanders of having to manage volunteers Increased response and recovery resources Community involvement	Staff costs
14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.	Reduced people, businesses, other assets at risk	Dam owner buy in Study costs
15	Rehabilitate dams known to be of high hazard potential.	Reduced people, businesses, other assets at risk	Dam owner buy in Project costs
16	Encourage participation from all jurisdictions for future plan updates.	Increased awareness of hazards and impacts	Chief Elected Officials buy-in

This page intentionally left blank

## Section VII – Mitigation Action Analysis

### A. Goal: Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure

#### 1. Action: Upgrade undersized storm water drainage systems.

Includes storms drains, catchment systems, culverts and ditches.

Priority	Start Date	End Date	Estimated Cost	Current Status
3	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail

*Jurisdiction(s) Affected:* Tiffin Township, Wayne Township, Rome Village, Seaman Village, Adams County, Cherry Fork Village, Manchester Village, Winchester Village, Peebles Village, West Union Village, Jefferson Township, Bratton Township, Winchester Township, Sprigg Township, Franklin Township, Brush Creek Township, Green Township, Liberty Township, Meigs Township, Scott Township, Oliver Township, Monroe Township, Manchester Township

*Project Lead(s):* Jurisdictional Chief Elected Officials

*Funding Resource(s):* Community Development Block Grant, Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Minor Localized Flood Reduction, Planning, Retrofit, Storm Shelter, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Stranded/isolated	Unknown	Fewer	Not quantifiable
Roadways - damaged or destroyed	Unknown	Fewer	Not quantifiable

Benefits	Costs
Increased public safety Decreased damage to infrastructure	Unknown

#### 2. Action: Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.

Create an EAP for each small dam on private property using Standards of the International Committee of Dam Safety (ICODS), developed in compliance with OAC requirements and including an update of the design floods and the downstream hazards. There is a lack of maintenance of the dams. Coordinate with ODNR Division of Water regarding lack of maintenance and inspection of dams. There are dams that have been constructed without review or state oversight. Identify dams throughout county to determine if they fall under state regulation. Findings to be provided to ODNR and to dam owners.

Priority	Start Date	End Date	Estimated Cost	Current Status
14	12/1/2021	11/30/2026	Unknown	New



*Hazards Addressed:* Dam/Levee Failure

*Jurisdiction(s) Affected:* Liberty Township, Adams County, Sprigg Township, Monroe Township, Tiffin Township, Oliver Township, Franklin Township, Winchester Township, Winchester Village, Meigs Township

*Project Lead(s):* Dam Owners, Jurisdictional Chief Elected Officials of affected jurisdictions

*Funding Resource(s):* Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Planning, Dam EAPs

Vulnerability	Before Implementation	After Implementation	Difference
People in inundation zones	Unknown	Fewer unaware	Not Quantifiable
Businesses in inundation zones	Unknown	Fewer unaware	Not Quantifiable
Other community assets in inundation zones	Unknown	Fewer unaware	Not Quantifiable

Benefits	Costs
Reduced people, businesses, other assets at risk	Dam owner buy in Study costs

### 3. Action: Rehabilitate dams known to be of high hazard potential.

Rehabilitate and maintain dams to ensure integrity.

Priority	Start Date	End Date	Estimated Cost	Current Status
15	12/1/2021	11/30/2026	Unknown	New

*Hazards Addressed:* Dam/Levee Failure

*Jurisdiction(s) Affected:* Monroe Township, Winchester Village, Winchester Township, Tiffin Township, Oliver Township, Meigs Township, Liberty Township, Franklin Township, Adams County, Sprigg Township

*Project Lead(s):* Dam Owners, Jurisdictional Chief Elected Officials of affected jurisdictions

*Funding Resource(s):* Hazard Mitigation Grant Program, In-Kind (Work or Labor), Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Planning, Reconstruction, Dam Rehabilitation

Vulnerability	Before Implementation	After Implementation	Difference
People in inundation zones	Unknown	Fewer at Risk	Not Quantifiable
Businesses in inundation zones	Unknown	Fewer at Risk	Not Quantifiable

Benefits	Costs
Reduced people, businesses, other assets at risk	Dam owner buy in Project costs

**4. Action: Mitigate structures at risk.**

Priority	Start Date	End Date	Estimated Cost	Current Status
6	12/1/2021	11/30/2026	\$84m	Unchanged

*Hazards Addressed:* Flooding

*Jurisdiction(s) Affected:* Adams County, Manchester Village

*Project Lead(s):* Jurisdictional Chief Elected Officials; Jurisdictional Floodplain Managers

*Funding Resource(s):* Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, Local Funds, Pre-Disaster Mitigation Grant, Repetitive Flood Claims Program, Severe Repetitive Loss Grant

*Mitigation Action Type(s):* Acquisition, Elevation, Planning, Relocation, Retrofit

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties, homeless (families)	58	0	-58
People - personal property loss	58	0	-58
Structures - damaged/destroyed	58	0	-58

Benefits	Costs
Decreased isolation Increased public safety Decreased response and recovery costs Community-owned green space Decreased response and recovery costs	Buy-in and funding by elected officials and property owners

**B. Goal: Provide timely warning****1. Action: Enhance public warning systems.**

Includes early warning systems, such as a location-based mass-notification system.

Priority	Start Date	End Date	Estimated Cost	Current Status
1	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Drought, Tornado, Mud/Landslide, Earthquake, Land Subsidence, Dam/Levee Failure, Severe Winter Storm, Infectious Disease

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County EMA

*Funding Resource(s):* Community Development Block Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant, State Funds

*Mitigation Action Type(s):* Planning, Public Warning

Vulnerability	Before Implementation	After Implementation	Difference
People - Unaware of emergency situations	Unknown	Fewer	Not quantifiable
People - Casualties	Unknown	Fewer	Not quantifiable
People - Stranded/isolated	Unknown	Fewer	Not quantifiable

Benefits	Costs
Increased public awareness Increased public safety	Unknown

**2. Action: Provide NOAA All-Hazards Warning Radios for all critical facilities.**

Identify critical facilities without these warning radios and purchase them.

