Ross County, Ohio

Natural Hazards Mitigation Plan

March 2020

Ross County, Ohio

Natural Hazards Mitigation Plan

FEMA Approved March 2020

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Executive Summary

The Ross 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 process of analyzing hazards and impacts on our community, the Mitigation Planning Team identified five mitigation goals and developed eighteen mitigation actions to achieve the goals. Of these actions, five actions were carried over from the previous plan, sixteen actions were added, no actions were completed, and no actions were deleted.

The following summarizes these efforts:

- Hazards Identified and Analyzed in Rank Order
  - Floods
  - Earthquakes
  - Mud/Landslides
  - Severe Winter/Ice Storms
  - Severe Windstorms
  - Severe Thunderstorms
  - Droughts
  - Dam Failure
- Goals Identified and Mitigation Actions Developed, Analyzed and Prioritized
  - Reduce or eliminate impact on public safety, lives and property
    - Rebuild, restore, reinforce ditches and stream banks
    - Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts
    - Raise/reroute roadbeds above the flood level
    - Remove or reinforce hillsides and banks prone to slippage
    - Conduct study to develop a comprehensive approach to handling stormwater runoff
    - Implement stormwater runoff solutions
    - Remove at-risk trees
    - Rehabilitate stormwater infrastructure
    - Mitigate structures at risk
    - Mitigate sanitary systems impacted by stormwater infiltration
    - Update dam Emergency Action Plans; update inundation data for dams without EAPs or no current inundation data
    - Rehabilitate dams known to be of high hazard potential
  - Provide timely warning
    - Improve hazard monitoring
    - Coordinate rain and stream gauges
    - Upgrade siren system
  - Create self sufficiency
    - Install generators at critical facilities

    - Construct Storm Shelter/EMA Office/EOC/Combined County-City Dispatch Center at Ross Fairgrounds
    - Construct Safe Rooms - Community
    - Construct Safe Rooms - Residential
- Plan for safe development
    - Review and update laws and regulations
- Increase public awareness
    - Develop and conduct a 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 Ross 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 *impact*ed 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 Ross County, Ohio, and provide that road map to a safer community.

B. Scope

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

C. Project Management

The Ross 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 Ross 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:

- Ross County Commissioners
- Ross County Floodplain Administrator
- Ross County Planning Commission
- Ross County Emergency Management Agency & Office of Homeland Security (EMA)
- Ross County Sheriff's Office
- Ross County Engineer's Office
- City of Chillicothe Mayor, Council and Floodplain Administrator
- Village of Adelphi Mayor and Council
- Village of Bainbridge Mayor, Council and Floodplain Administrator
- Village of Clarksburg Mayor, Council and Floodplain Administrator
- Village of Frankfort Mayor, Council and Floodplain Administrator
- Village of Kingston Mayor, Council and Floodplain Administrator
- Village of South Salem Mayor, Council and Floodplain Administrator

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
Ohio Department of Natural Resources (ODNR)	Dams, Waterways & Drought History and Conditions Landslide Characteristics

United States Geological Survey (USGS) & Ross 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
Ross County Emergency Management Agency (EMA)	Emergency Operations Plan Previous Disasters, Emergencies & Other Incidents
Ross County Auditor	Property Values & Types; Property Ownership
Ross County Engineer's Office	Impacted Roadways and Cost Estimates
Ross County Sheriff's Office	Public Safety Impacts: Location, Severity, Frequency
Ross County Planning Commission	Planning Regulations and Development Trends

I. Mitigation Action Changes as a Result of This Update

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

Mitigation Action	Priority		
	2010	2019	Status
Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts		1	New
Rebuild, restore, reinforce ditches and stream banks		2	New
Remove or reinforce hillsides and banks prone to slippage		3	New
Remove at-risk trees		4	New
Conduct study to develop a comprehensive approach to handling stormwater runoff		5	New
Implement stormwater runoff solutions		6	New
Rehabilitate stormwater infrastructure		7	New
Install generators at critical facilities		8	New
Construct Safe Rooms - Community		9	New
Construct Safe Rooms - Residential		10	New
Construct Storm Shelter/EMA Office/EOC/Combined County-City Dispatch Center at Ross Fairgrounds		11	New
Review and update laws and regulations	1	12	Unchanged
Develop and conduct a public education program	2	13	Unchanged
Upgrade siren system	3	14	Unchanged
Coordinate rain and stream gauges	4	15	Unchanged
Improve hazard monitoring	5	16	Unchanged
Mitigate structures at risk		17	New
Raise/reroute roadbeds above the flood level		18	New
Mitigate sanitary systems impacted by stormwater infiltration		19	New
Update dam Emergency Action Plans; update inundation data for dams without EAPs or no current inundation data		20	New
Rehabilitate dams known to be of high hazard potential		21	New

J. Progress Made

As this plan is an update to the 2010 plan, progress can be measured. While none of the existing 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.

K. 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 Ross County and its Assets.

Section IV – Hazard Identification and Analysis. This section lists the hazards likely to affect Ross 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.

Section II – The Planning Process

This section describes and summarizes the steps and actions taken to update the 2010 Ross County Mitigation Plan. Note that there are hyperlinks to the documentation for mentioned events/actions in *Section VIII – Supplemental Information*.

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

The Ross County EMA Director met with the Board of County Commissioners on July 30, 2019, advising them of the mitigation plan update project and received their full support.

The Ross County EMA Director announced that Ross County was updating its Mitigation Plan and personally invited interested EMA directors at the November 20, 2018, Ohio Emergency Management Southeast Sector meeting.

A representative of the Ross County EMA attended the Ross County Trustees' Association meeting on April 25, 2019, to explain the importance of mitigation planning and the update process as well as invite them to participate in the planning process.

The Ross County EMA Director, Deputy Director, and representatives from the Ohio EMA met with the Village of Bainbridge on April 28, 2019, Village of Frankfort on May 13, 2019, and Village of Adelphi on May 14, 2019, to personally discuss mitigation and specifically seek their input on mitigation actions that would apply to them.

Public participation and input to the planning process was first announced on the Ross County EMA Facebook page and in the Chillicothe Gazette, inviting the public to the Kick-Off Meeting to find out more about the mitigation plan update project. The current plan and a full description of the update process was posted on Ross County EMA web site. However, there was no 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 thy may have would be addressed.

B. Form the Planning Team

The Ross 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 Participating Agencies

The following agencies and individuals participated in the development of this plan:

Community	Name	Position / Title	Agency / Organization	Planning Team
State	Luan Nguyen	Mitigation Planner	Ohio EMA	
State	Darren Price	Regional Supervisor		
State	Lorie Haukedahl	Field Liaison		

Community	Name	Position / Title	Agency / Organization	Planning Team
Region	Ben Givens	Urban Technician	Ross County Soil & Water Conservation District	X
Region	J.T. Flowers	Urban Technician		X
County	Dwight Garrett	Commissioner	Ross County Board of Commissioners	
County	Paul Minney	Director	Ross County EMA & OHS	X
County	Linda Wood	Deputy Director		X
County	Susan Smith	PHEP Coordinator/PIO	Ross County Health Dept	X
County	Mike Buchanan	Superintendent	Ross County Engineer's Office	X
County	David Duckworth	CBO/Administrator	Ross County Building	X
City Township	Dean Carrol	City Engineer Trustee	City of Chillicothe Liberty Twp	X
Township	Daniel Mathews	President/Trustee	Huntington Twp	
Township	Dave Bethel	Trustee	Union Twp	
Township	Jacob S	Road Supervisor	Scioto Twp	
Township	Gary Hopkins	Trustee	Huntington Twp	
Village	Josh Hettinger	Mayor	Village of Adelphi	X
Village	Donald Conley	Council President	Village of Bainbridge	
Village	William Hubbard	Council Member		
Village	Barbara Everhart	Council Member		
Village	Rocky Countryman	Mayor		
Village	Paul Mather	Council Member		
Village	Frances Downing	Mayor	Village of Clarksburg	
Village	Dave Dratwa	Mayor	Village of Frankfort	
Village	Kevin Prickett	Mayor	Village of Kingston	
Village	Dennis Crouse	Mayor	Village of South Salem	
Consultant	David Pollinger	Consultant	RDI Solutions LLC	X

D. Hold the Kick-Off Meeting

The Planning Team conducted their Kick-Off meeting on October 9, 2018, at the Ross County Service Center Conference Room. Staff from the Ohio EMA attended and presented an overview of mitigation as well as requirements and expectations for a successful planning process and approved plan.

E. Gather Information

The Planning Team invited each jurisdiction's governing body to its planning meetings to gather information unique to each jurisdiction. The team also contacted agencies that have a mitigation-related role. This included the Ross County Health Department, Ross County Soil & Water Conservation District, Ross County Engineer's Office, Ross County Auditor's Office, Ross County Sheriff's Office and Ross County EMA.

The Planning Team reviewed existing plans and reports including Ross 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.

F. Draft the Updated Plan

The Planning Team met on November 14, 2018, February 5, 2019, and May 29, 2019. To maximize the effective use of time in meetings, drafted material was emailed to the Planning Team. Emails and conversations aimed at collecting information to be acted upon by the Planning Team were also employed. This included sending out worksheets to the villages soliciting input on mitigation actions that would have application to them. Those received were included in plan development.

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 Ross County's community assets.

- Floods
- Earthquakes
- Mud/Landslides
- Severe Winter/Ice Storms
- Severe Windstorms
- Severe Thunderstorms
- Droughts
- Dam Failure

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. Goals & Mitigation Actions

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 on public safety, lives and property
- Provide timely warning
- Create self sufficiency
- Plan for safe development
- Increase public awareness

The Planning Team then reviewed current mitigation actions and added several new ones. 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	Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts
2	Rebuild, restore, reinforce ditches and stream banks
3	Remove or reinforce hillsides and banks prone to slippage
4	Remove at-risk trees
5	Conduct study to develop a comprehensive approach to handling stormwater runoff
6	Implement stormwater runoff solutions
7	Rehabilitate stormwater infrastructure
8	Install generators at critical facilities
9	Construct Safe Rooms - Community
10	Construct Safe Rooms - Residential
11	Construct Storm Shelter/EMA Office/EOC/Combined County-City Dispatch Center at Ross Fairgrounds
12	Review and update laws and regulations
13	Develop and conduct a public education program
14	Upgrade siren system
15	Coordinate rain and stream gauges
16	Improve hazard monitoring
17	Mitigate structures at risk
18	Raise/reroute roadbeds above the flood level
19	Mitigate sanitary systems impacted by stormwater infiltration
20	Update dam Emergency Action Plans; update inundation data for dams without EAPs or no current inundation data
21	Rehabilitate dams known to be of high hazard potential

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

d. 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 September 2019. On September 16, 2019, FEMA determined this plan meets its requirements.

H. Adopt Plan

- On November 18, 2019, the Ross County Board of Commissioners adopted this plan.
- On January 13, 2020, the City of Chillicothe adopted this plan.
- On October 8, 2019, the Village of Adelphi adopted this plan.
- On September 26, 2019, the Village of Bainbridge adopted this plan.
- On December 19, 2019, the Village of Clarksburg adopted this plan.
- On February 10, 2020, the Village of Frankfort adopted this plan.
- On October 8, 2019, the Village of Kingston adopted this plan.
- On July 19, 2019, the Village of South Salem adopted this plan.
- On March 9, 2020, FEMA granted federal approval.

I. Present Plan to the Public

The plan was placed in the Chillicothe Public Library and on the Ross County EMA's website and a public notice was placed on the Ross 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.

J. Monitor Plan Implementation

The Ross 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 Ross 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.

K. Keep Plan Up to Date

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

The Ross 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 Ross County EMA's web site and Facebook page as well as announced in the various newspapers serving Ross 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 Ross County EMA initiates a formal plan update based on then current FEMA requirements and FEMA and Ohio EMA guidance.

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

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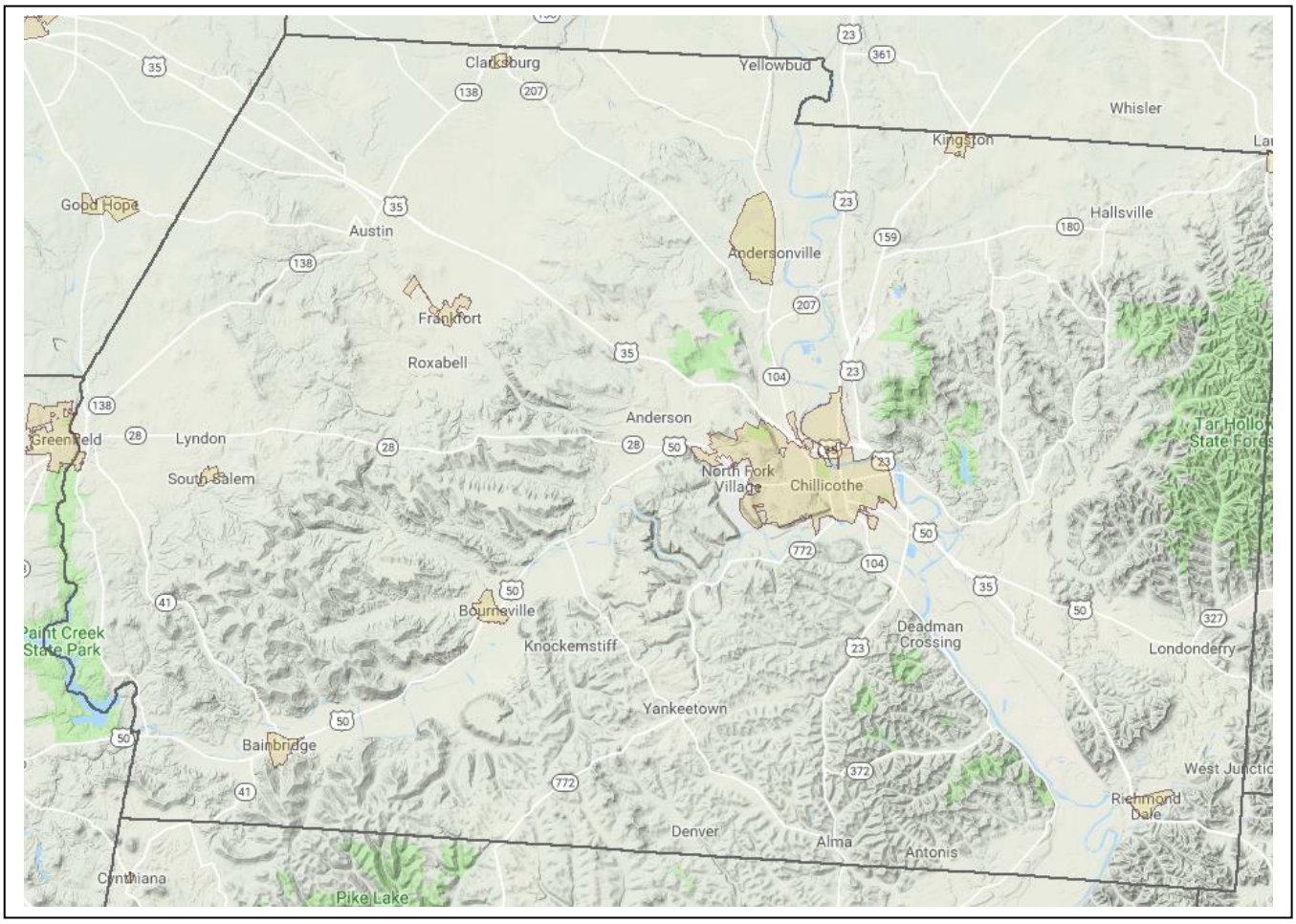
Section III – Community Profile and Assets



A. Location and Geography

Ross County is located in the south-central portion of the State of Ohio. It covers approximately 688.5 square miles. It is bounded by:

- Pickaway County to the north
- Vinton County to the east
- Jackson County to the southeast
- Pike County to the south
- Highland County to the southwest
- Fayette County to the northwest

Over half of the county is forest and shrub/scrub and grasslands. Almost half of the county is cropland and pastures. About 7% is developed.

B. Land Use

1. Land Use/Land Cover

The following chart depicts Ross County's land use and cover[1]:

[1] https://www.development.ohio.gov/files/research/C1072.pdf

Land Use/Land Cover	Percentage
Developed, Higher Intensity	.99%
Developed, Lower Intensity	5.97%
Barren (strip mines, gravel pits, etc.)	.10%
Forest	44.94%
Shrub/Scrub and Grasslands	4.54%
Pasture/Hay	13.22%
Cultivated Crops	29.45%
Wetlands	.05%
Open Water	.75%

2. Waterways

Scioto River originates northwest of Columbus and flows southerly out of Pickaway County, through Chillicothe and into Pike County.

Paint Creek originates in Madison County, flows into Highland County, turns east and flows easterly to drain into the Scioto River in Chillicothe.

There are numerous tributaries – both continuous and intermittent – feeding into these waterways.

3. Federal Lands

Hopewell Culture National Historic Park is located just north of Chillicothe off SR 104.

4. State Lands[2]

Great Seal State Park is located north of Chillicothe off Delano Rd.

Paint Creek State Park is located in southwest Ross County. The Ross-Highland County line follows – splits – Paint Creek as it turns north and into Fayette County.

