

# Final Report

Lawrence County, Ohio  
Hazard Mitigation Plan



## Executive Summary

This plan is the successor to hazard mitigation planning efforts begun in Lawrence County in 2003 when the County received a grant to develop and adopt a Natural Hazards Mitigation Plan for the County and the participating jurisdictions’.

Lawrence County assets are at risk of damage due to flooding, winter storms, severe (summer) storms, or other natural hazards. This plan provides a long-term approach to reducing the likelihood that a natural hazard will result in severe damage. This plan updates the data upon which the assessment of risk and identification of vulnerabilities is based and presents updated strategies for making Lawrence County a safer and more sustainable community.

The Lawrence County Natural Hazards Mitigation Plan represents the work of residents, business leaders, and elected and appointed government officials to develop a blueprint for protecting community assets, preserving the economic viability of the community, and saving lives. Endorsed by FEMA as being in compliance with regulations based on the Disaster Mitigation Act of 2000, the plan will help the County to implement mitigation projects so that a natural hazard does not result in a natural disaster.

The hazard mitigation planning update consisted of gathering and analyzing data available from various sources within the County. The data show that the hazards most likely to result in costly damages are flooding, winter storms, tornadoes and high winds, and severe storms. Lawrence County officials and representatives from local jurisdictions proposed and evaluated strategies that may be effective in mitigating the negative effects of natural hazards and the plan presents a conceptual-level approach for implementing these strategies. The plan recommends a number of public education efforts, structural efforts such as the elevation of structures above anticipated levels of flooding or the development of safe rooms in public schools to provide shelter during tornadoes, and the examination and the potential modification of zoning ordinances and other development regulations to ensure the risk of damage to new structures is minimized.

Most mitigation activities require funding. Under the Disaster Mitigation Act of 2000 (DMA2K, 42 USC 5165), a mitigation plan is a requirement for Federal mitigation funds. Therefore, a mitigation plan will both guide the best use of mitigation funding and meet the prerequisite for obtaining such funds from the Department of Homeland Security's Federal Emergency Management Agency (FEMA). This Mitigation Plan meets the criteria as set forth by FEMA in the DMA2K and provides a community with a "comprehensive guide" for future mitigation efforts as they relate to the natural hazards that affect their community.

This Mitigation Plan was developed in coordination with a Core Group of individuals from communities and agencies throughout Lawrence County. The Core Group met two separate times during the planning process to reevaluate the hazards that affect the County, the problems associated with these hazards, potential mitigation alternatives to minimize the effect of these hazards and goals that they would like to see achieved within

the county. Those entities that could not participate in the Core Group meetings were contacted individually and requested to evaluate the existing Action Plan and to please provide updates to the information that was currently on file for them. In particular the Village of Athalia, Coal Grove, and South Point were not able to participate in person but participated over the phone and via e-mail with the Lawrence County EMA Director. Their information was then incorporated into the final draft mitigation plan.

Lawrence County has experienced many natural disasters in the past one hundred years. Through a strategic effort led by the Lawrence County EMA offices, the Core Group evaluated these hazards and chose to address the following hazards based on their impact on human health and property damage: floods, winter storms (snow, ice), tornadoes, earthquakes, droughts, landslides, and severe storms (lightning, hail, and high winds).

The culmination of Lawrence County's Mitigation Plan was an Updated Action Plan for the communities to use to track progress on the implementation of their mitigation alternatives. By adopting this plan, county, township and incorporated jurisdictions of Lawrence County commit to working with citizens and business owners to make their communities safer.

NOTE: This plan is focused on information reported in 2012 and 2013. Several periods of review have delayed the release of this plan from the time of original submission in December 2013. Most notably the first cycle of Ohio Emergency Management Agency (OEMA) comments were not received until eleven (11) months after submission. Those comments were addressed and re-submitted. The second cycle of OEMA comments were received three (3) months after re-submission.

## Table of Contents

Executive Summary .....	0
Table of Contents.....	3
Introduction .....	8
Purpose of the Plan.....	9
Organization of the Plan.....	9
Jurisdictions Represented in the Plan.....	10
Adoption Resolutions .....	10
Planning Process .....	11
Planning Process .....	11
Mitigation Core Group.....	11
Jurisdictional Participation .....	12
Public Involvement .....	13
Other Planning Mechanisms.....	13
Gathering New Data .....	14
Community Profile.....	15
County Information.....	15
Jurisdictions .....	17
Land Use and Development Trends .....	19
Capability Assessment .....	21
Regulatory Capabilities.....	21
Planning Capabilities .....	23
Additional Capabilities .....	27
Other Resources .....	28
Structure Assessment .....	28
Hazard Identification.....	31
Description of Hazards .....	31
Flooding Risk Assessment .....	33
Hazard Profile – Flooding.....	33
Location.....	35
Extent .....	37
Previous Occurrences .....	38
Probability of Future Flooding .....	43
Vulnerability Assessment – Flooding.....	43
Overview of Vulnerability .....	43
Potential Impact of Flooding .....	44
Identifying Structures.....	44
Estimating Potential Loss .....	47
Winter Storms Risk Assessment .....	49
Hazard Profile – Winter Storms .....	49
Location.....	49
Extent .....	49
Previous Occurrences .....	49