Priority	Start Date	End Date	Estimated Cost	Current Status
7	12/1/2021	11/30/2026	\$2k	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Tornado, Earthquake, Dam/Levee Failure, Severe Winter Storm

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County EMA

*Funding Resource(s):* Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant, State Funds

*Mitigation Action Type(s):* Planning, Public Warning

Vulnerability	Before Implementation	After Implementation	Difference
People - Unaware of Hazards and Actions to Take	80%	50%	-30%

Benefits	Costs
Increased public safety Increased attractiveness to new businesses, visitors and residents	\$50 x 50 radios

**C. Goal: Enhance emergency response capability****1. Action: Upgrade the public safety countywide communications system.**

To ensure interoperability within the county as well as with assisting local, state and federal agencies.

Priority	Start Date	End Date	Estimated Cost	Current Status
<b>2</b>	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Drought, Tornado, Mud/Landslide, Earthquake, Land Subsidence, Dam/Levee Failure, Severe Winter Storm, Infectious Disease

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County EMA

*Funding Resource(s):* Community Development Block Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant, State Funds

*Mitigation Action Type(s):* Planning, Public Safety

Vulnerability	Before Implementation	After Implementation	Difference
Responders - lack of coordinated response	Unknown	None	100%

Benefits	Costs
Increased public safety Enhanced response and recovery operations	Unknown

**2. Action: Install dry hydrants throughout the county.**

To provide reliable source of firefighting water where hydrants are not available.

Priority	Start Date	End Date	Estimated Cost	Current Status
<b>9</b>	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Severe Summer Storm/Thunderstorm/Windstorm/Hail, Tornado, Earthquake

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Jurisdictional Fire Chiefs

*Funding Resource(s):* Community Development Block Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Planning, Wildfire, Public Safety

Vulnerability	Before Implementation	After Implementation	Difference
Structures - No Access to Fire Suppression Water	Unknown	Fewer at Risk	Not Quantifiable

Benefits	Costs
Decreased structural damage by fire Decreased response time Increased attractiveness to new businesses and residents	Unknown

**3. Action: Develop and implement a volunteer management program.**

To identify, vet, organize, train, equip and mobilize volunteers to assist in incident response and recovery operations.

Priority	Start Date	End Date	Estimated Cost	Current Status
13	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Drought, Tornado, Mud/Landslide, Earthquake, Land Subsidence, Dam/Levee Failure, Severe Winter Storm, Infectious Disease

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County EMA

*Funding Resource(s):* Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Planning, Volunteer Management

Vulnerability	Before Implementation	After Implementation	Difference
People - Wanting to Help but Not Knowing How	Unknown	Fewer	Not Quantifiable

Benefits	Costs
Relieving Incident Commanders of having to manage volunteers Increased response and recovery resources Community involvement	Staff costs

**D. Goal: Create self sufficiency****1. Action: Install back-up generators for shelters and critical facilities.**

Needed to maintain continuous power to protect human health and life.

Priority	Start Date	End Date	Estimated Cost	Current Status
4	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Tornado, Earthquake, Dam/Levee Failure, Severe Winter Storm

*Jurisdiction(s) Affected:* Winchester Village, Tiffin Township, Winchester Township, Cherry Fork Village, Manchester Village, Peebles Village, Seaman Village, Scott Township, West Union Village, Sprigg Township, Rome Village, Franklin Township, Adams County, Wayne Township, Brush Creek Township, Oliver Township, Green Township, Jefferson Township, Liberty Township, Manchester Township, Meigs Township, Monroe Township, Bratton Township

*Project Lead(s):* Facility Agency Heads

*Funding Resource(s):* Community Development Block Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Storm Shelter, Public Safety

Vulnerability	Before Implementation	After Implementation	Difference
People - Needing Sheltering and Emergency Services	Unknown	Fewer at Risk	Not Quantifiable

Benefits	Costs
Decreased impact of utility outages Increased public safety	\$25k per site

**2. Action: Identify/upgrade facilities to be shelters.**

Inventory and assess currently identified shelters to determine their viability, identify and assess new shelters locations, determine needed upgrades, and make upgrades.

Provide at least one shelter for each jurisdiction.

Priority	Start Date	End Date	Estimated Cost	Current Status
8	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Tornado, Earthquake, Dam/Levee Failure, Severe Winter Storm

*Jurisdiction(s) Affected:* Monroe Township, Adams County, Bratton Township, Brush Creek Township, Franklin Township, Green Township, Jefferson Township, Meigs Township, Manchester Township, West Union Village, Liberty Township, Oliver Township, Winchester Village, Seaman Village, Rome Village, Peebles Village, Manchester Village, Scott Township, Winchester Township, Wayne Township, Tiffin Township, Cherry Fork Village, Sprigg Township

*Project Lead(s):* Jurisdictional Chief Elected Officials

*Funding Resource(s):* Community Development Block Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant



*Mitigation Action Type(s):* Planning, Storm Shelter, Public Safety

Vulnerability	Before Implementation	After Implementation	Difference
People - In Vulnerable Structures/Situations	Unknown	Fewer at Risk	Not Quantifiable

Benefits	Costs
Locally-accessible shelters Increased public safety Increased self-sufficiency	Unknown

### 3. Action: Identify temporary facilities for non-life threatening emergencies.

To alleviate the overloading of the medical facilities.

Priority	Start Date	End Date	Estimated Cost	Current Status
11	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Infectious Disease

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County Health Department

*Funding Resource(s):* Community Development Block Grant, In-Kind (Work or Labor), Local Funds

*Mitigation Action Type(s):* Planning, Public Safety

Vulnerability	Before Implementation	After Implementation	Difference
People - Without beds for urgent medical needs	Unknown	Fewer	Not quantifiable

Benefits	Costs
Increased public safety and health during health emergencies	Staff costs

### 4. Action: Identify alternate potable water sources and develop a distribution system.

In the event that existing water supplies are disrupted or contaminated or wells run dry.