Pleasant Valley Wildlife Area is located northwest of Chillicothe off US 35

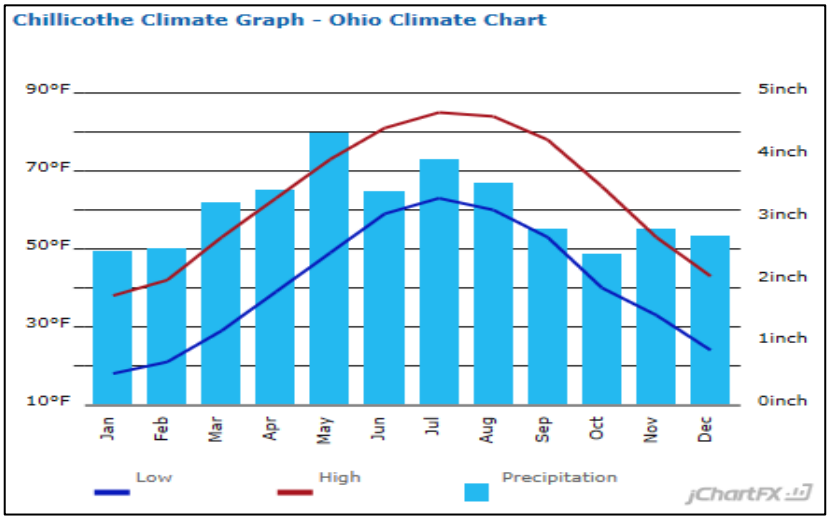
Ross Lake Wilderness Area is located east of Chillicothe

Scioto Trail State Park is located south of Chillicothe and west of Richmond Dale on the west bank of the Scioto River.

Tar Hollow State Forest is located east of Chillicothe. While mostly in Ross County, it straddles the Ross/Vinton/Hocking County lines with access from each county.

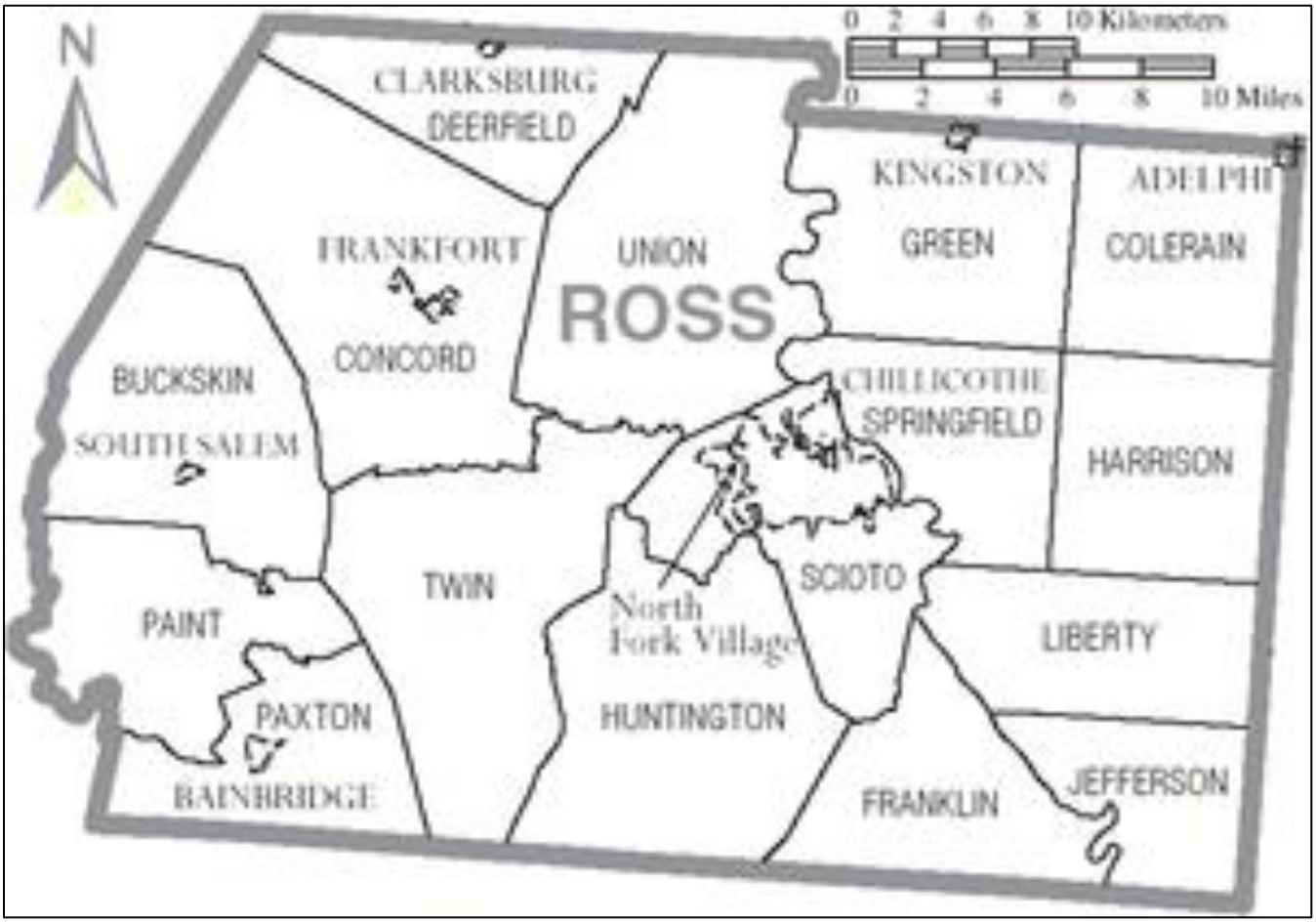
C. Climate

The following chart depicts climate information for Ross County[3]. The average temperature in Ross County is 52 degrees. The county has temperature extremes from sub-zero in the winter to the mid-90s in the summer. Average wind is 5-8 miles per hour from the southwest. The average annual rainfall in Ross County is 42 inches. Of this, the average snowfall is 23 inches.



[2] http://ohiodnr.gov/
[3] https://www.usclimatedata.com/climate/chillicothe/ohio/united-states/usoh0184

D. Jurisdictions and Populations



Ross County is subdivided into sixteen townships, one city and five incorporated villages. Below are their unique features, identified vulnerabilities and populations. Populations are 2018 estimates calculated by the Ohio Department of Development[4]

Jurisdiction	Population
Townships:	
Buckskin Township	1,903
Colerain Township	1,763
Concord Township	3,377
Deerfield Township	599
Franklin Township	1,690
Green Township	3,863
Harrison Township	1,305
Huntington Township	6,216
Jefferson Township	985
Liberty Township	2,598
Paint Township	1,361
Paxton Township	1,249
Scioto Township	5,777

[4] https://development.ohio.gov/files/research/P5027.pdf

Springfield Township	2,628
Twin Township	3,357
Union Township	12,635
Township Total	**51,306**
Cities:	
Chillicothe (Scioto and Springfield Townships)	21,698
City Total	**21,698**
Villages:	
Adelphi (Colerain Township)	374
Bainbridge (Paxton Township)	849
Clarksburg (Deerfield Township)	442
Frankfort (Concord Township)	1,047
Kingston (Green Township)	1,014
South Salem (Buckskin Township)	201
Village Total	**3927**
Ross County Total	**76,931**

E. Nonresidential Populations

There are activities in Ross County that attract many people from outside the county.

1. State Lands – Recreation

State lands provide many opportunities for recreation and people from all around the region use these facilities. The exact populations at any time are not known.

2. Hunting

Ross County is a popular area for deer and wild turkey hunting and attracts many out of county hunters during hunting seasons. State as well as private lands are used for hunting.

F. Demographics

The following information is a summary of information from the US Census Bureau[5]:

Population Trend. While the nation is growing at a 6% rate and Ohio at a 1.3% rate, Ross County is losing population at a 1.5% rate.

Diversity. With the exception of ethnicity and primary language (Ross County is approximately 8% more European American, 7% less African American and 3% less Hispanic), Ross County's diversity closely matches that of Ohio and the United States. This includes gender, age and family size.

Home Ownership. Ross County's home ownership rate is slightly higher than the national average.

Home Values. The average value of homes in Ross County is $114,600, 16% less than the state average and 40% less than the national average.

Education. Ross County students graduate high school close to the national average. The number of residents with post-high school degrees is a little more than one half of the state and national averages.

[5] https://www.census.gov/quickfacts/fact/table/rosscountyohio,oh,US/PST045218

Unemployment. Ross County's unemployment rate is approximately 5%, similar to Ohio as a whole but about 1% above the national average.

Income. The per capita income is $22,714, 22% lower than the state average and 17% lower than the national average. Sixteen percent of Ross County's population live below the poverty line, 14% higher than the state and 25% higher than national levels.

For a comprehensive analysis of Ross County's demographics, refer to the City-Data.com web site[6].

G. Major Transportation Routes

1. Highways

The major crossroads in Ross County are:

US 23 traverses the county north-south from Pickaway County (Circleville) through Chillicothe to Pike County (Waverly).

US 35 traverses the county northwest to southeast from Fayette County (Washington Courthouse) through Chillicothe and Richmond Dale to Jackson County (Jackson).

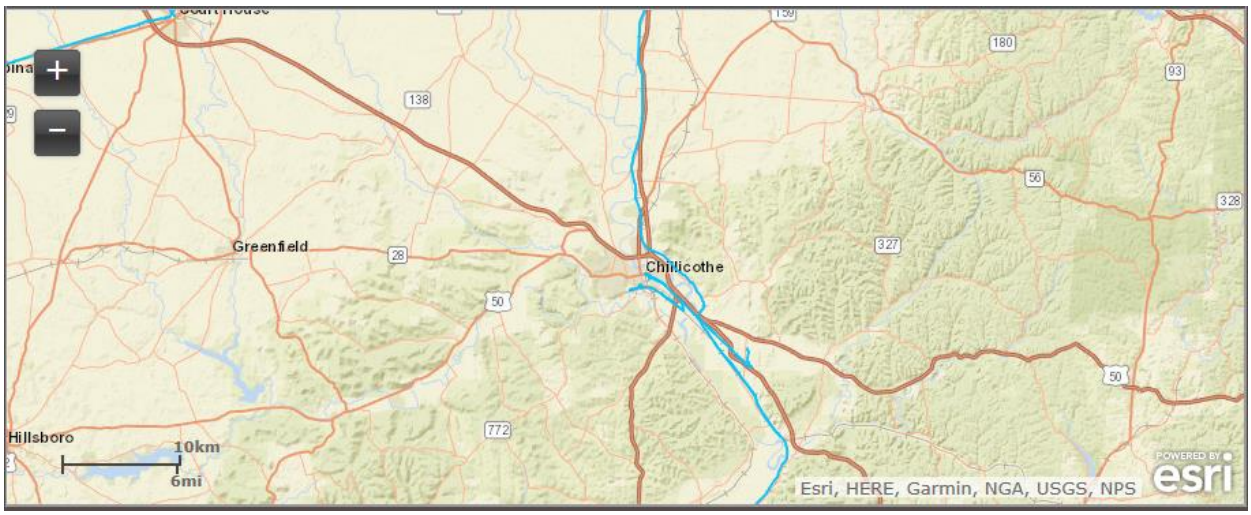
US 50 traverses the county generally west to east from Highland County (Hillsboro) through Bainbridge, Chillicothe and Londonderry to Vinton County (McArthur).

2. Airways

The Ross County Airport is located north of Chillicothe on SR 104.

3. Railways

CSTX operates a railway generally north-south following US 23 from the Pickaway County line south to Chillicothe. It follows US 35 south to the Pike County line. It also operates several spurs in the southern portion of Chillicothe. [Map Source[7]]



Norfolk Southern operates a railway that roughly parallels the CSTX railway. [Map Source[8]]

[6] http://www.city-data.com/county/Ross_County-OH.html
[7] http://www.acwr.com/economic-development/rail-maps/csx
[8] http://www.acwr.com/economic-development/rail-maps/norfolk-southern

H. Structures Types and Values[9]

The following summaries the structures and related information used in the plan:

Structure Type	Inventory	Average Value
Residential	38,473	$76,246
Nonresidential	4,920	$114,407
Critical	19	$250,000

I. Public Warning and Notifications Systems

1. NOAA Weather Radio All Hazards[10]

All county government facilities, local schools, hospitals and nursing homes have weather/all hazard alert radios.

2. Public Safety Location-Based Notification

Ross County employs a location-based notification system providing the capability to make emergency notifications to city residents via phone, texting and email.

J. Major Community Events

The *Ross County Fair* is held annually in August at the Ross County Fairgrounds. The fairgrounds are located just north of Chillicothe north of SR 207 between SR 104 and US 23.

The *Ohio Jeep Fest* is held at the Ross County Fairgrounds around the Fourth of July each year.

The *Easyrider Rodeo* is held at the Ross County Fairgrounds over the Labor Day weekend each year.

The *Feast of the Flowering Moon Festival* is held in Chillicothe annually on Memorial Day weekend in Yoctangee Park in historic downtown. The festival draws crowds of approximately 85,000.

The *International Sunflower Festival* is held in Frankfort over the Labor Day weekend each year.

The *Salt Creek Valley Festival* is held in Richmond Dale on the 2nd full weekend in September each year.

[9] Ross County Auditor's Office
[10] http://www.nws.noaa.gov/nwr/

K. Development Trends

1. Land Usage

Land usage hasn't changed significantly in recent years.

2. Economic Conditions

Ross County is enjoying a steady decrease in unemployment – 14.5% in 2010 to currently 4.9%.

L. Authorities Affecting Mitigation Activities

1. Zoning and Building Regulations

Ross County has a Planning Commission and countywide Comprehensive Plan which is and includes all townships and jurisdictions. Ross County (covering unincorporated areas) as well as all cities and villages have floodplain regulations formally adopted by resolution or ordinance. As of the Spring of 2005, all entities in Ohio now follow the State Building Code. There are no zoning ordinances in Ross 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
Ross County (Covers Unincorporated Areas)	Yes	Yes	Yes	Ohio Building Codes	No*	No	Operating Funds In-Kind Wages
Chillicothe	Yes	No	Yes		Yes	No	Operating Funds In-Kind Wages
Adelphi	No	No	Yes		No	No	In-Kind Wages
Bainbridge	No	No	Yes		No	No	In-Kind Wages
Clarksburg	No	No	Yes		No	No	In-Kind Wages
Frankfort	No	No	Yes				In-Kind Wages
Kingston	No	No	Yes				In-Kind Wages

Note: Buckskin and Deerfield Townships have zoning ordinances.

2. Floodplain Management

Ross County floodplain regulations are maintained by the county commissioners and mayors of those cities and 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[11].

CID	Jurisdiction	Initial FHBM Identified	Initial FIRM Identified	Current Effective Map Date	Reg-Emer Date	Sanction Date
390480	Ross County	2/7/1975	4/2/1991	7/22/2010	4/2/1991	N/A
390482	Chillicothe	6/28/1974	3/17/1984	7/22/2010	6/3/1986	N/A
390481	Bainbridge	3/29/1974	4/2/2003	7/22/2010	9/29/1978	N/A
390483	Clarksburg	11/15/1974	4/2/2003	All Zone C	5/25/1978	N/A
390484	Frankfort	4/12/1974	9/24/1984	7/22/2010	9/24/1984	N/A
	Adelphi	These jurisdictions chose not to participate as they are in FEMA-designated Areas of Minimal Flood Hazard effective 7/22/2010				
	Kingston					

4. Ross County Health Department

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

M. 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.

2. Grants

a. Community Development Block Grant Program[12]

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. 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.

c. 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.

[11] https://www.fema.gov/cis/OH.html
[12] http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/communitydevelopment/programs

d. 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).

e. Other Mitigation Grants

Information on other grant programs is available on the Ohio EMA's State Hazard Analysis Resource and Planning Portal (SHARPP)[13].

[13] http://ohiosharpp.ema.state.oh.us/OhioSHARPP/Grants.aspx#otherMitigationGrants

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Section IV – Hazard Identification and Analysis

A. Overview

The Ross 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 *State of Ohio Enhanced Hazard Mitigation Plan, Rev January 2011[14], page 72*) as the starting point for hazard identification. It then, based on a review of the community profile and historical records of hazards affecting southeast Ohio, selected the natural hazards it considered to be credible threats to Ross County's assets. No additional hazards were identified. A total of eight hazards were identified for Hazard and Vulnerability Analysis.

Hazard	Significant Impact on Assets
Floods	**Yes**
Storm Surges	No – No coastline
Windstorms/Tornadoes	**Yes**
Landslides	**Yes**
Severe Winter Storms	**Yes**
Severe Summer Storms	**Yes**
Invasive species	No – Day-to-day operations deals with these
Dam Failure	**Yes**
Coastal Erosion	No – No coastline
Wildfire	No – No past impacts on structures
Land Subsidence	No – No underground mining near structures
Droughts	**Yes**
Earthquakes	**Yes**

C. Hazard and Vulnerability Analysis Methodology

The Planning Team profiled each of the eight hazards identified. It collected and reviewed hazard information, assessed the impacts and the vulnerabilities of the community's assets. Events recorded in National Centers for Environmental Information (NCEI)[15] 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*[16]

The team assigned risk factor values based on the 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	1.5

[14] http://ema.ohio.gov/Documents/OhioMitigationPlan/2011/Section%202_HIRA%20Part%201.pdf
[15] http://www.NCEI.noaa.gov/stormevents/
[16] https://www.ncdc.noaa.gov/stormevents/pd01016005curr.pdf

Risk Factor	Criteria	Adjusting Factor
	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.	
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 weighted value of 1.25 above the raw score. The score is based on the percent of land area impacted by an event.	1.25
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

The team then estimated countywide structures at risk and associated damages for typical events using the following formula:

Structure Type	Inventory	Average Value	Percent at Risk	Number at Risk	Percent Damaged	Number Damaged	Percent Damages	Total Damages
Residential	38,473	$76,246	0.5%	192.4	10.0%	19.2	10.0%	$146,392
Nonresidential	4,920	$114,407	1.0%	49.4	10.0%	4.9	10.0%	$56,059

Critical	19	$250,000	0.0%	0.0	0.0%	0.0	10.0%	$0

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.