Priority	Start Date	End Date	Estimated Cost	Current Status
5	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Drought, Earthquake

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County Health Department, Jurisdictional Chief Elected Officials

*Funding Resource(s):* Community Development Block Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant

*Mitigation Action Type(s):* Planning

Vulnerability	Before Implementation	After Implementation	Difference
People - Access to Water	Unknown	Fewer at Risk	Not Quantifiable

Benefits	Costs
Water available during droughts	Staff costs

### 5. Action: Construct community and residential safe rooms.

A safe room is an extreme-wind shelter or space that provides protection to people during a tornado or other severe weather.

Priority	Start Date	End Date	Estimated Cost	Current Status
12	12/1/2021	11/30/2026	Unknown	New

*Hazards Addressed:* Severe Summer Storm/Thunderstorm/Windstorm/Hail, Tornado

*Jurisdiction(s) Affected:* Monroe Township, Bratton Township, Manchester Village, Seaman Village, Rome Village, Winchester Township, Peebles Village, Wayne Township, Tiffin Township, Sprigg Township, Scott Township, Oliver Township, Cherry Fork Village, Meigs Township, Manchester Township, Liberty Township, Jefferson Township, Green Township, Franklin Township, Winchester Village, Adams County, West Union Village, Brush Creek Township

*Project Lead(s):* Adams County EMA; Jurisdictional Chief Elected Officials, Interested Home Owners

*Funding Resource(s):* Hazard Mitigation Grant Program, Pre-Disaster Mitigation Grant, State Funds

*Mitigation Action Type(s):* Storm Shelter

Vulnerability	Before Implementation	After Implementation	Difference
People - In vulnerable structures	Unknown	Fewer at Risk	Not Quantifiable

Benefits	Costs
Increased public safety Decreased response and recovery costs	Chief Elected Official/Home-Owner buy-in and funding

**E. Goal: Increase public awareness****1. Action: Develop and conduct public education program.**

Priority	Start Date	End Date	Estimated Cost	Current Status
10	12/1/2021	11/30/2026	Unknown	Unchanged

*Hazards Addressed:* Flooding, Severe Summer Storm/Thunderstorm/Windstorm/Hail, Drought, Tornado, Mud/Landslide, Earthquake, Land Subsidence, Dam/Levee Failure, Severe Winter Storm, Infectious Disease

*Jurisdiction(s) Affected:* Adams County

*Project Lead(s):* Adams County EMA

*Funding Resource(s):* Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant, State Funds

*Mitigation Action Type(s):* Planning, Public Education

Vulnerability	Before Implementation	After Implementation	Difference
People - Unprepared	80%	50%	-30%
People - Casualties	Unknown	Fewer	Fewer casualties
Structures - At Risk	Unknown	Fewer	Fewer Damaged Structures Less Damage to Structures

Benefits	Costs
Increased public awareness and preparedness	Staff costs

This page intentionally left blank

## Section VII – Supplemental Information

### A. Meetings, Announcements and Correspondence

The Planning Team sent out the following emails and held public meetings to officially brief chief elected officials, gather data for inclusion in the updated plan, and make decisions on elements of the plan. The following are the emails with those contacted and responded, and announcements with rosters of attendees for meetings:

#### 1. Public Announcement



#### Adams County, Ohio EMA

Public ▼

+ Album ▼


The Adams County Emergency Management Agency is currently preparing an updated and new Mitigation plan for Adams County. Any and all jurisdictions in Adams County are invited to help with this planning process with their input of Mitigation plan for Adams County. Any and all jurisdictions in Adams County are invited to help with this planning process with their input of projects needed in their respected areas. Contact the Adams County EMA at 937-544-6123 to relay input or further information!!!! We look forward to hearing from you!

## 2. Kick-Off Meeting

### a. In-Person Meeting – June 17, 2021

ADAMS COUNTY MITIGATION PLAN KICK-OFF MEETING JUNE 17, 2021		
SIGN-IN		
NAME	REPRESENTING	PHONE
Lorrie Mount	Ohio EMA	614.296.4724
Brody Davis	OHIO EMA	740 979 9012
Barbara Fock	Deerport Police Chief EMA	937-544-2585
Ed Lock	Deerport ARC & EMA	937-544-2585
Wendell W. Sueaaringer	Liberty Twp.	937-549-2477
Mark Morgan	Manchester Twp.	937-549-3635
Jason Pempis	Village of West Union	937-779-2077
John Spill	EMA	937/217-8545
Kathryn Thompson	Resident	937-779-9077