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
Floods	6	3	1	1.25	2	2	3	18.25
Earthquakes	1.5	3	1	2.5	2	4	2	16
Mud/Landslides	6	3	4	1.25	0	0	1	15.25
Severe Winter/Ice Storms	3	1	1	2.5	1	2	2	12.5
Severe Wind Storms	4.5	1	2	0	1	2	1	11.5
Severe Thunderstorms	4.5	1	2	0	0	1	1	9.5
Droughts	3	1	1	2.5	0	0	1	8.5
Dam Failure	1.5	1	1	1.25	2	0	1	7.75

2. Vulnerability Analysis

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

Hazard	Structures at Risk				Damage in Millions of Dollars			
	Residen-tial (Res)	Non-Res	Crit	Total	Res	Non-Res	Crit	Total
Floods	11157	1427	6	12589	64.300	10.430	0.000	74.730
Earthquakes	38473	4920	19	43412	440.012	56.288	0.000	496.300
Mud/Landslides	0	0	0	0	0.000	0.000	0.000	0.000
Severe Winter/Ice Storms	385	49	0	434	0.147	0.028	0.000	0.175
Severe Wind Storms	1924	246	0	2170	0.220	0.042	0.000	0.262
Severe Thunderstorms	769	98	0	868	0.015	0.003	0.000	0.018
Dam Failure	769	246	1	1016	1.467	2.111	0.024	3.601
Droughts	0	0	0	0	0.000	0.000	0.000	0.000

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 river beds 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 crossings, 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.

3. Historical Occurrence

The following occurrences were recorded by the National Centers for Environmental Information (NCEI)[17] and local records. Available narratives of major events follow the table.

[17] http://www.NCEI.noaa.gov/stormevents/

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Flood	1/5/1996			5	0	X	
Flood	1/17/1996			5	0	X	
Flood	1/23/1996			30	0	X	
Flash Flood	4/5/1996	0	1	5	0	X	
Flash Flood	6/14/1996			10	0	X	
Flood	1/3/1997			0	0		
Flood	1/6/1997			0	0		
Flash Flood	2/3/1997			250	0	X	DR-1164
Flood	2/3/1997			0	0		
Flood	4/16/1998			0	0		
Flash Flood	4/28/1999			0	0		
Flash Flood	2/18/2000			25	0	X	
Flood	2/18/2000			0	0		
Flash Flood	3/1/2000			5	0	X	
Flash Flood	5/23/2000			5	0	X	
Flash Flood	5/16/2001			0	0		
Flash Flood	5/17/2001			5	0	X	
Flash Flood	5/18/2001			2,000	0	X	
Flash Flood	6/6/2001			3	0		
Flood	12/4/2001			0	0		
Flood	4/21/2002			0	0		
Flood	6/13/2002			0	0		
Flash Flood	7/5/2002			5	0	X	
Flash Flood	8/5/2002			0	0		
Flash Flood	10/7/2002			10	0	X	
Flood	2/5/2003			0	0		
Flood	7/23/2003			0	0		
Flash Flood	7/31/2003			10	0	X	
Flood	7/31/2003			0	0		
Flood	8/22/2003			0	0		
Flood	10/5/2003			0	0		
Flood	1/1/2004						DR-1507
Flood	4/1/2004			0	0		
Flood	5/27/2004			0	0		
Flood	5/1/2005			20	0	X	
Flood	6/14/2005			0	0		

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Flood	11/1/2005			10	0	X	
Flash Flood	4/10/2006			100	0	X	
Flood	3/19/2008			5	0	X	
Flood	4/3/2008			5	0	X	
Flash Flood	3/6/2010			2	0		
Flood	4/12/2011			1	0		DR-4002
Flash Flood	10/5/2011			12	0	X	
Flash Flood	11/5/2011			15	0	X	
Flood	11/5/2011			4	0		
Flood	12/4/2011			1	0		
Flood	1/17/2012			1	0		
Flood	5/21/2012			0	0		
Flood	1/3/2017			0	0		
Flash Flood	4/29/2017			0	0		
Flash Flood	6/23/2017			0	0		
Flood	6/23/2017			0	0		
Flood	4/15/2018			0	0		

	Years	Events	Annual Probability	Months
All Events	22	53	241%	5
Major Events	22	21	95%	13
Disaster Declarations	22	3	14%	88

- **Flash Flood - 03/02/1997**

  Heavy rainfall occurred for the second night in a row causing area creeks and streams to rise out of their banks. Numerous roads were covered by high water. Several evacuations occurred as 32 homes were damaged by the flooding.

- **Flash Flood - 10/04/2006**

  A line of severe thunderstorms affected central Ohio during the afternoon and evening ahead of a cold front.

4. Probability of Future Occurrences

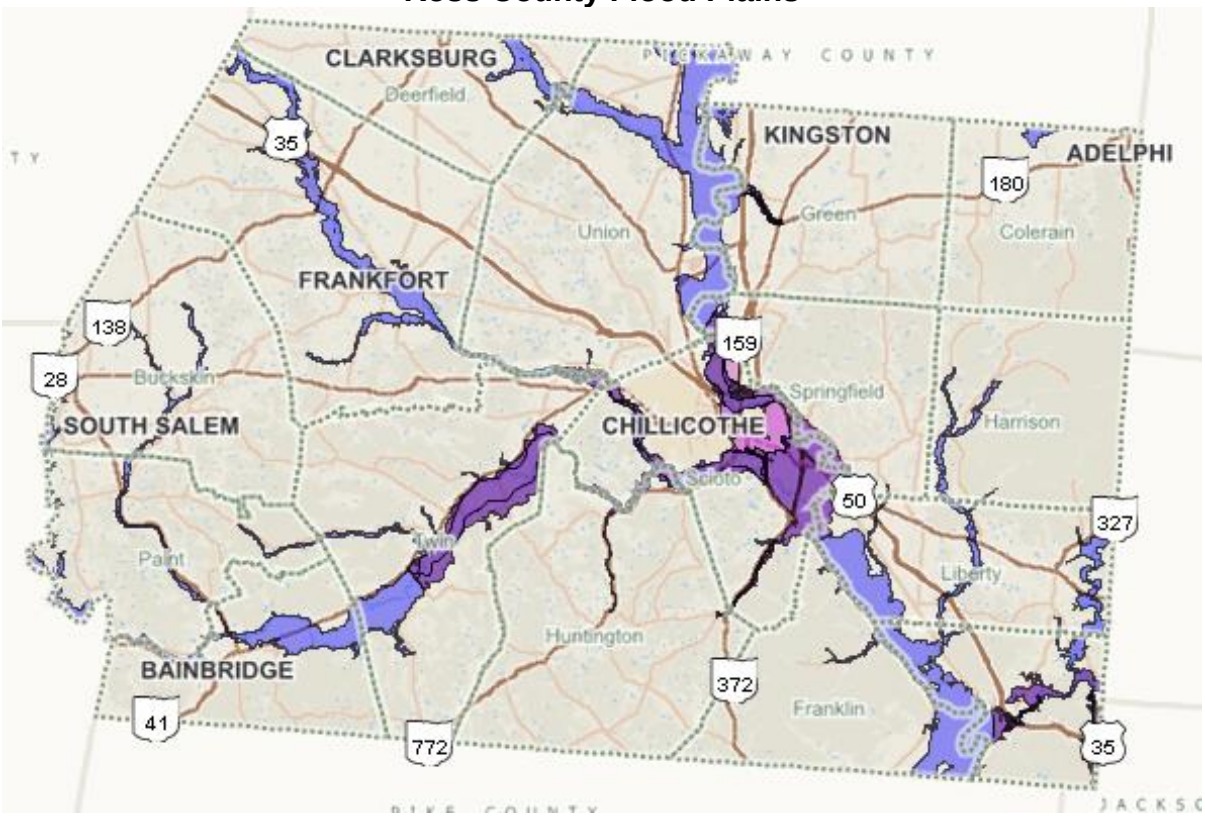
With 53 occurrences in the past 22 years, the probability of such an occurrence in a given year is 241% or an average of one every 5 months.

With 21 major occurrences (injuries, deaths, total damage $5,000 or greater) in the past 22 years, the probability of such an occurrence in a given year is 95% or an average of one every 13 months. There is a 4% probability of an occurrence with damages exceeding $1,000,000.

With 3 disaster declarations in the past 22 years, there is a 12% probability of such an occurrence in a given year.

5. Affected Locations

Ross County Flood Plains



Source: Ross County Auditor

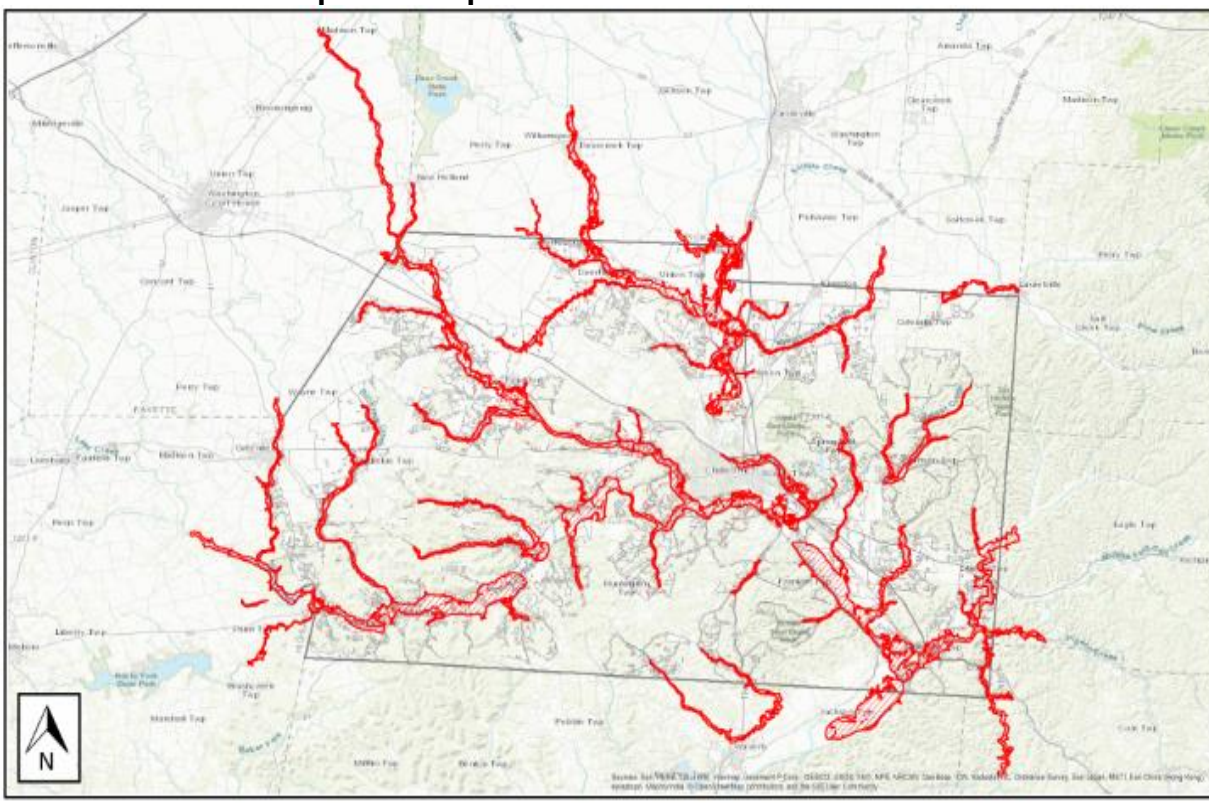
Flooding affects the entire county, primarily in the flood plains. There are mapped flood plain areas primarily along the Scioto River basin, Paint Creek, North Fork Paint Creek, Deer Creek, and their tributaries.

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 – Multi-Hazard Risk Assessment Program simulation[18] results for a 100-year flood affecting Ross County was used to estimate damages and impact on community assets.

[18] Provided by Ohio EMA, available in Ross County EMA Office

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 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.[19]

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.[20]

There are a number of repetitive loss structures in Ross County and are summarized below (as of September 30, 2018)[21] (Bolded properties are Severe Repetitive Loss properties):

[19] https://www.fema.gov/pdf/nfip/manual201205/content/20_srl.pdf
[20] https://www.fema.gov/txt/rebuild/repetitive_loss_faqs.txt
[21] Ohio EMA

Community Name	Number	Structure Type	Flood Zone	Number Losses	Building Loss	Contents Loss	Total Paid
Ross Co	**390480**	**Single Family**	**X**	**4**	**$ 54,512**	**$ 11,934**	**$ 66,446**
Ross Co	390480	Single Family	A	3	$ 52,128	$ 5,345	$ 57,474
Ross Co	390480	Other Residential	A	2	$ 43,161		$ 43,166
Ross Co	390480	Single Family	A	2	$ 33,600		$ 33,600
Ross Co	390480	Single Family	X	2	$ 29,100	$ 2,770	$ 31,870
Ross Co	390480	Single Family	AE	4	$ 24,174	$ 6,528	$ 30,702
Ross Co	390480	Single Family		2	$ 19,933	$ 7,100	$ 27,033
Ross Co	390480	Single Family	X	3	$ 17,329		$ 17,329
Ross Co	390480	Single Family	AE	2	$ 12,300	$ 1,241	$ 13,541
Chillicothe	390482	Single Family	AE	2	$ 15,641	$ 6,085	$ 21,726
Chillicothe	390482	Single Family	AE	2	$ 8,069	$ 4,467	$ 12,535
Chillicothe	390482	Single Family	A	2	$ 4,744		$ 4,744
Frankfort	390484	Single Family	X	2	$ 16,610	$ 4,998	$ 21,608

6. Analysis

Factor	Ranking
Frequency	High: 6-8 Declarations
Response	< 1 Week
Onset	> 24 Hours
Magnitude	10% Land Area
Business	1 Week
Human	Some Injuries
Property	25-50% Damaged

7. Vulnerable Community Assets

Asset	Impact
People	Major flooding potentially affects a large portion of the population, either directly or indirectly. This includes structural damages, isolation from essential services, need for relocaction or sheltering, injuries and possibly death. Casualities. HAZUS-MH estimates no casualities. Displaced and Sheltered. HAZUS-HM estimates 3,581 people would be displaced and 108 of the these would seek shelter in public shelters.
Economy	Flooded businesses would be out of business until clean up and repairs are completed and damaged inventory replaced. HAZUS-MH estimates $81.71 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.
Structures	The Planning Team used the results of FEMA's HAZUS-MH simulation of a 100-year flood for Ross County. HAZUS-MH estimates the following structural damages. The critical facility impact is loss of use.

Structure Type	Inven-tory	Average Value	At Risk		Damaged			Damages
			%	Number	%	Number	%	Total
Residential	38,473	$76,246	29	11,157	4	446		$64,300,000
Nonresidential	4,920	$114,407	29	1,427	4	3		$10,430,000
Critical	19	$250,000	29	6	0.2	1		$0

B. Severe Summer Storms (Thunderstorms/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.

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 hail storms, 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, winds gusting in excess of 50 knots (57.5 mph), or a tornado. 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.

Any of these is considered an occurrence.

3. Historical Occurrence

The following occurrences were recorded by the National Centers for Environmental Information (NCEI)[22] and local records. Available narratives of major events follow the table.

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Hail	8/8/1966			0	0		
Hail	3/13/1967			0	0		
Hail	3/16/1982			0	0		
Hail	2/5/1983			0	0		
Hail	4/25/1989			0	0		
Hail	2/6/1991			0	0		
Hail	11/22/1992			0	0		

[22] http://www.NCEI.noaa.gov/stormevents/

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Hail	4/15/1994			0	0		
Hail	6/16/1994			0	0		
Hail	6/21/1994			50	50	X	
Hail	9/25/1994			0	0		
Hail	6/16/1995			6	6	X	
Hail	8/4/1995			0	0		
Hail	1/5/1996			0	0		
Lightning	12/6/1996	0	1	50	0	X	
Hail	7/23/1999			0	0		
Lightning	9/29/1999			0	0		
Hail	5/23/2000			0	0		
Lightning	5/27/2000			30	0	X	
Hail	7/14/2000			0	0		
Hail	9/4/2001			0	0		
Hail	4/19/2002			10	0	X	
Hail	4/21/2002			3	0		
Hail	4/28/2002			5	0	X	
Hail	5/27/2004			0	0		
Hail	4/22/2005			15	0	X	
Hail	6/14/2005			0	0		
Lightning	6/29/2005	0	1	0	0	X	
Hail	8/11/2005			0	0		
Hail	4/10/2006			2	0		
Hail	7/4/2006			8	0		
Hail	4/26/2007			5	0	X	
Hail	7/26/2007			5	0	X	
Hail	8/25/2007			5	0	X	
Hail	11/4/2007			8	0	X	
Hail	6/23/2008			8	0	X	
Hail	2/6/2009			0	0		
Hail	5/30/2009			5	0	X	
Hail	6/25/2009			1	0		
Hail	8/20/2009			0	0		
Hail	9/6/2009			0	0		

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Hail	5/4/2010			0	0		
Hail	7/9/2010			0	0		
Hail	3/23/2011			0	0		
Hail	4/6/2011			0	0		
Hail	4/20/2011			0	0		
Hail	6/21/2011			0	0		
Hail	10/5/2011			0	0		
Hail	1/5/2012			0	0		
Hail	1/7/2012			0	0		
Hail	3/15/2012			0	0		
Hail	2/8/2014			0	0		
Hail	5/14/2014			0	0		
Hail	6/30/2015			0	0		
Hail	8/4/2015			0	0		
Hail	4/28/2016			0	0		

	Years	Events	Annual Probability	Months
All Events	50	56	112%	11
Major Events	50	14	28%	43
Disaster Declarations	50	0	0%	-

- **Lightning - 06/12/1996**

  Lightning struck a propane tank which caused a nearby home to explode. One person was killed and 2 were injured.

4. Probability of Future Occurrences

With 56 occurrences in the past 50 years, the probability of such an occurrence in a given year is 112% or an average of one every 11 months.

With 14 major occurrences (injuries, deaths, total damage $5,000 or greater) in the past 50 years, the probability of such an occurrence in a given year is 28% or an average of one every 43 months.

5. Affected Locations

Severe summer storms affect the entire county.

6. Analysis

Factor	Ranking
Frequency	Medium: 3-5 Declarations
Response	< 1/2 Day

Onset	12-24 Hours
Magnitude	No Impact
Business	No Impact
Human	Minor 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. Injuries are possible from hail and other falling objects.
Economy	Loss of power affect businesses both in loss of sales and regrigeration.
Infrastructure	The primary vulnerable infrastructure assets are roads, culverts and bridges, damaged by erosion. Lightning may adversely affect electrical and communications systems.
Structures	All structures are at risk for rain water and hail damage. The Planning Team estimates that in a typical event, 2% of structures would be at risk, .5% of structures at risk would be damaged with an average of 5% damage.

	Inven-	Average	At Risk		Damaged		Damages	
Structure Type	tory	Value	%	Number	%	Number	%	Total
Residential	38,473	$76,246	2	769	0.5	4	5	$14,667
Nonresidential	4,920	$114,407	2	98	0.5	0	5	$2,814
Critical	19	$250,000	2	0	0.5	0	5	$23

C. Severe Winter Storms

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 snow plows; 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[23].

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.

3. Historical Occurrence

The following occurrences were recorded by the National Centers for Environmental Information (NCEI)[24] and local records. Available narratives of major events follow the table.

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Cold/Wind Chill	1/2/1996			20	0	X	
Winter Storm	3/19/1996			0	0		
Winter Storm	6/1/1996			500	0	X	
Heavy Snow	11/1/1996			1	0		
Winter Storm	3/2/1998			0	0		
Winter Storm	1/1/1999			0	0		
Heavy Snow	3/13/1999			0	0		
Winter Storm	7/1/1999			0	0		
Heavy Snow	9/3/1999			0	0		
Heavy Snow	1/19/2000			0	0		
Heavy Snow	1/19/2001			0	0		
Winter Storm	5/12/2002			0	0		
Winter Storm	2/15/2003			0	0		DR-1453
Winter Storm	2/16/2003			0	0		
Winter Storm	1/25/2004			0	0		
Winter Storm	12/23/2004			0	0		DR-1580
Winter Storm	1/22/2005			0	0		
Winter Storm	4/12/2005			0	0		
Heavy Snow	6/2/2007			0	0		
Frost/Freeze	6/4/2007			0	540	X	

[23] http://www.nssl.noaa.gov/education/svrwx101/winter/
[24] http://www.NCEI.noaa.gov/stormevents/

Winter Storm	2/21/2008			0	0		
Winter Storm	7/3/2008			0	0		
Winter Storm	12/2/2008			0	0		
Heavy Snow	1/27/2009			0	0		
Heavy Snow	12/19/2009			0	0		
Heavy Snow	2/15/2010			0	0		
Heavy Snow	5/2/2010			0	0		
Heavy Snow	9/2/2010			0	0		
Winter Storm	12/16/2010			0	0		
Heavy Snow	1/20/2011			0	0		
Winter Storm	1/20/2012			0	0		
Winter Storm	12/28/2012			0	0		
Winter Storm	6/12/2013			0	0		
Winter Storm	11/26/2013			0	0		
Winter Storm	2/1/2014			0	0		
Winter Storm	2/3/2014			0	0		
Winter Storm	2/14/2014			0	0		
Winter Storm	4/2/2014			0	0		
Winter Storm	2/15/2015			0	0		
Winter Storm	2/21/2015			0	0		
Winter Storm	4/3/2015			0	0		
Winter Storm	5/1/2015			0	0		
Winter Storm	1/22/2016			0	0		
Winter Storm	8/2/2016			0	0		
Winter Storm	6/2/2018			0	0		
Winter Storm	12/1/2018			0	0		

	Years	Events	Annual Probability	Months
All Events	23	46	200%	6
Major Events	23	3	13%	92
Disaster Declarations	23	2	9%	138

- **Winter Storm – 6/1/1996**

  The Blizzard of '96 developed near the Gulf Coast and moved up the East Coast. This massive system produced the greatest total and 24-hour snowfall at Greater Cincinnati\Northern Kentucky airport. This one storm brought 14.3 inches of snowfall to the airport which normally receives 23 inches for an entire season. The heaviest snow fell near the Ohio river in the extreme south. The worst blizzard conditions occurred over West Central areas as dry and powdery snow was blown around by high winds causing whiteouts. Some areas had more than 30 continuous hours of snowfall, and many people in Southern Ohio felt this was the worst winter storm since the Blizzard of '78. In Fayette county, the airport reported a wind gust to 56 mph

during the height of the storm. By the end of the storm many homes and businesses had their roof collapse or partially collapse from the weight of the new snow, and snow from a storm earlier in the week. By late in the day on the 7th arctic air was pouring into the region. A 47 year old man died of exposure under an overpass in Miami county. A 76 year old man died of exposure on his front porch in Montgomery county.

- **Frost/Freeze – 6/4/2007**

  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.

4. Probability of Future Occurrences

With 46 occurrences in the past 23 years, the probability of such an occurrence in a given year is 200% or an average of one every 6 months.

With 3 major occurrences (injuries, deaths, total damage $5,000 or greater) in the past 23 years, the probability of such an occurrence in a given year is 13% or an average of one every 92 months.

With 2 disaster declarations in the past 23 years, there is a 9% probability of such an occurrence in a given year.

5. Affected Locations

Severe winter storms affect the entire county.

6. Analysis

Factor	Ranking
Frequency	Low: 1-2 Declarations
Response	< 1/2 Day
Onset	> 24 Hours
Magnitude	10-25% 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. People living on township roads may be affected for several days to a week. Injuries may occur from traveling in hazardous conditions, home fires from using auxillary heat sources, lack of heat and building/roof collaspe.
Economy	Loss of power would affect businesses both in loss of sales and regrigeration.
Infrastructure	The primary vulnerable infrastructure assets are roads – covered to the point of not being passable and the roadbed being damaged by thawing. Electric and communications lines and poles may be damaged by heavy snow and ice.
Structures	Older structures and those with flat roofs would be most at risk by the weight of snow and ice on their roofs. An estimated 1% of the non-critical structures in the county fall into this category, 5% of which potentially receiving 10% structural damage.

Structure Type	Inven-tory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	38,473	$76,246	1	385	5	19	10	$146,670
Nonresidential	4,920	$114,407	1	49	5	2	10	$28,144
Critical	19	$250,000	0	0	5	0	0	$0

D. Severe Wind Storms and Tornadoes

1. Description

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.

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.

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 wind storms 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. Source: NOAA[25]

2. Extent of Hazard

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

The severity of tornadoes is measured by the damaged it caused and relates it back to estimated three-second wind speed. The Enhanced Fujita Scale is used to rate tornadoes. Any verified tornado is considered an event.

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 occurrences were recorded by the National Centers for Environmental Information (NCEI)[26] and local records. Available narratives of major events follow the table.

[25] http://www.nssl.noaa.gov/education/svrwx101/wind/
[26] http://www.NCEI.noaa.gov/stormevents/

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Tornado	3/19/1954			250	0	X	
Tornado	5/26/1962			25	0	X	
Thunderstorm Wind	4/23/1968			0	0		
Tornado	6/14/1970			25	0	X	
Tornado	12/26/1973			250	0	X	
Thunderstorm Wind	6/22/1974			0	0		
Thunderstorm Wind	6/17/1975			0	0		
Thunderstorm Wind	3/30/1977			0	0		
Thunderstorm Wind	7/13/1977			0	0		
Thunderstorm Wind	5/7/1980			0	0		
Thunderstorm Wind	3/16/1982			0	0		
Tornado	8/24/1982			2500	0	X	
Tornado	2/5/1983			250	0	X	
Thunderstorm Wind	7/23/1983			0	0		
Thunderstorm Wind	6/22/1984			0	0		
Thunderstorm Wind	11/7/1984			0	0		
Thunderstorm Wind	11/6/1985			0	0		
Thunderstorm Wind	5/19/1987			0	0		
Thunderstorm Wind	3/4/1988			0	0		
Thunderstorm Wind	5/8/1989			0	0		
Thunderstorm Wind	7/7/1989			0	0		
Thunderstorm Wind	5/7/1990			0	0		
Thunderstorm Wind	9/14/1990			0	0		
Thunderstorm Wind	10/7/1990			0	0		
Thunderstorm Wind	8/8/1991			0	0		
Thunderstorm Wind	9/4/1991			0	0		
Thunderstorm Wind	6/24/1992			0	0		
Thunderstorm Wind	7/26/1992			0	0		
Thunderstorm Wind	10/4/1992			0	0		
Thunderstorm Wind	10/7/1992			0	0		
Thunderstorm Wind	11/17/1993			50	0	X	
Thunderstorm Wind	2/8/1994			5	0	X	
Thunderstorm Wind	4/8/1994			5	0	X	
Thunderstorm Wind	6/21/1994			55	50	X	

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Thunderstorm Wind	6/23/1994			5	0	X	
Thunderstorm Wind	7/6/1994			5	0	X	
Thunderstorm Wind	12/8/1994			5	0	X	
Thunderstorm Wind	5/14/1995			12	0	X	
Thunderstorm Wind	4/5/1996			5	0	X	
Thunderstorm Wind	6/14/1996			10	0	X	
Thunderstorm Wind	6/24/1996			6	0	X	
High Wind	10/29/1996			10	0	X	
Thunderstorm Wind	2/7/1997			10	0	X	
Thunderstorm Wind	5/1/1997			5	0	X	
Tornado	5/14/1997			25	0	X	
Thunderstorm Wind	5/19/1997			5	0	X	
Thunderstorm Wind	7/27/1997			5	0	X	
Thunderstorm Wind	7/28/1997			3	0		
Thunderstorm Wind	5/31/1998			3	0		
Thunderstorm Wind	7/19/1998			10	0	X	
Thunderstorm Wind	7/22/1998			3	0		
Thunderstorm Wind	8/25/1998			5	0	X	
Thunderstorm Wind	10/11/1998			5	0	X	
Thunderstorm Wind	12/6/1998			3	0		
Thunderstorm Wind	6/5/1999			3	0		
Thunderstorm Wind	7/22/1999			3	0		
Thunderstorm Wind	8/24/1999			5	0	X	
Thunderstorm Wind	9/29/1999			3	0		
Thunderstorm Wind	10/13/1999			15	0	X	
Tornado	10/13/1999			10	0	X	
Thunderstorm Wind	4/20/2000			5	0	X	
Thunderstorm Wind	5/23/2000			5	0	X	
Thunderstorm Wind	6/26/2000			12	0	X	
Thunderstorm Wind	7/14/2000			10	0	X	
Thunderstorm Wind	9/8/2000			60	0	X	
Thunderstorm Wind	9/11/2000			30	0	X	
Thunderstorm Wind	9/20/2000			10	0	X	
Thunderstorm Wind	10/7/2000			5	0	X	

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
High Wind	11/12/2000			0	0		
Thunderstorm Wind	5/18/2001			3	0		
Thunderstorm Wind	6/6/2001			5	0	X	
Thunderstorm Wind	6/21/2001			5	0	X	
Thunderstorm Wind	9/4/2001			3	0		
Thunderstorm Wind	10/24/2001			13	0	X	
Thunderstorm Wind	12/6/2001			7	0	X	
High Wind	12/14/2001			10	0	X	
High Wind	9/3/2002			12	0	X	
Thunderstorm Wind	10/11/2002			2	0		
Thunderstorm Wind	11/8/2002			3	0		
Thunderstorm Wind	2/5/2003			1	0		
Thunderstorm Wind	8/6/2003			2	0		
Thunderstorm Wind	8/27/2003			13	0	X	
High Wind	11/5/2003			0	0		
Thunderstorm Wind	1/6/2004			4	0		
Thunderstorm Wind	5/27/2004			3	0		
Tornado	5/27/2004			30	0	X	
Thunderstorm Wind	5/13/2005			8	0	X	
Thunderstorm Wind	5/28/2005			8	0	X	
Thunderstorm Wind	6/14/2005			3	0		
Thunderstorm Wind	6/30/2005			3	0		
Thunderstorm Wind	8/18/2005			8	0	X	
High Wind	1/12/2006			15	0	X	
Thunderstorm Wind	2/4/2006			4	0		
Thunderstorm Wind	7/20/2006			8	0	X	
Thunderstorm Wind	5/15/2007			3	0		
Thunderstorm Wind	8/6/2007			5	0	X	
Thunderstorm Wind	8/25/2007			6	0	X	
Thunderstorm Wind	9/8/2007			6	0	X	
Thunderstorm Wind	11/4/2007			100	0	X	
Thunderstorm Wind	4/6/2008			4	0		
Thunderstorm Wind	4/8/2008			2	0		
Thunderstorm Wind	8/7/2008			15	0	X	

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
High Wind	9/14/2008			8900	0	X	
Thunderstorm Wind	10/6/2008			3	0		
Thunderstorm Wind	5/30/2009			3	0		
Thunderstorm Wind	6/25/2009			2	0		
Tornado	8/20/2009			0	3		
High Wind	9/12/2009			0	0		
High Wind	11/2/2009			0	0		
Tornado	11/7/2009			95	15	X	
Thunderstorm Wind	2/6/2010			1	0		
Thunderstorm Wind	4/8/2010			1	0		
Thunderstorm Wind	6/27/2010			2	0		
Thunderstorm Wind	10/26/2010			2	0		
Thunderstorm Wind	12/6/2010			1	0		
Thunderstorm Wind	2/28/2011			7	0	X	
Thunderstorm Wind	4/20/2011			10	0	X	
Thunderstorm Wind	5/23/2011			15	0	X	
Thunderstorm Wind	6/21/2011			13	0	X	
Thunderstorm Wind	7/6/2011			2	0		
Thunderstorm Wind	9/6/2011			5	0	X	
Thunderstorm Wind	11/7/2011			2	0		
Thunderstorm Wind	1/7/2012			10	0	X	
Thunderstorm Wind	6/29/2012			45	0	X	EM-3346
Thunderstorm Wind	7/26/2012			3	0		
Thunderstorm Wind	1/11/2013			2	0		
Thunderstorm Wind	6/26/2013			10	0	X	
Thunderstorm Wind	10/31/2013			5	0	X	
Thunderstorm Wind	11/17/2013			3	0		
Thunderstorm Wind	12/22/2013			2	0		
Thunderstorm Wind	3/6/2014			10	0	X	
Thunderstorm Wind	5/14/2014			25	0	X	
Thunderstorm Wind	10/6/2014			1	0		
Thunderstorm Wind	11/5/2014			222	0	X	
Thunderstorm Wind	12/24/2014			4	0		
Thunderstorm Wind	6/18/2015			0	0		

Event	Date	Injuries	Deaths	Property Damage x $1000	Crop Damage x $1000	Major	Disaster Declaration
Thunderstorm Wind	6/26/2015			1	0		
Thunderstorm Wind	7/13/2015			1	0		
Thunderstorm Wind	7/14/2015			4	0		
Thunderstorm Wind	8/4/2015			3	0		
High Wind	3/4/2016			0	0		
Thunderstorm Wind	6/23/2016			13	7	X	
Thunderstorm Wind	8/28/2016			4	20	X	
Thunderstorm Wind	10/5/2016			5	0	X	
Thunderstorm Wind	1/3/2017			9	0	X	
Thunderstorm Wind	5/4/2017			0.5	0		
Thunderstorm Wind	5/19/2017			5	0	X	
Thunderstorm Wind	2/15/2018			0	0		
Thunderstorm Wind	4/5/2018			0.25	0		

	Years	Events	Annual Probability	Months
All Events	64	149	233%	5
Major Events	64	74	116%	10
Disaster Declarations	64	1	2%	768

- **High Wind - 09/14/2008**

  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 surface. Gusty winds in excess of 70 mph persisted for a period of several hours, causing significant damage and widespread power outages.

- **Thunderstorm Wind - 05/11/2014**

  Thunderstorms developed across the region as a disturbance moved across the area. Some of these storms became severe with damaging winds and large hail being the primary threats. Heavy rainfall also occurred in a few locations with localized flooding.

- **Thunderstorm Wind - 04/05/2017**

  Showers and thunderstorms developed ahead of a strengthening surface low which moved from the Middle Mississippi Valley into Northwest Ohio.

- **Thunderstorm Wind - 05/04/2018**

  Scattered thunderstorms developed along a cold front that pushed slowly south into the upper Ohio Valley.

4. Probability of Future Occurrences

With 149 occurrences in the past 64 years, the probability of such an occurrence in a given year is 233% or an average of one every 5 months.

With 74 major occurrences (injuries, deaths, total damage $5,000 or greater) in the past 64 years, the probability of such an occurrence in a given year is 116% or an average of one every 10 months.

With 1 disaster declaration in the past 64 years, there is a 2% probability of such an occurrence in a given year.

5. Affected Locations

Severe wind storms and tornadoes affect the entire county.

6. Analysis

Factor	Ranking	
Frequency	Medium: 3-5 Declarations	
Response	< 1/2 Day	
Onset	12-24 Hours	
Magnitude	No Impact	
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 regrigeration.
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	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. An estimated 5% of the non-critical structures in the county fall into this category, 3% of which potentially receiving 5% structural damage.

Structure Type	Inven-tory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	38,473	$76,246	5	1,924	3	58	5	$220,005
Nonresidential	4,920	$114,407	5	246	3	7	5	$42,216
Critical	19	$250,000	0	0	3	0	0	$0

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.

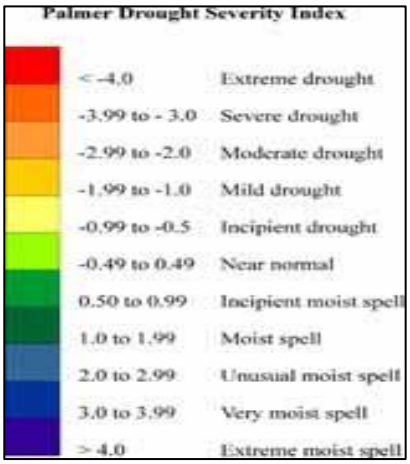
Agricultural Drought links various characteristics of meteorological (or hydrological) drought to agricultural impacts, focusing on precipitation shortages, soil water deficits, reduced ground water or reservoir levels needed for irrigation, and so forth.