### b. Talking Paper Prepared by Contractor

<div data-bbox="178 1102 519 1176">  <p><b>RDI SOLUTIONS, LLC</b> A Service Connected Disabled Veteran Owned Small Business</p> </div> <div data-bbox="584 1102 763 1176"> <p>65238 Infirmity Rd McArthur, Ohio 45651 Office/Cell/Text: (740) 418-1598 Fax: (740) 994-8463 Email: main@rdisolutions.org</p> </div> <div data-bbox="341 1186 584 1228"> <p><b>Mitigation Planning Kick-Off Meeting Talking Paper</b></p> </div> <div data-bbox="178 1239 763 1900"> <p><b>What is Mitigation?</b> Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. For mitigation to be effective we need to <u>take action</u> now – before the next disaster – reduce human and financial consequences later (analyzing risk, reducing risk, and insuring against risk).</p> <p><b>What are the Benefits of Mitigation?</b></p> <ul style="list-style-type: none"> <li>Identifying actions for risk reduction that are agreed upon by stakeholders and the public.</li> <li>Focusing resources on the greatest risks and vulnerabilities.</li> <li>Building partnerships by involving citizens, organizations, and businesses.</li> <li>Increasing education and awareness of threats and hazards, as well as their risks.</li> <li>Communicating priorities to State and Federal officials.</li> <li>Aligning risk reduction with other community objectives.</li> </ul> <p><b>What's the Real Value of Mitigation?</b></p> <ul style="list-style-type: none"> <li>It creates safer communities by reducing loss of life and property damage. For example, the rigorous building standards adopted by 20,000 communities across the country are saving the nation more than \$1.1 billion a year in prevented flood damages.</li> <li>It allows individuals to minimize post-flood disaster disruptions and recover more rapidly. For example, homes built to NFIP standards incur less damage from floods. When floods cause damage, flood insurance protects the homeowner's investment, as it did for the more than 200,000 Gulf Coast residents who received more than \$23 billion in payments following the 2005 hurricanes.</li> <li>It lessens the financial impact on individuals, communities, and society as a whole. For example, a recently updated study by the National Institute of Building Sciences shows that federally funded mitigation grants, on average, can save the nation \$6 in future disaster costs for every \$1 spent on hazard mitigation. The report also demonstrates for the first time that, on average, investments made by local communities and homeowners in hazard mitigation measures that exceed standard building codes can save the nation \$4 for every \$1 spent.</li> </ul> <p><b>What's the Benefit Having a FEMA-Approved Mitigation Plan?</b> The purpose of the Stafford Act, as amended by the Disaster Mitigation Act of 2000, is "to reduce the loss of life and property, human suffering, economic disruption, and disaster assistance costs resulting from natural disasters." Section 322 requires state and local governments to prepare multi-hazard mitigation plans as a precondition for receiving FEMA mitigation project grants.</p> <p><b>Who's Involved in County Mitigation Planning?</b> "Stakeholders":</p> <ul style="list-style-type: none"> <li>Emergency management (including adjacent jurisdictions)</li> <li>Chief and other elected officials</li> </ul> </div>	<div data-bbox="958 1102 1299 1123"> <p>Mitigation Planning Kick-Off Meeting Talking Paper - April 10, 2020</p> </div> <div data-bbox="860 1134 1331 1239"> <ul style="list-style-type: none"> <li>Agencies with responsibilities related to hazards</li> <li>Agencies with regulatory authority in/affecting your county</li> <li>Agencies (all levels of government) involved in mitigation for your county</li> <li>Groups that may be affected by your mitigation actions or policies</li> <li>Any others that add value to the process</li> <li>The public</li> </ul> </div> <div data-bbox="844 1249 1250 1638"> <p><b>What's the Mitigation Planning Process?</b></p> <ul style="list-style-type: none"> <li>Organize Resources <ul style="list-style-type: none"> <li>Access Community Support <ul style="list-style-type: none"> <li>Is the community ready?</li> <li>Gain support</li> </ul> </li> <li>Build the Hazard Mitigation Planning Team <ul style="list-style-type: none"> <li>Representatives from those involved (above)</li> </ul> </li> <li>Engage the public <ul style="list-style-type: none"> <li>Marketing, media, social media, outreach, feedback</li> </ul> </li> </ul> </li> <li>Assess Risks <ul style="list-style-type: none"> <li>Identify hazards</li> <li>Identify affected community assets</li> <li>Analyze risk</li> <li>Summarize vulnerability</li> </ul> </li> <li>Develop Goals, Actions and Priorities <ul style="list-style-type: none"> <li>Establish mitigation goals</li> <li>Identify and prioritize mitigation actions</li> <li>Prepare implementation strategy</li> </ul> </li> <li>Assemble the plan</li> <li>Implement the plan and monitor progress <ul style="list-style-type: none"> <li>Adopt the plan – commissioners and mayors/councils</li> <li>Implement the plan</li> <li>Monitor progress</li> <li>Revise the plan</li> </ul> </li> </ul> </div>
--	--

Mitigation Planning Kick-Off Meeting Talking Paper - April 10, 2020	Mitigation Planning Kick-Off Meeting Talking Paper - April 10, 2020
<p><b>What's Your Involvement in the Mitigation Planning Process?</b></p> <ul style="list-style-type: none"> <li>• Mitigation Planning Team <ul style="list-style-type: none"> <li>• Understand mitigation and the planning process (Kick-Off Meeting)</li> <li>• Participate in hazard and risk analysis (Hazards Meeting)</li> <li>• Participate in mitigation goals and actions development (Actions Meeting)</li> </ul> </li> <li>• Commissioners and Mayors/Councils <ul style="list-style-type: none"> <li>• Understand mitigation and the planning process (Kick-Off Meeting)</li> <li>• Participate in the process</li> <li>• Adopt and implement the plan</li> </ul> </li> <li>• Other Stakeholders <ul style="list-style-type: none"> <li>• Understand mitigation and the planning process (Kick-Off Meeting)</li> <li>• Provide input as requested and as seen fit</li> </ul> </li> <li>• Consultant <ul style="list-style-type: none"> <li>• Keep process on track</li> <li>• Prepare documents and worksheets for Planning Team to review, provide information and make decisions (All meetings)</li> <li>• Document the process and assemble the plan</li> </ul> </li> </ul> <p><b>What Meetings are Held?</b></p> <ul style="list-style-type: none"> <li>• Kick-Off Meeting <ul style="list-style-type: none"> <li>• Present the information in this talking paper</li> <li>• Answer questions</li> </ul> </li> <li>• Hazards Meeting <ul style="list-style-type: none"> <li>• Identify hazards</li> <li>• Identify affected assets</li> <li>• Prioritize hazards by risk (usually done by email after above information is assimilated)</li> </ul> </li> <li>• Actions Meeting <ul style="list-style-type: none"> <li>• Identify Goals</li> <li>• Evaluate actions from previous plan</li> <li>• Add new actions</li> <li>• Prioritize actions (usually done by email after above information is assimilated)</li> </ul> </li> </ul> <p><b>What are Acceptable Alternate Forms of Participation?</b> For those who cannot attend meetings or when in-person meetings cannot be held, the following are acceptable alternatives:</p> <ul style="list-style-type: none"> <li>• Webinars</li> <li>• Conference calls</li> <li>• Direct phone calls</li> <li>• Email exchanges</li> <li>• Postal mail</li> <li>• Surveys</li> </ul> <p style="text-align: right;">Page 3 of 4</p>	<p><b>What Does a Mitigation Plan Look Like?</b></p> <ul style="list-style-type: none"> <li>• Cover &amp; Table of Contents</li> <li>• Executive Summary <ul style="list-style-type: none"> <li>• 1-2-page quick read</li> </ul> </li> <li>• Introduction <ul style="list-style-type: none"> <li>• A lot of overhead material</li> </ul> </li> <li>• The Planning Process <ul style="list-style-type: none"> <li>• Describes each step</li> <li>• Identifies participants, public involvement, meetings, <u>analysis</u> and results</li> </ul> </li> <li>• Community Profile <ul style="list-style-type: none"> <li>• Describes geography, climate, <u>demographics</u> and other things that make the county unique</li> </ul> </li> <li>• Hazards <ul style="list-style-type: none"> <li>• Identifies hazards affecting community assets</li> <li>• Profiles identified natural hazards</li> <li>• Ranks hazards based on impact on assets</li> </ul> </li> <li>• Mitigation Goals &amp; Actions <ul style="list-style-type: none"> <li>• Identifies goals</li> <li>• Identifies actions to achieve these goals</li> <li>• Always starts with actions from previous plan</li> <li>• Prioritizes actions</li> </ul> </li> <li>• Supplemental Information <ul style="list-style-type: none"> <li>• Anything that adds value to the plan</li> </ul> </li> </ul> <p><b>Author:</b> David Pollinger, Owner/Consultant RDI Solutions LLC Current as of February 2021</p> <p style="text-align: right;">Page 4 of 4</p>