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[27]

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 caused damage to community assets. Available narratives of major events follow. Primary Source: National Centers for Environmental Information (NCEI)[28].

- **1988-1989 North American Drought**

  The Western United States experienced a lengthy drought in the late 1980s. Much of California endured one of its longest droughts ever observed from late 1986 through

[27] http://www.nws.noaa.gov/os/brochures/climate/DroughtPublic2.pdf
[28] http://www.NCEI.noaa.gov/stormevents/

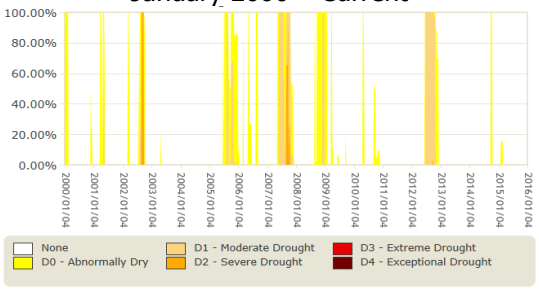
early 1991. Drought worsened in 1988 as much of the United States also suffered from severe drought. In California, the five-year drought ended in late 1991 as a significant El Niño event in the Pacific Ocean (and the eruption of Mount Pinatubo in June 1991) most likely caused unusual persistent heavy rains.

Following a milder drought in the Southeastern United States and California in 1987, this drought overspread the Mid-Atlantic states, Southeastern United States, Midwestern United States, northern Great Plains, and Western United States. Heat waves accompanied this widespread, unusually intense drought and killed around 4,800 to 17,000 Americans. The heat also killed livestock across the United States. Farmers perhaps cultivated marginally arable land, contributing to the damage from this drought. Pumping groundwater near depletion also contributed to damage. The drought destroyed crops almost nationwide; lawns of residents went brown, and many cities declared water restrictions. Wildfires in Yellowstone National Park burned many trees and created exceptional destruction in the area. This very catastrophic drought for multiple reasons continued across the Upper Midwest and northern Great Plains states during 1989, not officially ending until 1990. The conditions continued into 1989 and 1990, although the drought ended in some states, thanks to normal rainfalls returning to some portions of the United States. Dry conditions, however, increased again during 1989, affecting Iowa, Missouri, eastern Nebraska, Kansas and certain portions of Colorado. The drought also affected Canada in certain divisions.

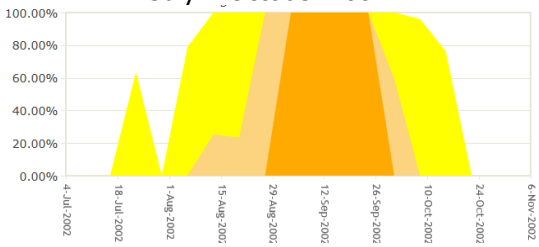
The drought of 1988 ranks as the worst drought since the Dust Bowl a half-century earlier in the United States; estimates in 2008 put damages from the drought between $80 billion and almost $120 billion in damage (2008 USD). The state of Minnesota alone saw $1.2 billion in crop losses. The drought of 1988 caused more devastation comparable to that which Hurricane Andrew in 1992 and Hurricane Katrina wrought. In Canada, drought-related losses added to $1.8 billion (1988 Canadian dollars).

Ross County Drought Percent Area

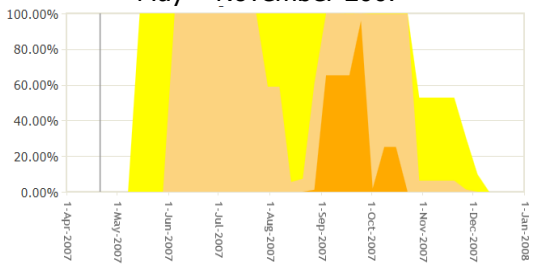
January 2000 – Current



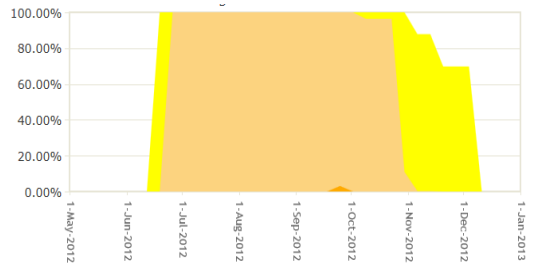
July – October 2002



May – November 2007



June – December 2012



Source: National Drought Mitigation Center (http://droughtatlas.unl.edu/Data.aspx)

Source: Project Gutenberg Self-Publishing Press[29]

- **Summer 1999 Drought**
  Drought conditions existed in Ross County for a five-month period during the summer of 1999.
  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 Ross 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. Nelsonville observed the minimum, with just a half inch of rain. Temperatures peaked in the mid and upper 90s during the second week of the month. Beverly registered 98 degrees, while South Point had 97 degrees on the 10th.
  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 Ross Counties. In Lawrence County, an emergency drought declaration was issued. Delivery of water to residents with dry or contaminated wells continued in Lawrence County. The town of Rio Grande in Gallia County had to connect to another water system when their source was depleted. In Ross 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. Preliminary data indicated Beverly of Washington County and South Point of Lawrence County both reached 102 degrees on the 30th.
  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. Yet, South Point of Lawrence County had even less rain, with just three quarters of an inch.
  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.

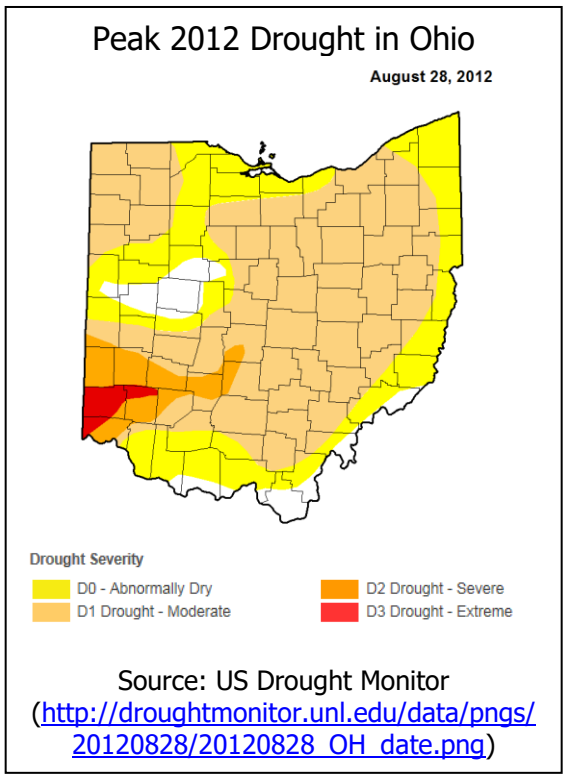
- **Fall 2007 Drought**
  Three months moderate; one month severe. In September, drought conditions crept north, as the month averaged warmer and drier than normal. The monthly rainfall was mostly between 1 and 2 inches.

[29] http://self.gutenberg.org/articles/1988%E2%80%9389_North_American_drought

A rare October heat wave, during the 1st and 2nd weeks of the month, helped peak the severity of the drought. On the 11th, Gallia County declared an emergency due to a water shortage. With the lowering of the water table, wells were becoming less productive. Morgan County officials reported that their wildlife was being stressed from the lack of available water. 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.



Source: US Drought Monitor (http://droughtmonitor.unl.edu/data/pngs/20120828/20120828_OH_date.png)

- **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, Ross 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, Ross 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[30]. At its peak in Ohio, Ross County experienced "Moderate Drought Severity" for

[30] http://www.NCEI.noaa.gov/sotc/drought/201207#det-reg

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[31]. Ross County had no reported crop losses. Source: NCEI[32]

4. Probability of Future Occurrences

With five major occurrences in the past 28 years, the probability of an occurrence in a given year is 18%. None resulted in recorded damages; the probability of a damaging occurrence in a given year is close to 0%.

5. Affected Locations

Drought affects the entire county. The Ross County Health Department estimates that less than 5% of the county's population uses 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	< 1/2 Day
Onset	> 24 Hours
Magnitude	10-25% Land Area
Business	No Impact
Human	No Impact
Property	< 10% Damaged

7. Vulnerable Community Assets

Asset	Impact
People	People relying on private wells may need to find alternate sources of potable water. Less than 5% are on public water.
Economy	Agricutural impact - crops and livestock. Water-dependent businesses such as car washes.
Infrastructure	No impact.
Structures	No impact.

	Inven-	Average	At Risk		Damaged		Damages	
Structure Type	tory	Value	%	Number	%	Number	%	Total
Residential	38,473	$76,246	0	0	0	0	0	$0
Nonresidential	4,920	$114,407	0	0	0	0	0	$0
Critical	19	$250,000	0	0	0	0	0	$0

[31] http://farmdocdaily.illinois.edu/2013/03/drought-crop-insurance-loss-2012. html
[32] http://www.NCEI.noaa.gov/stormevents/

F. Dam Failures

1. Description

A dam is a barrier that impounds water or underground streams. The reservoirs created by dams not only suppress floods but provide water for various needs to include irrigation, human consumption, industrial use, aquaculture and navigability. Hydropower is often used in conjunction with dams to generate electricity. A dam can also be used to collect water or for storage of water which can be evenly distributed between locations. Dams generally serve the primary purpose of retaining water, while other structures such as floodgates or levees (also known as dikes) are used to manage or prevent water flow into specific land regions. Source: Wikipedia[33]

A dam failure is partial, complete or catastrophic release of water held behind a dam that results in down-stream flash flooding. 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)[34]

The following Class I and II dams in Ross County that are rated in the High or Significant Hazard Class as listed in the US Army Corps of Engineers' National Inventory of Dams[35]:

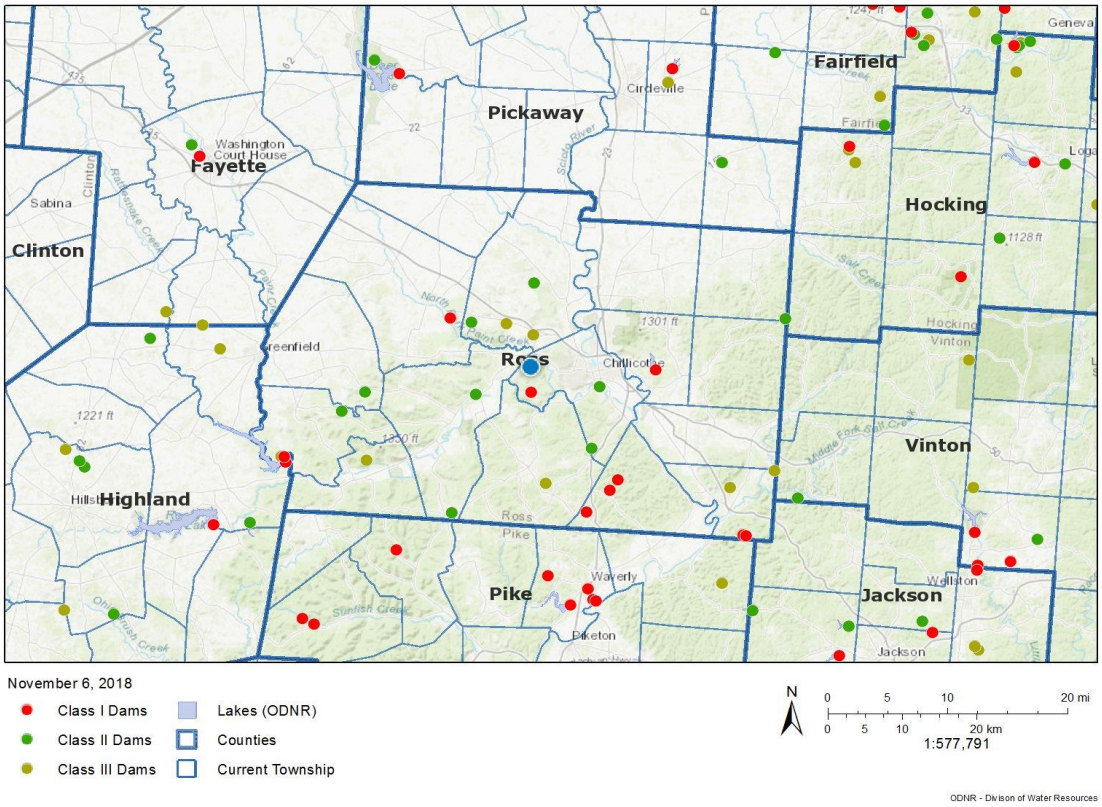
Dam Name	NIDID	Class I/II	Hazard Potential	River	City/Distance (mi)		Emergency Action Plan Approval Date
Brown & Haskins Lake Dam	OH02356	I	High	Paint Creek	Chillicothe	2.7	Not Approved
Caldwell Lake Dam	OH00023	I	High	Stony Creek	Pride	3.3	1/27/2017
Glatfelter Upground Reservoir	OH02367	II	Significant	Paint Creek	Three Locks	6.4	Not Approved
Hutchison Lake Dam	OH02360	II	Significant	Biers Run	North Fork Village	10	Not Approved
Knoles Pond Dam	OH00773	II	Significant	Indian Creek	Massieville	-	6/12/2018
Lake Hill Dam	OH00075	I	High	Paint Creek	North Fork Village	-	Not Approved
Lake Royal Dam	OH02362	II	Significant	Paint Creek	Chillicothe	13.6	Not Approved
Leeth Lake Dam	OH00957	II	Significant	Upper Twin Creek	Bourneville	7.6	Not Approved
Luehrs Lake Dam	OH02365	II	Significant	Lower Twin Creek	Bourneville	6.5	Not Approved
Pine Lake Dam	OH00026	II	Significant	Pike Run	Jimtown	14	Not Approved
Ross Lake Dam	OH00443	I	High	Lick Run	Schrader	2.3	12/16/2016
Rustic Acres Lake Dam	OH00076	II	Significant	Dry Run	Chillicothe	7.5	Not Approved
Southern Silica Pond No. 1 Dam	OH00766	I	High	Whiskey Run	Omega	9	Not Approved
Southern Silica Pond No. 2 Dam	OH00767	I	High	Whiskey Run	Omega	9	Not Approved
Stewart Lake Dam	OH00024	I	High	Stony Creek	Pride	3.9	1/27/2017
White Turkey Lake Dam	OH00025	I	High	Crooked Creek	Alma	-	7/2/2004
Paint Creek Dam (Highland Co)	OH00017	I	High	Paint Creek	Bainbridge	6	1/30/2018

[33] https://en.wikipedia.org/wiki/Dam
[34] http://codes.ohio.gov/oac/1501:21-13-01
[35] https://nid.sec.usace.army.mil/ords/f?p=105:18:7533098219673::NO:::

Note that Paint Creek Dam is not in Ross County, but its inundation would be focused in Ross County.

Ross County Dams

Ohio Dam Locator



Source: ODNR (https://gis.ohiodnr.gov/MapViewer/?config=ohiodams#)

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 Ross County. According to the Stanford University's National Performance of Dam Program (NPDP) Dam Incident database[36], the following incidents have occurred:

Dam Name	Registration Nbr	Incident Date	Incident Type
Brown & Haskins Lake Dam	NPDPUSA0056241	4/19/2000	Inadequate Spillway Capacity
Caldwell Lake Dam	NPDPUSA0055002	5/4/1994	Seepage; Piping; Concrete Deterioration
Pine Lake Dam	NPDPUSA0055148	3/13/1995	Inadequate Spillway Capacity
Southern Silica Pond No. 1 Dam	NPDPUSA0055651	7/1/1997	Inadequate Spillway Capacity
Southern Silica Pond No. 2 Dam	NPDPUSA0055652	7/1/1997	Inadequate Spillway Capacity
Stewart Lake Dam	NPDPUSA0055003	3/1/1997	Inflow Flood - Hydrologic Event

[36] http://ce-npdp-serv2.stanford.edu/DamDirectory/DamIncidentQuery

4. Probability of Future Occurrences

In the American Society of Civil Engineers *2009 Ohio Infrastructure Report Card – Dams Fact Sheet*[37], 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 Ross 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 only dam failure that would have significant impact is that of Paint Creek Dam. In reviewing the flood inundation plan and maps, most if not all structures in the Paint Creek basin as well as the Scioto River basin at and below its confluence with Paint Creek. This includes the entire Village of Bainbridge, the southeast sector of Chillicothe (residential and industrial area) and the communities of Dills, Bourneville, Slate Mills, Schrader and portions of Anderson. These areas include several schools and a wastewater treatment plant.

6. Analysis

Factor	Ranking
Frequency	None: No Declarations
Response	< 1/2 Day
Onset	> 24 Hours
Magnitude	10% Land Area
Business	1 Week
Human	No Impact
Property	< 10% Damaged

7. Vulnerable Community Assets

Asset	Impact
People	No impact.
Economy	Business loss of revenue and damage costs; employees' loss of wages.
Infrastructure	Vulnerable infrastructure assets are roads, culverts and bridges, primarily US 50. Also, the Chillicothe wastewater treatment plant would potentially be inundated - out of service and the potential for release of untreated waste water into the Scioto River.
Structures	Based on a failure of Paint Creek Dam, structure estimates are below.

	Inven-	Average	At Risk		Damaged		Damages	
Structure Type	tory	Value	%	Number	%	Number	%	Total
Residential	38,473	$76,246	2	769	25	192	10	$1,466,706
Nonresidential	4,920	$114,407	5	246	25	123	15	$2,110,809
Critical	19	$250,000	5	1	50	1	10	$23,750

[37] http://ohioasce.org/sites/default/files/2009 Dams Fact Sheet.pdf

G. Earthquakes

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[38]

Ohio is located near the New Madrid fault. Ross 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 Ross 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 City of Ross scenario as modeled by the *Hazards U.S. Multi-Hazard* (HAZUS-MH) simulation preformed and provided by Ohio EMA. The HAZUS-MH report used in this analysis is available from the Ross County EMA.