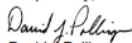
### c. Talking Paper Emailing

The Kick-Off Meeting Talking Paper was sent to the following:

- Jason Work, Adams County Health Department
- William E. Hablitzel, Adams County Health Department
- David Hook, Adams County Engineer's Office
- Rick Adamson, Adams County Regional Water
- Richard A. Lewis, Adams County Regional Medical Center
- Terri Crothers, Adams County EMS Coordinator
- Lorie Mount, Ohio EMA
- Barb Davis, Brown County EMA
- Dave Buschelman, Highland EMA
- Larry Mullins, Scioto County EMA
- Tim Dickerson, Pike County EMA



### 3. Hazard Identification and Ranking Worksheet – June 16, 2021

<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="text-align: center;">  <p><b>RDI SOLUTIONS, LLC</b> <small>A Service-Connected Disabled Veteran-Owned Small Business</small></p> </div> <div style="font-size: 0.8em;"> <p>Homeland Security/Emergency, Business, Project &amp; Information Systems Planning &amp; Management</p> <p>65238 Infirmary Rd McArthur, Ohio 45651 Office/Cell: (740) 418-1598 Fax: (740) 994-8463 Email: main@rdisolutions.org</p> </div> </div> <p style="text-align: center; margin-top: 10px;">June 16, 2021</p> <p>Memorandum for: Adams County Mitigation Planning Team</p> <p style="margin-left: 40px;">Re: Mitigation Plan Update – Hazard Identification and Ranking</p> <p>All,</p> <p>We need to rank the identified hazards in order of impact on county assets. Relying your experience and knowledge of each hazard, rank the identified hazards based on impact on assets tempered by the frequency of their occurrence. For example:</p> <ul style="list-style-type: none"> <li>Major flooding may have a significant impact on people (isolation and potential injuries or deaths), infrastructure (washed out roads, culverts or bridges), and structures (water in structures particularly those in flood-prone areas); with a high frequency, this would rank high.</li> <li>A 5.0 earthquake would have devastating effects on assets; with a low probability of occurrence, this would probably rank in the mid-range.</li> </ul> <p>As we receive your completed worksheets, I'll tally the results and average the rankings and perform some statistical analysis. If the collective rankings are relatively close to the whole, we will go with them. Otherwise, Karen, Tom and I will take action to resolve the differences.</p> <p>Please return these worksheets as soon as you can. Contact us if you have any questions.</p> <p>Respectfully,  David J. Pollinger Senior Analyst/Consultant</p>	<p style="text-align: center;"><b>Hazard Ranking Worksheet</b></p> <p style="text-align: center; font-size: 0.8em;">Using your experience and knowledge of each hazard, rank the identified hazards based on impact on assets tempered by the frequency of their occurrence.</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr style="background-color: #333; color: white;"> <th style="width: 35%;">Hazard</th> <th style="width: 10%;">Last Plan Ranking</th> <th style="width: 10%;">My Ranking</th> <th style="width: 45%;">Notes</th> </tr> </thead> <tbody> <tr><td>Flooding</td><td style="text-align: center;">1</td><td></td><td></td></tr> <tr><td>Severe Summer Storm/Thunderstorm/Windstorm/Hail</td><td style="text-align: center;">2</td><td></td><td></td></tr> <tr><td>Severe Winter Storm</td><td style="text-align: center;">3</td><td></td><td></td></tr> <tr><td>Drought</td><td style="text-align: center;">4</td><td></td><td></td></tr> <tr><td>Tornado</td><td style="text-align: center;">5</td><td></td><td></td></tr> <tr><td>Mud/Landslide</td><td style="text-align: center;">6</td><td></td><td></td></tr> <tr><td>Earthquake</td><td style="text-align: center;">7</td><td></td><td></td></tr> <tr><td>Land Subsidence</td><td style="text-align: center;">8</td><td></td><td></td></tr> <tr><td>Dam/Levee Failure</td><td style="text-align: center;">9</td><td></td><td></td></tr> <tr><td>Infectious Disease</td><td style="text-align: center;">N/A</td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> <tr><td> </td><td></td><td></td><td></td></tr> </tbody> </table>	Hazard	Last Plan Ranking	My Ranking	Notes	Flooding	1			Severe Summer Storm/Thunderstorm/Windstorm/Hail	2			Severe Winter Storm	3			Drought	4			Tornado	5			Mud/Landslide	6			Earthquake	7			Land Subsidence	8			Dam/Levee Failure	9			Infectious Disease	N/A																		
Hazard	Last Plan Ranking	My Ranking	Notes																																																										
Flooding	1																																																												
Severe Summer Storm/Thunderstorm/Windstorm/Hail	2																																																												
Severe Winter Storm	3																																																												
Drought	4																																																												
Tornado	5																																																												
Mud/Landslide	6																																																												
Earthquake	7																																																												
Land Subsidence	8																																																												
Dam/Levee Failure	9																																																												
Infectious Disease	N/A																																																												