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

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

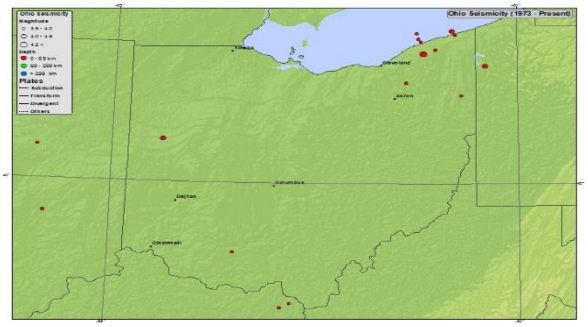
Modified Mercalli Scale		Richter Magnitude Scale
I	Detected only by sensitive instruments	1.5
II	Felt by few persons at rest, especially on upper floors; delicately suspended objects may swing	2
III	Felt noticeably indoors, but not always recognized as earthquake; standing autos rock slightly, vibration 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
		7.5
		8

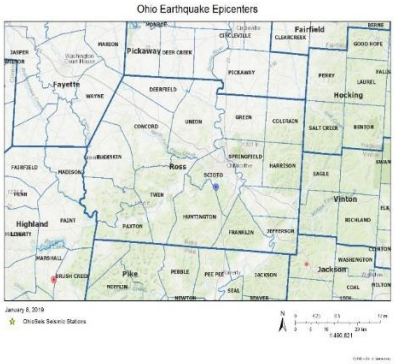
3. Historical Occurrence

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 Ross County only in 1899.

Ohio

Seismicity Map - 1973 to March 2012





[38] http://www.usgs.gov/faq/categories/9827/3343

4. Probability of Future Occurrences

The USGS reports a 2% probability that Ross 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[39], published research[40] 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[41].

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

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

7. Vulnerable Community Assets

Asset	Impact
People	Casualities. HAZUS-MH estimates that 674 people would receive minor injuries, 157 people would receive greater non-life-threatening injuries, 25 people would receive life-threating injuries and 41 people would die. Displaced and Sheltered. HAZUS-HM estimates less than 2% of households would be displaced and 72% of the these (343) would seek shelter in public shelters. Electric Service. HAZUS-MH estimates that 46% of households would lose electricity at onset. After one week, 11% would still be without electricity. Less than 2% would still be without electricty after one month. Potable Water. HAZUS-MH estimates that less than 1% of households would lose potable at onset. Within one week, all would be restored.
Economy	HAZUS-MH estimates a total economic loss of $1,057 million.
Infrastructure	HAZUS-HM estimates all infrustructure would unaffected or operational within one day with the exception 2 bridges, 3 railway facilities and 1 bus station all of which would operational within 1 week . It also estimates that 9 wastewater treatment systems would have moderate damage; 5 would be operational within 1 day and all within 7 days. 5 of 8 communication systems would have be damaged and be restored in 1 day.

[39] http://www.lis.ucr.ac.cr/ index.php?id=Inicio
[40] http://www.research gate.net/profile/Lepolt_Linkimer/ publication/228755080_Relationship_between_peak_ground_ acceleration_and_Modified_Mercalli_intensity_in_Costa_Rica/ links/0c960528bc84924b44 000000.pdf
[41] http://earthquake.usgs.gov/learn/topics/mercalli.php

Structures	The Planning Team used the results of FEMA's HAZUS-MH simulation of an earthquake of 5 magnitude, 5 km deep centered on Chillicothe. HAZUS-MH estimates the following structural damages.

Structure Type	Inven-tory	Average Value	At Risk		Damaged		Damages	
			%	Number	%	Number	%	Total
Residential	38,473	$76,246	100	38,473	30	11,542	50	$440,011,868
Nonresidential	4,920	$114,407	100	4,920	30	984	50	$56,288,244
Critical	19	$250,000	100	19	20	0		$0

H. Landslides

1. Description

Landslides are a downslope movement of earth. They may be quick, moving in seconds, or take a varying amount of time to move.

According to the Ohio Department of Natural Resources[42], 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).

2. Extent of Hazard

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

3. Historical Occurrence

Landslides generally occur during or after heavy rain and sometimes result in blocked roadways. Any landslide that impacts people, structures or infrastructure (such as roads) is considered an occurrence.

4. Probability of Future Occurrences

Landslides do occur in Ross County but their impact on community assets is minimal. Therefore, the estimated risk of the future occurrence of an impacting landslide is once in twenty years or 5% in a given year.

5. Affected Locations

There are no reports of damage to structures from landslides.

6. Analysis

Factor	Ranking
Frequency	High: 6-8 Declarations
Response	< 1 Week
Onset	< 6 Hours
Magnitude	10% Land Area
Business	No Impact
Human	No Impact
Property	< 10% Damaged

7. Vulnerable Community Assets

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

Structure Type	Inventory	Average Value	At Risk %	At Risk Number	Damaged %	Damaged Number	Damages %	Damages Total
Residential	38,473	$76,246	0	0	0	0	0	$0
Nonresidential	4,920	$114,407	0	0	0	0	0	$0
Critical	19	$250,000	0	0	0	0	0	$0

[42] http://geosurvey. ohiodnr.gov/portals/geosurvey/PDFs/GeoFacts/geof08.pdf

Section VI – Mitigation Goals and Actions

A. Overview

The Ross 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. 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.

C. Goals

The Planning Team selected the following mitigation goals:

- Reduce or eliminate impact on public safety, lives and property
- Provide timely warning
- Create self sufficiency
- Plan for safe development
- Increase public awareness

D. Actions

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

- Reduce or eliminate impact on public safety, lives and property
  - Rebuild, restore, reinforce ditches and stream banks
  - Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts
  - Raise/reroute roadbeds above the flood level
  - Remove or reinforce hillsides and banks prone to slippage
  - Conduct study to develop a comprehensive approach to handling stormwater runoff
  - Implement stormwater runoff solutions
  - Remove at-risk trees
  - Rehabilitate stormwater infrastructure
  - Mitigate structures at risk
- Provide timely warning
  - Improve hazard monitoring
  - Coordinate rain and stream gauges
  - Upgrade siren system
- Create self sufficiency
  - Install generators at critical facilities
  - Construct Storm Shelter/EMA Office/EOC/Combined County-City Dispatch Center at Ross Fairgrounds
  - Construct Safe Rooms - Community
  - Construct Safe Rooms - Residential
- Plan for safe development
  - Review and update laws and regulations

- Increase public awareness
  - Develop and conduct a public education program

E. 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*[43], 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
- Monetary costs

Priority	Mitigation Action	Benefits	Costs
1	Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts	Increased public safety Decreased damage to infrastructure Decreased response and recovery costs	Project costs (~$200k per jurisdiction x 2)
2	Rebuild, restore, reinforce ditches and stream banks	Increased public safety Decreased damage to infrastructure Decreased response and recovery costs	Project costs (~$100k per site x 6)
3	Remove or reinforce hillsides and banks prone to slippage	Increased public safety Decreased damage to infrastructure Decreased response and recovery costs	Project costs (~$500k per site x 4)
4	Remove at-risk trees	Increased public safety Decreased damage to infrastructure Decreased response and recovery costs	Project costs (~$1.5k per tree x 30) Possible collateral adverse environmental impact Debris removal costs
5	Conduct study to develop a comprehensive approach to handling stormwater runoff	Comprehensive plan for handling stormwater runoff	Project costs (~$75k per jurisdiction x 3)
6	Implement stormwater runoff solutions	Increased public safety Decreased damage to	Project costs (~$1.5 million per jurisdiction x

[43] http://www.fema.gov/media-library-data/20130726-1606-20490-3557/how_to__5___final_may_2007.pdf

Priority	Mitigation Action	Benefits	Costs
		infrastructure Decreased response and recovery costs	3) Elected official buy-in Voter buy-in
7	Rehabilitate stormwater infrastructure	Increased public safety Decreased damage to infrastructure Decreased response and recovery costs	Project costs (~$4m)
8	Install generators at critical facilities	Decreased impact of utility outages Increased public safety	Project costs (~$25k per facility x 4) By-in by elected officials and facility owners
9	Construct Safe Rooms - Community	Increased public safety	Project costs (~$1m) Community buy-in
10	Construct Safe Rooms - Residential	Increased public safety	Community education Home-owner buy-in and funding
11	Construct Storm Shelter/EMA Office/EOC/Combined County-City Dispatch Center at Ross Fairgrounds	Protection for people at fairgrounds Protected county-wide dispatch facility Protected EMA Office/EOC	Project costs (~$2.5m) Elected official buy-in
12	Review and update laws and regulations	Increased public safety Increased attractiveness to new businesses, visitors and residents	Elected official buy-in Voter buy-in Increased economic development costs
13	Develop and conduct a public education program	Increased public safety	EMA time and effort
14	Upgrade siren system	Increased public safety Increased attractiveness to new businesses, visitors and residents	Project cost (~$1.5m) By-in by elected officials
15	Coordinate rain and stream gauges	Increased public safety	EMA time and effort
16	Improve hazard monitoring	Increased public safety	EMA time and effort
17	Mitigate structures at risk	Increased public safety Decreased response and recovery costs Community-owned green space	Cost: $250k By-in and funding by elected officials and property owners
18	Raise/reroute roadbeds above the flood level	Increased public safety Decreased damage to infrastructure Decreased response and recovery costs	Project costs (~$50k per site x 2)
19	Mitigate sanitary systems impacted by stormwater infiltration	Maintenance of sanitary conditions Decreased damage to infrastructure	Project costs (~$350k)

Priority	Mitigation Action	Benefits	Costs
20	Update dam Emergency Action Plans; update inundation data for dams without EAPs or no current inundation data	Reduced people, businesses, other assets at risk	Dam owner buy in Study costs
21	Rehabilitate dams known to be of high hazard potential	Reduced people, businesses, other assets at risk	Dam owner buy in Study costs Rehabilitation costs

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Section VII – Mitigation Action Analysis

A. Goal 1: Reduce or eliminate impact on public safety, lives and property

Reduce or eliminate impact on public safety, lives and property caused by hazards threatening Ross County

1. Mitigation Action 1: Rebuild, restore, reinforce ditches and stream banks

Rebuild, restore, reinforce ditches and stream banks to prevent flood waters from covering roads, making them impassable and causing structural damage by erosion

Hazards Addressed: Floods, Severe Thunderstorms, Dam Failure

Priority: 2

Jurisdiction(s) Affected: Chillicothe City, Ross County, Bainbridge Village, Clarksburg Village, Kinsgton Village, South Salem Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$600k	New

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

Mitigation Action Type(s): Soil Stabilization, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Unknown	Fewer casualties
People - Isolation	Unknown	Unknown	Fewer isolated
Roadways - damaged or destroyed - sites	6	0	-6

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$100k per site x 6)

2. Mitigation Action 2: Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts

Clean out streambeds, ditches, storm drains and culverts; repair/replace undersized and failing storm drains and culverts to ensure proper water flow to prevent flood waters from covering roads, making them impassable and causing structural damage by erosion

Hazards Addressed: Floods, Severe Thunderstorms, Dam Failure

Priority: 1

Jurisdiction(s) Affected: Bainbridge Village, Clarksburg Village, Kinsgton Village, South Salem Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$400k	New

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

Mitigation Action Type(s): Soil Stabilization, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Unknown	Fewer casualties
People - Isolation	Unknown	Unknown	Fewer isolated
Roadways - damaged or destroyed - sites	20	0	-20

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$200k per jurisdiction x 2)

3. Mitigation Action 3: Raise/reroute roadbeds above the flood level

Raise/reroute roadbeds above the flood level to prevent flood waters from covering roads, making them impassable and causing structural damage by erosion

Hazards Addressed: Floods, Severe Thunderstorms, Dam Failure

Priority: 18

Jurisdiction(s) Affected: Clarksburg Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$100k	New

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

Mitigation Action Type(s): Elevation, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Unknown	Fewer casualties
People - Isolation	Unknown	Unknown	Fewer isolated
Roadways - damaged or destroyed - sites	2	0	-2

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$50k per site x 2)

4. Mitigation Action 4: Remove or reinforce hillsides and banks prone to slippage

Remove or reinforce hillsides and banks prone to slippage to prevent road/stream blockage and road collapse

Hazards Addressed: Mud/Landslides

Priority: 3

Jurisdiction(s) Affected: Chillicothe City, Clarksburg Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$20m	New

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

Mitigation Action Type(s): Soil Stabilization

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Unknown	Fewer casualties
People - Isolation	Unknown	Unknown	Fewer isolated
Roadways - damaged or destroyed - sites	4	0	-4

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$500k per site x 4)

5. Mitigation Action 5: Conduct study to develop a comprehensive approach to handling stormwater runoff

Hazards Addressed: Floods, Severe Thunderstorms

Priority: 5

Jurisdiction(s) Affected: Chillicothe City, Bainbridge Village, Clarksburg Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$225k	New

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

Mitigation Action Type(s): Planning, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Same	No Change
People - Isolation	Unknown	Same	No Change
Roadways - damaged or destroyed	Unknown	Same	No Change
Structures - damaged or destroyed	Unknown	Same	No Change

Benefits
Comprehensive plan for handling stormwater runoff

Costs
Project costs (~$75k per jurisdiction x 3)

6. Mitigation Action 6: Implement stormwater runoff solutions

Implement the solutions from the stormwater runoff study

Hazards Addressed: Floods, Severe Thunderstorms

Priority: 6

Jurisdiction(s) Affected: Chillicothe City, Bainbridge Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$45m	New

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

Mitigation Action Type(s): Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Lessened or Eliminated	Fewer casualties
People - Isolation	Unknown	Lessened or Eliminated	Fewer people isolated
Roadways - damaged or destroyed	Unknown	Lessened or Eliminated	Fewer roads damaged
Structures - damaged or destroyed	Unknown	Lessened or Eliminated	Fewer structures damaged

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$1.5 million per jurisdiction x 3) Elected official buy-in Voter buy-in

7. Mitigation Action 7: Remove at-risk trees

Remove trees that are at risk for falling down, blocking roadways

Hazards Addressed: Severe Wind Storms

Priority: 4

Jurisdiction(s) Affected: Bainbridge Village, Clarksburg Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	*Est Complete Date:*	*Estimated Cost:*	*Current Status:*
7/1/2019	6/30/2024	$45k	New

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

Mitigation Action Type(s): Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Unknown	Fewer casualties
People - Isolation	Unknown	Unknown	Fewer isolated
Roadways - blocked	30	0	-30

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$1.5k per tree x 30) Possible collateral adverse environmental impact Debris removal costs

8. Mitigation Action 8: Rehabilitate stormwater infrastructure

Repair and service storm drains and fixtures to handle stormwater to keep it from undermining roads and causing road collapse

Hazards Addressed: Floods, Severe Thunderstorms

Priority: 7

Jurisdiction(s) Affected: Chillicothe City

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$40m	New

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

Mitigation Action Type(s): Soil Stabilization, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Less	Fewer casualties
People - Isolation	Unknown	Less	Fewer isolated
Roadways - damaged or destroyed - sites	1	0	-1

Benefits
Increased public safety Decreased damage to infrastructure Decreased response and recovery costs

Costs
Project costs (~$4m)

9. Mitigation Action 9: Mitigate structures at risk

Mitigate flood-prone dwellings of willing residents to break the damage-repair-damage repair cycle through actions such as acquisition, demolition, and retrofitting.

Hazards Addressed: Floods

Priority: 17

Jurisdiction(s) Affected: Ross County, Chillicothe City, Frankfort Village, South Salem Village

Project Lead(s): Jurisdictional chief elected officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$250k	New

Funding Resource(s): Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant, Repetitive Flood Claims Program, Severe Repetitive Loss Grant, State Funds, Neighborhood Stabilization Grant, Moving Ohio Forward

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

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	0	Casualties eliminated
People - Isolation	13 x 3 = 39	0	-39
Residential structures - damaged or destroyed	13	0	-13

Benefits
Increased public safety Decreased response and recovery costs Community-owned green space

Costs
Cost: $250k By-in and funding by elected officials and property owners

10. Mitigation Action 10: Mitigate sanitary systems impacted by stormwater infiltration

Eliminate stormwater infiltration by replacing/upgrading lift stations and sewer lines.

Hazards Addressed: Floods

Priority: 19

Jurisdiction(s) Affected: Village of Kingston Mayor

Project Lead(s): Jurisdictional chief elected official

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$350k	New

Funding Resource(s): Flood Mitigation Assistance Grant, Hazard Mitigation Grant Program, In-Kind (Work or Labor), Local Funds, Pre-Disaster Mitigation Grant, Severe Moving Ohio Forward

Mitigation Action Type(s): Planning, Reconstruction, Retrofit, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People - at risk from unsanitary conditions	1000	0	-1000
Sewer systems - Damaged	1	0	-1

Benefits
Maintenance of sanitary conditions Decreased damage to infrastructure

Costs
Cost: $350k

11. Mitigation Action 11: Update dam Emergency Action Plans; update inundation data for dams without EAPs or no current inundation data

Ensure there is current inundation data on all Class I and Class II dams; update EAPs on required dams.

Hazards Addressed: Floods, Earthquakes, Severe Summer Storms/Thunderstorms

Priority: 20

Jurisdiction(s) Affected: Countywide

Project Lead(s): Dam Owners

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	Unknown	New

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

Mitigation Action Type(s): Planning, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People at risk in inundation zones	Unknown	Unknown	Unknown
Businesses in inundation zones	Unknown	Unknown	Unknown
Other community assets in inundation zones	Unknown	Unknown	Unknown

Benefits
Reduced people, businesses, other assets at risk

Costs
Dam owner buy in Study costs

12. Mitigation Action 12: Rehabilitate dams known to be of high hazard potential

Rehabilitate dams to ensure integrity..

Hazards Addressed: Floods, Earthquakes, Severe Summer Storms/Thunderstorms

Priority: 21

Jurisdiction(s) Affected: Countywide

Project Lead(s): Dam Owners

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	Unknown	New

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

Mitigation Action Type(s): Planning, Reconstruction, Retrofit, Stormwater

Vulnerability	Before Implementation	After Implementation	Difference
People at risk in inundation zones	Unknown	Unknown	Unknown
Businesses in inundation zones	Unknown	Unknown	Unknown
Other community assets in inundation zones	Unknown	Unknown	Unknown

Benefits
Reduced people, businesses, other assets at risk

Costs
Dam owner buy in Study costs Rehabilitation costs

B. Goal 2: Provide timely warning

Provide warning of imminent hazard occurences with sufficient time to take protective action

1. Mitigation Action 1: Improve hazard monitoring

Improve hazard monitoring by, for example, organizing weather spotter training classes

Hazards Addressed: Floods, Severe Thunderstorms, Severe Winter/Ice Storms, Severe Wind Storms, Dam Failure

Priority: 16

Jurisdiction(s) Affected: Ross County

Project Lead(s): Ross County EMA

Start Date:	*Est Complete Date:*	*Estimated Cost:*	*Current Status:*
7/1/2019	6/30/2024	$5k	Unchanged

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, Emergency Warning & Notification

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Less	Fewer casualties
People - Isolation	Unknown	Less	Fewer isolated

Benefits
Increased public safety

Costs
EMA time and effort

2. Mitigation Action 2: Coordinate rain and stream gauges

Develop a coordinated plan using existing gauges and identify additional needs; secure funding to implement and operate system; implement/construct system; collect data to be analyzed and distributed through program administration; link data to early warning system

Hazards Addressed: Floods

Priority: 15

Jurisdiction(s) Affected: Ross County

Project Lead(s): Ross County EMA

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$0k	Unchanged

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): Emergency Warning & Notification

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Less	Fewer casualties
People - Isolation	Unknown	Less	Fewer isolated

Benefits
Increased public safety

Costs
EMA time and effort

3. Mitigation Action 3: Upgrade siren system

Upgrade and expand county-wide outdoor warning siren system with technology to permit seamless operations with Emergency Alert System (EAS) and NOAA alerts; investigate integrating all school buildings with siren system; secure funding to implement and operate system; plan for future system administration

Hazards Addressed: Floods, Severe Thunderstorms, Severe Wind Storms, Dam Failure

Priority: 14

Jurisdiction(s) Affected: Ross County

Project Lead(s): Ross County EMA

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$15m	Unchanged

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, Emergency Warning & Notification

Vulnerability	Before Implementation	After Implementation	Difference
People - Casualties	Unknown	Less	Fewer casualties

Benefits
Increased public safety Increased attractiveness to new businesses, visitors and residents

Costs
Project cost (~$1.5m) By-in by elected officials

C. Goal 3: Create self sufficiency

Create a resilient, self-sufficient community

1. Mitigation Action 1: Install generators at critical facilities

Provide backup power for critical facilities such as community buildings, water treatment plants & lift stations, fire departments and police departments that do not have this capability.

Hazards Addressed: Floods, Severe Thunderstorms, Severe Winter/Ice Storms, Severe Wind Storms, Earthquakes

Priority: 8

Jurisdiction(s) Affected: Ross County, Bainbridge Village, Clarksburg Village, South Salem Village

Project Lead(s): Jurisdictional chief elected and public works officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$100k	New

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): Self-Sufficiency

Vulnerability	Before Implementation	After Implementation	Difference
People - no shelter/power	1700	0	-1700

Benefits
Decreased impact of utility outages Increased public safety

Costs
Project costs (~$25k per facility x 4) By-in by elected officials and facility owners

2. Mitigation Action 2: Construct Storm Shelter/EMA Office/EOC/Combined County-City Dispatch Center at Ross Fairgrounds

Construct a facility to shelter 250 people at the Ross County Fairgrounds and house the EMA, EOC and county-wide dispatch center.

Hazards Addressed: Floods, Severe Thunderstorms, Severe Winter/Ice Storms, Severe Wind Storms, Earthquakes

Priority: 11

Jurisdiction(s) Affected: Ross County

Project Lead(s): Ross County Commissioners

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$25m	New

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, Storm Shelter

Vulnerability	Before Implementation	After Implementation	Difference
Exposed people at fairgrounds	100%	less 250 people	250 fewer people at risk
Critical facilities at risk	3 Facilities	0	-3

Benefits
Protection for people at fairgrounds Protected county-wide dispatch facility Protected EMA Office/EOC

Costs
Project costs (~$2.5m) Elected official buy-in

3. Mitigation Action 3: Construct Safe Rooms - Community

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

Hazards Addressed: Severe Thunderstorms, Severe Winter/Ice Storms, Severe Wind Storms, Earthquakes

Priority: 9

Jurisdiction(s) Affected: Ross County, Bainbridge Village

Project Lead(s): Jurisdictional chief elected officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$10m	New

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): Storm Shelter

Vulnerability	Before Implementation	After Implementation	Difference
People in vulnerable structures	Unknown	0	Unknown

Benefits
Increased public safety

Costs
Project costs (~$1m) Community buy-in

4. Mitigation Action 4: Construct Safe Rooms - Residential

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

Hazards Addressed: Severe Thunderstorms, Severe Winter/Ice Storms, Severe Wind Storms, Earthquakes

Priority: 10

Jurisdiction(s) Affected: Ross County

Project Lead(s): Ross County EMA

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$0k	New

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): Storm Shelter

Vulnerability	Before Implementation	After Implementation	Difference
People in vulnerable structures	Unknown	0	Unknown

Benefits
Increased public safety

Costs
Community education Home-owner buy-in and funding

D. Goal 4: Plan for safe development

Review and modify planning and building codes and regulations to ensure future development has resiliency built it

1. Mitigation Action 1: Review and update laws and regulations

Integrate natural hazard mitigation plan into ongoing and future land use planning; adopt and enforce Flood Plain Regulations; participate in the NFIP

Hazards Addressed: Floods, Severe Wind Storms, Earthquakes, Dam Failure, Mud/Landslides

Priority: 12

Jurisdiction(s) Affected: Chillicothe City, Ross County, Adelphi Village, Bainbridge Village, Clarksburg Village, Frankfort Village, Kingston Village, South Salem Village

Project Lead(s): Jurisdictional chief elected and planning officials

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$0k	Unchanged

Funding Resource(s): In-Kind (Work or Labor), Local Funds, EMPG

Mitigation Action Type(s): Planning

Vulnerability	Before Implementation	After Implementation	Difference
People	Unknown	Less	Fewer casualties/isolated
Infrastructure - new	All	None	- All
Structures - new	All	None	- All
Economy	Unknown	Unknown	Unknown

Benefits
Increased public safety Increased attractiveness to new businesses, visitors and residents

Costs
Elected official buy-in Voter buy-in Increased economic development costs

E. Goal 5: Increase public awareness

Increase public awareness of hazards and preparedness actions

1. Mitigation Action 1: Develop and conduct a public education program

Take actions such as distribute brochures that describe the natural hazard mitigation plan; offer curriculum to schools (Red Cross – Masters of Disasters program); promote the use of FEMA for Kids program; make presentations about natural hazards to nursing homes staff and senior citizens; hold public meetings; deliver Public Service Announcements (PSAs)

Hazards Addressed: Floods, Severe Thunderstorms, Severe Winter/Ice Storms, Severe Wind Storms, Earthquakes, Droughts, Mud/Landslides, Dam Failure

Priority: 13

Jurisdiction(s) Affected: Ross County

Project Lead(s): Ross County EMA

Start Date:	***Est Complete Date:***	***Estimated Cost:***	***Current Status:***
7/1/2019	6/30/2024	$0k	Unchanged

Funding Resource(s): Local Funds, State Funds, EMPG

Mitigation Action Type(s): Public Education

Vulnerability	Before Implementation	After Implementation	Difference
People - Unprepared	80%	50%	-30%

Benefits
Increased public safety

Costs
EMA time and effort

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Section VII – Supplemental Information

A. Acronyms, Terms and Definitions

Term	Acronym	Description
Community Development Block Grant Program	CDBC	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 conditions, but loss of human life is not probable. (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

Term	Acronym	Description
		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. (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. Reference: OAC 1501:21-13-01(A)(3)
Dam - Class IV		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. Reference: OAC 1501:21-13-01(A)(4)
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		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 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.

Term	Acronym	Description
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.
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

Term	Acronym	Description
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

B. Meetings, Announcements and Correspondence

The Planning Team 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 announcements and rosters of Planning Team meetings:

1. August 9, 2018 – Kick-Off Meeting

a. Public Announcements

All Hazards Mitigation Plan Public Meeting kickoff at Ross County Service Center | Sciot... Page 1 of 2

Events Home > All Hazards Mitigation Plan Public Meeting kickoff

All Hazards Mitigation Plan Public Meeting kickoff

Tuesday
Oct 9, 2018 – 10:00 AM - 11:00 AM

Ross County Service Center
475 Western Avenue
Chillicothe, OH 45601 Map

More Info

Ross County is updating the All Hazards Mitigation Plan with public participation.

Home Posts Reviews Vide

Ross County Emergency Managment Agency
5 hrs ·

Ross County is beginning the All Hazard Mitigation Plan update. An open meeting has been scheduled at the Ross County Service Center Conference Room A on October 9, 2018 at 10 am as our Kickoff Meeting. This is open to the public.

3 1 Share

b. Sign-In Sheet

HAZARD MITIGATION PLAN INITIAL MEETING **10/9/2018**

NAME	AGENCY OR JURISDICTION	POSITION/TITLE	SIGNATURE
David Pelling	RD Solutions	Consultant	
Mike Buchanan	Ross Co Engineers	Superintendent	
John Flowers	Ross Co. SWCD	Technician	
DARREN PRICE	Ohio EMA	Regional Supervisor	
Ben Given	Ross SWCD	Urban Technician	
DAVID DUCKWORTH	Ross Co Building	CBO/ADMINISTRATOR	
Joshua Hettinger	Village of Adelphi	Mayor	
Luan Nguyen	Ohio EMA	Mitigation Planner	

2. August 9, 2018 – Planning Team Invitation

9/5/2018 Ross County, Ohio Mail - Ross County Hazard Mitigation Plan Core Group

Gmail

Ross Ema <rossema@rosscountyohio.gov>

Ross County Hazard Mitigation Plan Core Group

Ross Ema <rossema@rosscountyohio.gov> Thu, Aug 9, 2018 at 11:25 AM
To: mayor@adelphiohio.com, villofbainbridge@horizonview.net, Brad Cosenza <bradcosenza@rosscountyohio.gov>, roscoeng@bright.net, rebeccssueb@yahoo.com, David Duckworth <daveduckworth@rosscountyohio.gov>, threelocksgravel@horizonview.net, George Lavender <g.lavender@rosssheriff.com>, jtflowers@rosscountyswcd.org, Mary McCord <mary.mccord@redcross.org>, Luke Feeney <luke.feeney@chillicotheoh.gov>, ssalem1@roadrunner.com, Susan R Smith <srsmith@rosscountyhealth.com>

Good Morning,

Ross County is beginning the process of updating the Ross County Mitigation Plan.
Your name and email was listed as a Core Group for the planning of the last plan, I am wondering if you are still willing to be apart of the Core Group or if you have someone in your group that would serve as a Core Group Member.

Paul H. Minney

Ross County Emergency Management Agency
Director: Paul H. Minney- MARC'S or VHF 1721
Assistant Director: Linda L. Wood- MARC'S or VHF 1722
475 Western Avenue
Chillicothe, Ohio 45601
Phone: 740-773-1700 or 740-773-0049
Fax: 740-773-1701
rossema@rosscountyohio.gov

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Brad Cosenza, County Adm.
Dave Duckworth, County Planning Dept.
J.T. Flowers / Ben Gives, Soil & Water
Josh Hettinger / mayor Adelphi
N- George Lavender / Sheriff
mary McCord / Red Cross
Charlie Ortman / Engineer
N- Susan Smith / H Co Hlth Dept.

Meeting -
Brad Cosenza
David Duckworth
TJ. Flowers / Ben Gives
Josh Hettinger / Adelphi Mayor
Engineer will Send Someone

https://mail.google.com/mail/u/1/?ui=2&ik=92d309bb1c&jsver=TKereZPtSMY.en.&cbl=gmail_fe_180822.12_p2&view=pt&msg=1651f4adf00252db&se... 1/1

3. November 14, 2018 – Planning Team Meeting

a. Public Announcement

Natural Hazards Mitigation Plan Public Meeting #2 at Ross County Service Center | Sciot... Page 1 of 2

Events Home / Natural Hazards Mitigation Plan Public Meeting #2

Natural Hazards Mitigation Plan Public Meeting #2

Wednesday
Nov 14, 2018 – 10:00 AM - 12:00 PM

Ross County Service Center
475 Western Avenue
Chillicothe, OH 45601 Map

More Info

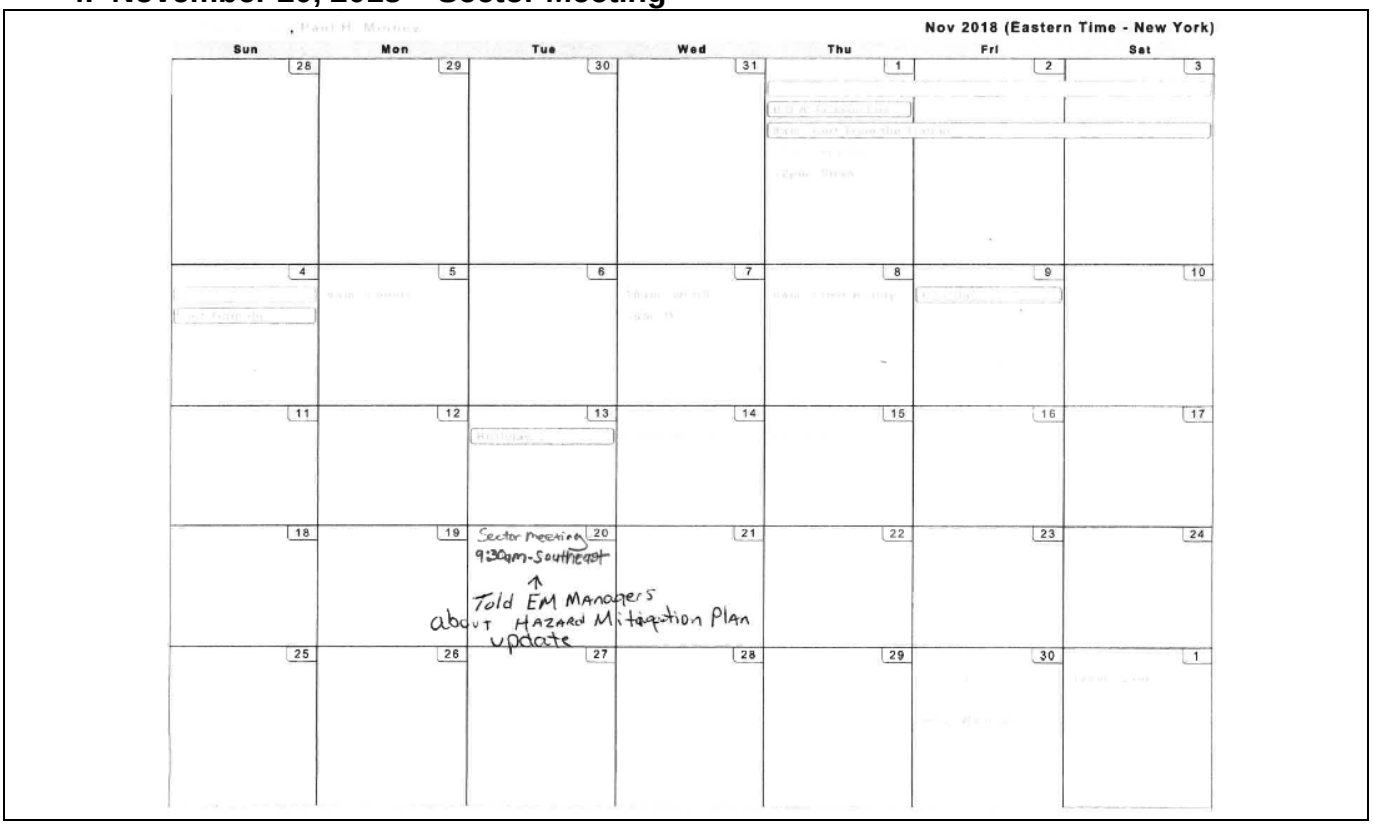
The meeting will be in Conference Room C. This is the second meeting on the update of the Natural Hazard Mitigation Plan with public participation.

b. Sign-In Sheet

HAZARD MITIGATION PLAN INITIAL MEETING **11/14/2018**

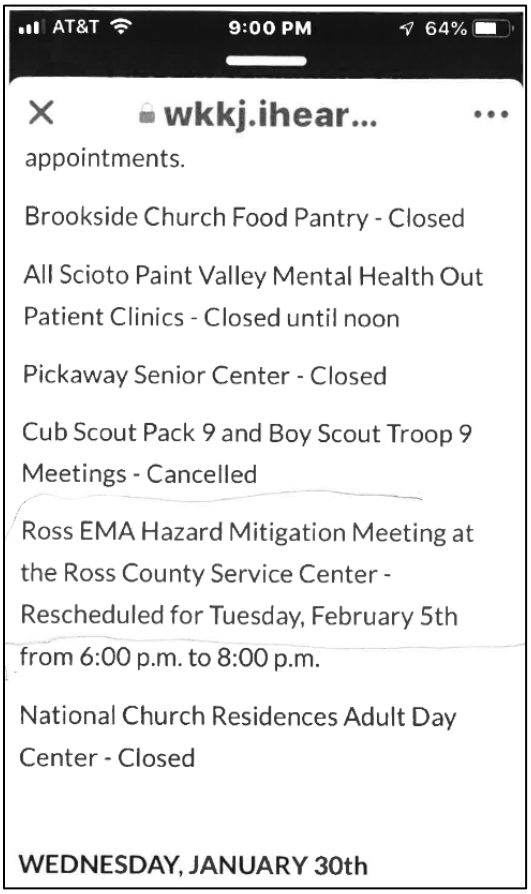
NAME	AGENCY OR JURISDICTION	POSITION/TITLE	SIGNATURE
Paul Minney	RC EMA	Director	
Ben Givens	Ross SWCD	Technician	
Linda Wood	RCEMA	Deputy Director	
Mike Buchanan	Ross Co Engineers	Superintendent	
Susan R Smith	Ross County Health District	PHEP Coord/PIO	
DARREN PRICE	Ohio EMA	Regional Supervisor	
J.T. Flowers	Ross Co. SWCD	Tech.	
Dwight Garrett	Commissioner (Ross)	Commissioner	
David Pelling	RDI Solutions	Consultant	