### 4. Mitigation Actions Review, Additions and Prioritization Worksheet

Adams County 2021 Mitigation Plan Update					Agency/Jurisdiction
Mitigation Action Prioritization Worksheet					
Goal	Action	Benefits	Costs	Priority	
Reduce or eliminate impact of hazards on public safety, lives, property and infrastructure	Upgrade undersized storm water drainage systems.	Increased public safety Decreased damage to infrastructure	Unknown		
	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.	Reduced people, businesses, other assets at risk	Dam owner buy in Study costs		
	Rehabilitate dams known to be of high hazard potential.	Reduced people, businesses, other assets at risk	Dam owner buy in Project costs		
	Mitigate structures at risk.	Decreased isolation Increased public safety Decreased response and recovery costs Community-owned green space Decreased response and recovery costs	Buy-in and funding by elected officials and property owners		
Provide timely warning	Enhance public warning systems.	Increased public awareness Increased public safety	Unknown		
	Provide NOAA All-Hazards Warning Radios for all critical facilities.	Increased public safety Increased attractiveness to new businesses, visitors and residents	\$50 x 50 radios		
Enhance emergency response capability	Upgrade the public safety countywide communications system.	Increased public safety Enhanced response and recovery operations	Unknown		
	Install dry hydrants throughout the county.	Decreased structural damage by fire Decreased response time Increased attractiveness to new businesses and residents	Unknown		

Goal	Action	Benefits	Costs	Priority
	Develop and implement a volunteer management program.	Relieving Incident Commanders of having to manage volunteers Increased response and recovery resources Community involvement	Staff costs	
Create self-sufficiency	Install back-up generators for shelters and critical facilities.	Decreased impact of utility outages Increased public safety	\$250k per site	
	Identify/upgrade facilities to be shelters.	Locally-accessible shelters Increased public safety Increased self-sufficiency	Unknown	
	Identify temporary facilities for non-life threatening emergencies.	Increased public safety and health during health emergencies	Staff costs	
	Identify alternate potable water sources and develop a distribution system.	Water available during droughts	Staff costs	
	Construct community and residential safe rooms.	Increased public safety Decreased response and recovery costs	Chief Elected Official/Home-Owner buy-in and funding Staff costs	
Increase public awareness	Develop and conduct public education program.	Increased public awareness and preparedness		

New Action	Benefits	Costs	Priority

## 5. Township Trustees' Meeting – September 13, 2021

Trustees Meeting 9/13/2021	
Name	Municipality
Mike Robinson	Bratton Twp
Lawrence Shriener	Jefferson Twp
Jack Lewis	....
John Lloyd	Meigs Twp
Bill Setty	Meigs Twp
Paul W. Baker	Meigs Twp.
Beverly Cox	Green Twp
Clinton Baker	Oliver Township
Carol Grooms	Tiffin Twp
Dan Abbott	Springs Township
Richard M. Myler	Tiffin Twp
Tom Perdue	Franklin Twp
David Duggan	Springs Twp
Angela Wilkoff	Monroe Twp
Gary B. Grooms	Tiffin Twp
Dan Bolander	Scott Twp
Susan K. Lee	Monroe Twp.
Chuck Taylor	Brush Creek
Jimmy Tadlock	Wayne
Tom Downing	Wayne
Phil Calvin	Manchester Twp
Cal [Signature]	Manchester Twp
Wendell W. Swearingen	Liberty Twp.

## 6. Village Review and Concurrence

### Adams County Emergency Management Agency

To: Village of West Union

Subject: Hazard Mitigation Plan

The Adams County Mitigation Planning Team worked together to identify and prioritize the hazards affecting Adams County. It then reviewed the mitigation actions identified in our previous Mitigation Plan and added several more that reflect newly identified needs. Attached are the results of this project.

Please review these and indicate your concurrence. If you have any questions or comments, please contact me.

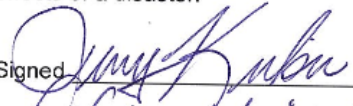
Respectfully,  
Karen Howelett, Director

We have reviewed the hazards prioritized by the mitigation planning team and the mitigation actions that apply to us. These actions fairly reflect those we need to take to help mitigate the effects of a disaster.

Signed

Title

Date

  
Village Administrator  
2-16-2022

### Adams County Emergency Management Agency

To: Village of Winchester

Subject: Hazard Mitigation Plan

The Adams County Mitigation Planning Team worked together to identify and prioritize the hazards affecting Adams County. It then reviewed the mitigation actions identified in our previous Mitigation Plan and added several more that reflect newly identified needs. Attached are the results of this project.

Please review these and indicate your concurrence. If you have any questions or comments, please contact me.


Respectfully,  
Karen Howelett, Director

We have reviewed the hazards prioritized by the mitigation planning team and the mitigation actions that apply to us. These actions fairly reflect those we need to take to help mitigate the effects of a disaster.

Signed

Title

Date

  
Mayor  
2/2/22

**B. Mitigation Actions by Jurisdiction**

<b>Jurisdiction</b>	<b>Priority</b>	<b>Action</b>
Adams County	1	Enhance public warning systems.
	2	Upgrade the public safety countywide communications system.
	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	5	Identify alternate potable water sources and develop a distribution system.
	6	Mitigate structures at risk.
	7	Provide NOAA All-Hazards Warning Radios for all critical facilities.
	8	Identify/upgrade facilities to be shelters.
	9	Install dry hydrants throughout the county.
	10	Develop and conduct public education program.
	11	Identify temporary facilities for non-life threatening emergencies.
	12	Construct community and residential safe rooms.
	13	Develop and implement a volunteer management program.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Bratton Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Brush Creek Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Franklin Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Green Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Jefferson Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Liberty Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.