4. November 20, 2018 – Sector Meeting

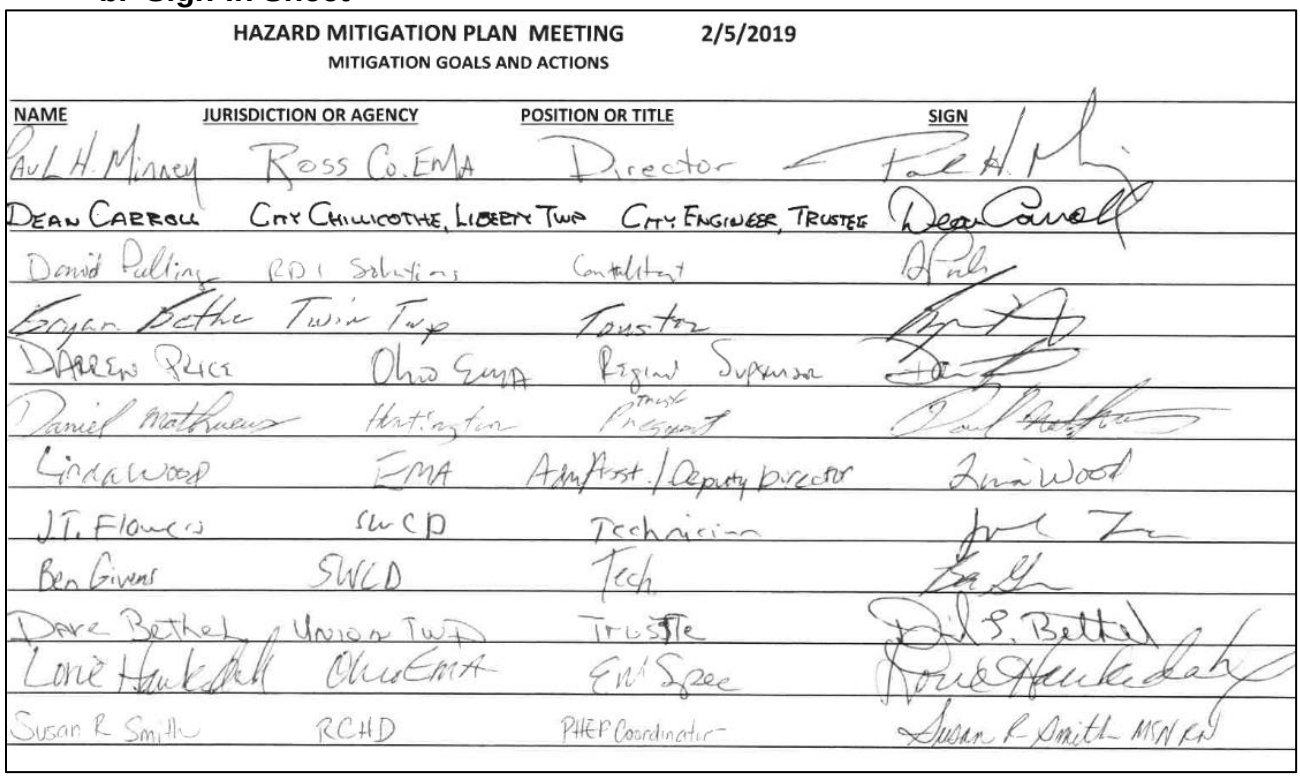


5. February 5, 2019 – Planning Team Meeting

a. Public Announcement



b. Sign-In Sheet



HAZARD MITIGATION PLAN MEETING 2/5/2019
MITIGATION GOALS AND ACTIONS

NAME	JURISDICTION OR AGENCY	POSITION OR TITLE	SIGN
Paul H. Minney	Ross Co. EMA	Director	
Dean Carroll	City Chillicothe, Liberty Twp	City Engineer, Trustee	
David Pulling	RDI Solutions	Contractor	
Bethel Twin Twp	Twin Twp	Trustee	
Darren Price	Ohio EMA	Regional Supervisor	
Daniel Mathews	Huntington	Trustee President	
Linda Wood	EMA	Asst. / Deputy director	
JT. Flowers	SWCD	Technician	
Ben Givens	SWCD	Tech	
Dave Bethel	Union Twp	Trustee	
Lorie Hunkedall	Ohio EMA	Env Spec	
Susan R Smith	RCHD	PHEP Coordinator	

6. April 10, 2019 – Village of Clarksburg Meeting

April 18th, 2019

6:05 PM: Mayor Frances Downing called the meeting to order.

Council members present: Paul Wood, Crystal Everheart, Julie Speakman, Catherine Wilson, Beth Hobbs and Dave Brilinski.

Also, present: Village Administrator Mark Downing, Village Fiscal Officer's Lisa Heise, Barbara Cleary, Joyce Schaffer and Ollie Jane Rosenberger current residents of the village, Samuel Knight of United States Census Bureau, Darren Price, Linda Wood and Paul Minney of Ohio Emergency Management Agency.

Joyce Schaffer discussed her late mother's property of three lots to get councils authority to have the state purchase the property to put in a park on this side of the village vs. where the village park is currently located. Joyce Schaffer thought it would be beneficial to the village, so the children of the village would not have to travel the busy State Route of 138. Samel Knight discussed the upcoming 2020 census and the importance of funding for the village, his asking the village to partner a committee to get accurate numbers to the upcoming census. Paul Minney presented the village to do some planning for the mitigations plan. It is a required thing that the village put in a work detail on this plan. It can be as little as cleaning out the sewage, the storm drains or it can be as large as putting in great big shelter for storms. It does require filling out an application and Mark Downing has the details on that. This is done to help the impact of villages for preparing for national disasters. They are asking the village to come up with plans to help us prepare for this.

The minutes were presented. Julie Speakman moved to accept the minutes and Catherine Wilson seconded the motion. Motion approved.

FISCAL OFFICER: Lisa Heise: The water & sewage ordinance: notice to owners with rental property using the water and sewage system of the village of Clarksburg. At the March 21st, 2019 council meeting, Ordinance 2014-11 concerning the laws regulating the village of the water & sewage system was reviewed by members of the council, The Mayor and the Village Administrator. At that time, it was voted to adhere to regulations as set forth in the ordinances: Section Q of Ordinance 2014-11 passed in December 18th, 2014 states: property owners that rent their property to tenants are ultimately responsible for all billings an charges of the water and sewage services provided by the Village of Clarksburg. The property owners are to contact the Village Fiscal Officer to have water sewage turned off after a tenant has vacated the property. Any water or sewage billing that is not paid in full by the tenant or the tenants deposit, will be bill to the the property owner. Service will not be establish to that dwelling until the past due balance has been paid in full, prior to the restoration of services to a new tenant and or occupied dwellant. There is a 10% penalty each month for any unpaid water sewage charges. There were no recommendation to make any changes to the written notice to property owners. This notice, will be mailed to all property owners by the end of April 2019, and or on or before the next billing cycle of May 2019. It was also discussed to have a revision to the New Water/Sewage Customers package, verbiage is to be change to adhere to the set rulings brought forth. Catherine Wilson made a motion and Julie Speakman seconded the motion to pass Ordinance 2014-11 revisions. Motion carried an approved.

CCR reports have been printed and will be distributed to the residents of the village in the month of April 2019. It was recommended that the village could create a FaceBook site to publicize any notifications such as the CCR reports to the village and it would be accepted. And or we continue as we have an post in the Municipal Building along with the other businesses within the village. Council agreed not to create a FaceBook site an continue as we have been doing in the local businesses within the village for publications. Julie Speakman moved and Catherine Wilson seconded the motion. Motion carried.

Disconnects for the month of April 2019: Tara Cambell, Desky Poise, and David McCain. There was an issue with David McCain being caught with a crowbar and bolt cutter trying to cut off the lock to turn his water back on. Mr. McCain was told to get out of the pit, what he was doing was steeling water services from the village. If he does not comply he would be going to jail. There is an ordinance against it.

Crystal Everhart resigned from council. They have sold their house and will be moving. This will be her last meeting to attend.

Village Administrator: Mark Downing: PEP follow up. Changes on insurance were not mandatory, it was merely a recommendation. Generator has been picked up, and is out for repair.

MAYOR: Frances Downing: Three Clean-up letters are being sent: Todd Wills, Irma Frasure, Jami Colter. She reported contacting the Health Department concerning the clean-ups. Council, Catherine Wilson feels we should have an Ordinance for property owners to be responsible for rental and tenant clean-up. Copy of letter clean up are to be sent to the property owner as well as the renter.

ADJOURNMENT: Dave Birlinski made a motion to adjourn the meeting and Beth Hobb seconded the motion. All were in favor. Meeting adjourned at 7:25 PM

Attest:_____ _____

Lisa Heise, Fiscal Officer Frances Downing, Mayor

7. April 28, 2019 – Village of Bainbridge Meeting

VILLAGE OF BAINBRIDGE

AUDIENCE ACKNOWLEDGEMENT

DATE 4/28/19

NAME	ORGANIZATION/BUSINESS
Lorie Hawkedahl	Ohio Emergency Mgt Agency
Linda Wood	Ross County EMA
Paul Minney	Ross County EMA

8. May 13, 2019 – Village of Frankfort Meeting

VILLAGE of FRANKFORT

Council Meeting

May 13, 2019

Visitors and Guests:

NAME	Company/Phone #
Linda Wood	RC EMA 740-773-1700
Paul Minney	RC EMA 740-773-1700
Lorie Hawkedahl	Ohio EMA 614 799-4724
Tony Hogan	Electric JoB

9. May 14, 2019 – Village of Adelphi Meeting

VILLAGE OF ADELPHI

COUNCIL MEETING AGENDA

5/14/19

Type of Meeting: Regular Session

Invitees: ALL ARE WELCOME

1. 7:00 Call to Order / Roll Call / Pledge of Allegiance
2. 7:00 – 7:05 Approval of previous meetings minutes
3. 7:05 – 7:10 Complaint Follow up
4. 7:10 - 7:25 Paul Minney, Director Ross county EMA - Hazard Mitigation Plan Updates
5. 7:25 - 7:40 Samuel Knight, US census bureau
6. 7:40 - 7:50 Michelle Wall, Ross County Health District - Smoke Free Parks
7. 7:50 – 8:00 Recognition of guests
8. 8:00 – 8:10 New Business
   A. Letter to owner of hazardous commercial building.
9. 8:10 – 8:20 Open Issues
   A. Metering discrepancy - report from expert
   B. Opera house curtains
   C. Discussion Regarding Storm Sewer Utility
   D. Sale of former rossiter property -No bids received, line up potential buyer then advertise again
10. 8:10 – 8:20 Village Administrator's Report
11. 8:20 – 8:30 Clerk- Treasurer
    A. Fund Status Reports
    B. Presentation of bills
    C. Dump truck update
12. 8:30 Adjournment

10. May 29, 2019 – Planning Team Meeting

a. Public Announcement

Ross County Emergency Management Agency

Public group

About

Discussion

Members

Events

Photos

Paul Minney shared a post.
May 14

Paul Minney
May 14

RDI Solutions and the Ross County EMA announce the next meeting of the Hazard Mitigation Planning Meeting. Ross County Service Center, 475 Western Avenue, Chillicothe, Ohio 45601Wednesday, May 29, 2019, 6:00 pmAll Elected officials and the Public is invited to this discussion.

b. Sign-In Sheet

HAZARD MITIGATION PLAN MEETING 5/29/2019
MITIGATION GOALS AND ACTIONS

NAME	JURISDICTION OR AGENCY	POSITION OR TITLE	SIGN	EMAIL
Linda Wood	RC EMA	Adm. Asst. Deputy Director		
Susan Smith	RCHD	PHEP Coord		srsmith@rosscountyhealth.com
David Pelling	Ema Consultt			
Jacob Staats	Scioto Twp	Road Supervisor		
Gary Hopkins	Huntington Twp	Trustee		ghopkins5398@gmail.com
Dan Mathews	Huntington Twp	Trustee		
Loan Nguyen	OEMA	Hazard Mit. Plans		LKnguyen@dps.ohio.gov
Daniel "Matt" Conley	Bainbridge	Council Pres		dmattc@yahoo.com
Paul H. Minney	RCEMA	Director		paulminney@rosscountyohio.gov
Mike Buchanan	Ross Co Engineers	Superintendent		mikebuchanan@rosscountyohio.gov
William Hubbard	Village of Bainbridge	Council Member		bhubb4@hotmail.com
Paul Mercer				
Barbara Eyerhart	Village of Bainbridge			
Rocky V. Countryman	Village of Bainbridge	Mayor		rockycountryman72@gmail.com

11. July 19, 2019 – City of Chillicothe Participation and Concurrence

CHILLICOTHE
OHIO'S FIRST CAPITAL

LUKE M. FEENEY
MAYOR

Chillicothe Utilities Department
We Don't Make the Water . . . We Make It Better!!

David J. Fishel, P.E.
Chillicothe Utilities Director

July 19, 2019

Utilities Director
740-773-1932
Fax 740-773-8143
david.fishel@chillicotheoh.gov

Linda Wood
Ross County Emergency Management Agency
475 Western Avenue
P.O. Box 87
Chillicothe OH 45601

HAZARD MITIGATION PLAN UPDATE FOR ROSS COUNTY

Ms. Wood:

We have been kept apprised of the progression of the update to the Ross County Hazard Mitigation Plan. We have reviewed the mitigation actions developed by the planning team and find that the following action(s) apply to our jurisdiction:

Action 1: Rebuild, restore, reinforce ditches and stream banks

Action 2: Clean out streambeds, ditches, storm drains and culverts, repair/replace undersized and failing storm drains and culverts

Action 4: Remove or reinforce hillsides and banks prone to slippage

Action 5: Conduct study to develop comprehensive approach to handling stormwater runoff

Action 9: Rehabilitate stormwater infrastructure

Sincerely,

David J. Fishel, P.E.
Utilities Director

35 South Paint Street • Chillicothe, Ohio 45601

12. July 23, 2019 – Village of South Salem Participation and Concurrence

Gmail

Linda Wood <lindawood@rosscountyohio.gov>

Mitigation-Responses
3 messages

Joe Smith <joe.smith@greenfieldmcclain.org> Tue, Jul 23, 2019 at 4:24 PM
To: lindawood@rosscountyohio.gov

The village of South Salem would like to see the following mitigation efforts for the Village\
Goal 1
Action Number One
Action Number Two
Action Number Nine

Goal 3
Action Number One

Goal 4
Action Number One

--
Joseph P. Smith, Treasurer
Greenfield Exempted Village School District
200 North Fifth Street
Greenfield, Ohio 45123
937-981-2152-Telephone
937-981-4395-fax
joe.smith@greenfieldmclain.org

Linda Wood <lindawood@rosscountyohio.gov> Wed, Jul 24, 2019 at 7:29 AM
To: Joe Smith <joe.smith@greenfieldmcclain.org>

Received, thank you.
[Quoted text hidden]
--
Linda Wood
Adm. Asst./Deputy Director, EMA
Secretary/Info. Coordinator, LEPC

---

dennis crouse <crousedennis14@hotmail.com> Thu, Jul 25, 2019 at 2:14 PM
To: Linda Wood <lindawood@rosscountyohio.gov>

We have been kept apprised of the progression of the update to the Ross County Hazard Mitigation Plan. We have reviewed the mitigation actions developed by the planning team and find that the following actions apply to our village:

Dennis Crouse
Mayor, Village of South Salem

13. August 1, 2019 – Village of Kingston Participation and Concurrence

Village of Kingston Ohio August 1, 2019

Kevin V. Prickett Mayor
Brian Barr Clerk
Jeff Smith Village Administrator

Village of Kingston, Ohio
PO Box 615
Kingston, OH 45644
(740) 642-3678

We have been kept apprised of the progression of the update to the Ross County Hazard Mitigation Plan. We have reviewed the mitigation actions developed by the planning team and find that the following actions apply to our village.

Mitigation Goals and Actions

Goal 1 Minimize effects of flooding/hazards on critical facilities, as well as, the safety of village residents.

Action 1 Replace and upgrade current lift stations that are critical to the health and safety of village residents. They have become prone to failure because of outdated infrastructure and infiltration into our sanitary system by excessive rainfall is a major problem. The estimated cost could be in excess of $250,000.

Action 2 Reduce infiltration, caused by erosion in our sewer lines that allow water to enter our sanitary system that should be going through our storm system. This would also require camera work to identify such areas. The estimated cost could exceed $80,000.

Goal 2 Minimize effects of flooding on roads and surface areas

Action 1 Cleanout ditches, culverts, and catch basins to ensure proper water flow. The cleanout of these structures is imperative to removing excessive water before it causes structural damage through erosion. The estimate cost would be $5,000.

Action 2 See action1& 2 under Goal 1. Both of these actions would also aid in reducing the effects of flooding on roads and surface areas.

Action 3 Rebuild, restore, reinforce ditches and stream banks to prevent future erosion. We have a stream that flows through the village that is in need of work to prevent and reduce flooding and erosion that could cause structural damage. The estimated cost would be $10,000.

Kevin V. Prickett
Mayor of The Village of
Kingston, Ohio