Jurisdiction	Priority	Action
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Manchester Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Meigs Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Monroe Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Oliver Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Scott Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Sprigg Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Tiffin Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.

Jurisdiction	Priority	Action
Wayne Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Winchester Township	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.
Cherry Fork Village	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
West Union Village	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
Winchester Village	3	Upgrade undersized storm water drainage systems.
	4	Install back-up generators for shelters and critical facilities.
	8	Identify/upgrade facilities to be shelters.
	12	Construct community and residential safe rooms.
	14	Update dam Emergency Action Plans, update inundation data for dams without EAPs or current data.
	15	Rehabilitate dams known to be of high hazard potential.

### C. 2010 Mitigation Action Adjustments

2010 Goal/Action	Disposition	2022 Action
<b>Flooding - 100-year zone, non-flood zone, flash flooding</b>		
Seek funding for undersized culverts and drainage along roadways.	Unchanged	Upgrade undersized storm water drainage systems.
Seek funding to provide back-up generators for critical facilities, including shelters, which need to maintain continuous power to protect human health and life.	Unchanged	Install back-up generators for shelters and critical facilities.
Seek funding to increase manpower and equipment for townships and villages for debris removal.	Deleted Not a mitigation action	
Develop a public education program for informing residents about the benefits of having NOAA radios and Family Disaster	Unchanged	Develop and conduct public education program.

2010 Goal/Action	Disposition	2022 Action
Plans, which will help them better respond to an emergency situation.		
Upgrade the radio communications system throughout the County for all public safety services. Seek funding to provide MARCS radios throughout the County.	Unchanged	Upgrade the public safety countywide radio communications system.
Document which critical facilities do not have NOAA weather radios and seek funding to provide them to those documented without radios.	Unchanged	Enhance public warning systems.
<b>Severe Storms - Winter/Summer</b>		
Provide back-up generators for critical facilities, including shelters, which need to maintain continuous power to protect human health and life.	Deleted Merged	Install back-up generators for shelters and critical facilities.
Seek funding to increase manpower and equipment for townships and villages for snow and debris removal.	Deleted Not a mitigation action	
Develop a public education program for informing residents about the benefits of having NOAA radios and Family Disaster Plans, which will help them better respond to an emergency situation.	Deleted Merged	Develop and conduct public education program.
Provide/Encourage NOAA weather radios for all critical facilities within the County.	Deleted Merged	Enhance public warning systems.
Upgrade the radio communications system throughout the County for all public safety services. Seek funding for MARCS radios for all necessary public entities.	Deleted Merged	Upgrade the public safety countywide radio communications system.
Upgrade existing and provide additional shelters where residents, especially the medically fragile, can seek safety from severe weather. Provide at least one shelter for each jurisdiction. (talk to red cross)	Unchanged	Identify/upgrade facilities to be shelters.
<b>Droughts - Severe</b>		
Provide alternate potable water source in the event that existing water supplies are disrupted or wells run dry.	Deleted	Identify alternate potable water sources and develop a distribution system.
Provide back-up generators for critical facilities, including shelters, which need to maintain continuous power to protect human health and life.	Deleted Merged	Install back-up generators for shelters and critical facilities.



2010 Goal/Action	Disposition	2022 Action
Provide temporary facilities for non-life threatening emergencies to alleviate the overloading of the medical facilities.	Unchanged	Identify temporary facilities for non-life threatening emergencies.
Seek funding for dry hydrants	Unchanged	Install dry hydrants throughout the county.
<b>Tornadoes</b>		
Provide back-up generators for critical facilities, including shelters, which need to maintain continuous power to protect human health and life.	Deleted Merged	Install back-up generators for shelters and critical facilities.
Seek funding to increase manpower and equipment for townships and villages for debris removal.	Deleted Not a mitigation action	
Develop a public education program for informing residents about the benefits of having NOAA radios and Family Disaster Plans, which will help them better respond to an emergency situation.	Deleted Merged	Develop and conduct public education program.
Provide/Encourage NOAA weather radios for all critical facilities within the County.	Deleted Merged	Enhance public warning systems.
Upgrade the radio communications system throughout the County for all public safety services.	Deleted Merged	Upgrade the public safety countywide radio communications system.
Develop a mapping system to identify existing shelters, where residents can go to seek safety in the event of severe weather. Coordinate with the Red Cross on identifying existing shelters.	Unchanged	Identify/upgrade facilities to be shelters.
<b>Earthquakes</b>		
Provide alternate potable water source in the event that existing water supplies are disrupted or wells run dry.	Unchanged	Identify alternate potable water sources and develop a distribution system.
Seek funding to develop a Volunteer Reception Center for coordinating volunteers who are willing to help with the response of a severe weather incident.	Unchanged	Develop and implement a volunteer management program.
Seek funding to provide early warning system, such as reverse 9-1-1, to warn residents of emergency situations.	Unchanged	Enhance public warning systems.
Seek funding to increase manpower and equipment for townships and villages for debris removal.	Deleted Not a mitigation action	
Upgrade the radio communications system throughout the County for all public safety services.	Deleted Merged	Upgrade the public safety countywide radio communications system.

2010 Goal/Action	Disposition	2022 Action
Provide back-up generators for critical facilities, including shelters, which need to maintain continuous power to protect human health and life.	Deleted Merged	Install back-up generators for shelters and critical facilities.

**D. Acronyms, Terms and Definitions**

Term	Acronym	Description
Community Development Block Grant Program	CDBG	The Community Development Block Grant program is a flexible program that provides communities with resources to address a wide range of unique community development needs.
Community Asset		The people, structures, facilities, and systems that have value to the community
Dam - Class I		Dams having a total storage volume greater than five thousand acre-feet or a height of greater than sixty feet shall be placed in class I. A dam shall be placed in class I when sudden failure of the dam would result in one of the following conditions: (a) Probable loss of human life. (b) Structural collapse of at least one residence or one commercial or industrial business. Reference: OAC 1501:21-13-01(A)(1)
Dam - Class II		Dams having a total storage volume greater than five hundred acre-feet or a height of greater than forty feet shall be placed in class II. A dam shall be placed in class II when sudden failure of the dam would result in at least one of the following conditions, but loss of human life is not probable. (a) Disruption of a public water supply or wastewater treatment facility, release of health hazardous industrial or commercial waste, or other health hazards. (b) Flooding of residential, commercial, industrial, or publicly owned structures. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potentially affected property. (c) Flooding of high-value property. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potentially affected property. (d) Damage or disruption to major roads including but not limited to interstate and state highways, and the only access to residential or other critical areas such as hospitals, nursing homes, or correctional facilities as determined by the chief. (e) Damage or disruption to railroads or public utilities. (f) Damage to downstream class I, II or III dams or levees, or other dams or levees of high value. Damage to dams or levees can include, but is not limited to, overtopping of the structure. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potentially affected property. Reference: OAC 1501:21-13-01(A)(2)
Dam - Class III		Dams having a total storage volume greater than fifty acre-feet or a height of greater than twenty-five feet shall be placed in class III. A dam shall be placed in class III when sudden failure of the dam would result in at least one of the following

Term	Acronym	Description
		<p>conditions, but loss of human life is not probable.</p> <p>(a) Property losses including but not limited to rural buildings not otherwise described in paragraph (A) of this rule, and class IV dams and levees not otherwise listed as high-value property in paragraph (A) of this rule. At the request of the dam owner, the chief may exempt dams from the criterion of this paragraph if the dam owner owns the potentially affected property.</p> <p>(b) Damage or disruption to local roads including but not limited to roads not otherwise listed as major roads in paragraph (A) of this rule.</p> <p>Reference: OAC 1501:21-13-01(A)(3)</p>
Dam - Class IV		<p>Dams which are twenty-five feet or less in height and have a total storage volume of fifty acre-feet or less may be placed in class IV. When sudden failure of the dam would result in property losses restricted mainly to the dam and rural lands, and loss of human life is not probable, the dam may be placed in class IV. Class IV dams are exempt from the permit requirements of section 1521.06 of the Revised Code pursuant to paragraph (C) of rule 1501:21-19-01 of the Administrative Code.</p> <p>Reference: OAC 1501:21-13-01(A)(4)</p>
Emergency Management Agency	EMA	
Federal Emergency Management Agency	FEMA	FEMA's mission is to support our citizens and first responders to ensure that as a nation we work together to build, sustain and improve our capability to prepare for, protect against, respond to, recover from and mitigate all hazards.
Hazards U.S. Multi-Hazard	HAZUS-MH	The Hazards U.S. Multi-Hazard is a nationally applicable standardized method that estimates potential losses from earthquakes, hurricane winds, and floods. HAZUS-MH uses state-of-the-art geographic information system (GIS) software to map and display hazard data and estimates of damage and economic loss to buildings and infrastructure.
Impact		The consequences or effects of a hazard on the community and its assets
Mitigation		<p>Activities providing a critical foundation in the effort to reduce the loss of life and property from natural and/or manmade disasters by avoiding or lessening the impact of a disaster and providing value to the public by creating safer communities. Mitigation seeks to fix the cycle of disaster damage, reconstruction, and repeated damage. These activities or actions, in most cases, will have a long-term sustained effect. Mitigation measures may be implemented prior to, during, or after an incident. Mitigation measures are often informed by lessons learned from prior incidents. Mitigation involves ongoing actions to reduce exposure to, probability of, or</p>

Term	Acronym	Description
		potential loss from hazards. Measures may include zoning and building codes, floodplain buyouts, and analysis of hazard related data to determine where it is safe to build or locate temporary facilities. Mitigation can include efforts to educate governments, businesses, and the public on measures they can take to reduce loss and injury.
Modified Mercalli Intensity Scale		The Modified Mercalli Intensity value assigned to a specific site after an earthquake has a more meaningful measure of severity to the nonscientist than the magnitude because intensity refers to the effects actually experienced at that place. The lower numbers of the intensity scale generally deal with the manner in which the earthquake is felt by people. The higher numbers of the scale are based on observed structural damage.
Natural Hazard		Source of harm or difficulty created by a meteorological, environmental, or geological event
National Flood Insurance Program	NFIP	The National Flood Insurance Program is aimed at reducing the impact of flooding on private and public structures. This is achieved by providing affordable insurance for property owners and by encouraging communities to adopt and enforce floodplain management regulations. These efforts help mitigate the effects of flooding on new and improved structures. Overall, the program reduces the socio-economic impact of disasters by promoting the purchase and retention of Risk Insurance in general, and National Flood Insurance in particular.
National Oceanic and Atmospheric Administration	NOAA	Science, Service, and Stewardship. Mission: To understand and predict changes in climate, weather, oceans, and coasts, To share that knowledge and information with others, and To conserve and manage coastal and marine ecosystems and resources.
National Weather Service	NWS	The National Weather Service provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community.
Ohio Department of Natural Resources	ODNR	
Per Capita		Per unit of population.

Term	Acronym	Description
Repetitive Loss Property		Any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. The property may or may not be currently insured by the NFIP.
Risk		The potential for damage, loss, or other impacts created by the interaction of natural hazards with community assets.
Risk Assessment		Product or process that collects information and assigns values to risks for the purpose of informing priorities, developing or comparing courses of action, and informing decision making.
Severe Repetitive Loss Property		A residential property that is covered under an NFIP flood insurance policy and: (a) 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 (b) 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.
Threat or Human-Caused Incident		Intentional actions of an adversary, such as a threatened or actual chemical or biological attack or cyber event
United States Geological Survey	USGS	The USGS serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life.
United States Department of Housing and Urban Development	USHUD	HUD's mission is to create strong, sustainable, inclusive communities and quality affordable homes for all. HUD is working to strengthen the housing market to bolster the economy and protect consumers; meet the need for quality affordable rental homes; utilize housing as a platform for improving quality of life; build inclusive and sustainable communities free from discrimination and transform the way HUD does business.
Vulnerability		Characteristics of community assets that make them susceptible to damage from a given hazard