Probability of Future Winter Storms .....	51
Vulnerability Assessment – Winter Storms .....	51
Overview of Vulnerability .....	51
Potential Impact of Winter Storms.....	51
Identifying Structures .....	52
Estimating Potential Loss .....	53
Tornadoes Risk Assessment.....	55
Hazard Profile – Tornadoes.....	55
Location.....	55
Extent .....	55
Previous Occurrences .....	57
Probability of Future Tornadoes.....	58
Vulnerability Assessment – Tornadoes.....	59
Overview of Vulnerability .....	59
Potential Impact of Tornadoes .....	60
Identifying Structures .....	61
Estimating Potential Loss .....	61
Earthquake Risk Assessment.....	62
Hazard Profile – Earthquake .....	62
Location.....	62
Extent .....	62
Previous Occurrences .....	64
Probability of Future Damaging Earthquakes.....	65
Vulnerability Assessment – Earthquake .....	65
Overview of Vulnerability .....	65
Potential Impact of Earthquake.....	65
Identifying Structures .....	67
Estimating Potential Loss .....	67
Drought Risk Assessment .....	68
Hazard Profile – Drought.....	68
Location.....	68
Extent .....	68
Previous Occurrences .....	69
Probability of Future Damaging Drought.....	75
Vulnerability Assessment – Drought.....	76
Overview of Vulnerability .....	76
Potential Impact of Drought .....	76
Identifying Structures .....	76
Estimating Potential Loss .....	77
Landslide and Subsidence Risk Assessment .....	78
Landslide and Subsidence Update .....	78
Hazard Profile – Landslide and Subsidence .....	78
Location.....	78
Extent .....	78

Previous Occurrences .....	80
Probability of Future Damaging Landslides and Subsidence .....	81
Vulnerability Assessment – Landslide and Subsidence .....	81
Overview of Vulnerability .....	81
Potential Impact of Landslide and Subsidence .....	82
Identifying Structures .....	82
Estimating Potential Loss .....	82
Severe Storms Risk Assessment .....	84
Hazard Profile – Severe Storms .....	84
Location .....	84
Extent .....	84
Previous Occurrences .....	84
Probability of Thunderstorms High Winds .....	87
Vulnerability Assessment – Severe Storms .....	88
Overview of Vulnerability .....	88
Potential Impact of Severe Storms .....	88
Identifying Structures .....	88
Estimating Potential Loss .....	89
Summary of Risk Assessment Findings .....	90
Mitigation Goals .....	92
Mitigation Goals Update .....	92
Mitigation Planning Principles .....	92
Goals .....	92
Alternative Mitigation Actions .....	93
Mitigation Alternatives Update .....	93
Review of Previously Proposed Mitigation Actions .....	93
Benefit Cost Review of Mitigation Alternatives .....	93
Prioritization Methodology .....	98
Proposed Mitigation Actions .....	99
Mitigation Actions Update .....	99
Selected Actions .....	99
Selected Actions Addressing Public Safety .....	99
Selected Actions Addressing Existing Development .....	100
Selected Actions Addressing Future Development .....	101
Selected Actions Addressing Continued Participation in the NFIP .....	101
Selected Actions That Incorporate Mitigation into Other Plans .....	102
Other Selected Mitigation Actions .....	103
Implementation Strategies .....	104
Plan Maintenance .....	105
Plan Maintenance Update .....	105
Monitoring Mitigation Actions .....	105
Evaluating the Plan .....	106
Updating the Plan .....	106
Continued Public Involvement .....	107

List of Sources .....	108
List of Acronyms.....	110
Appendices .....	111

## List of Tables

Table 1: Past Presidential Declarations in Lawrence County .....	8
Table 2: Lawrence County’s Overall Growth Since the 1800’s .....	15
Table 3: Township Change in Population from 2000 to 2010 .....	16
Table 4: Regulatory Capabilities .....	22
Table 5: Lawrence County Dam Summary .....	26
Table 6: Dam Vulnerability .....	26
Table 7: Potential Damages from Dam Failure .....	27
Table 8: Structure Inventory .....	30
Table 9: Descriptions of Natural Hazards Addressed in This Plan.....	32
Table 10: NFIP Participation .....	<b>Error! Bookmark not defined.</b>
Table 11: Rivers and Streams in Lawrence County .....	37
Table 12: Lloyd Greenup Lock Stage History .....	38
Table 13: Ashland Stage History.....	39
Table 14: Huntington Stage History .....	39
Table 15: Lawrence County Infrastructure Damage.....	41
Table 16: Residential Damage Assessments .....	42
Table 17: Disaster Assistance Received by Lawrence County .....	42
Table 18: Summary of Past Losses Due to Flooding.....	43
Table 19: Jurisdiction Inventory of At-Risk Structures.....	44
Table 20: Incorporated Repetitive Loss Structures .....	46
Table 21: FEMA Individual Assistance for Winter Storm of 2003.....	50
Table 22: Enhanced Fujita Scale .....	56
Table 23: Expected Tornado Damages .....	56
Table 24: Damage Assessment for an EF-5 Tornado through Lawrence County .....	60
Table 25: Building Exposure for a 5.4 Magnitude Earthquake .....	66
Table 26: Palmer Drought Severity Index .....	68
Table 27: Commodity Loss Statistics for 1999 Drought .....	71
Table 28: Commodity Loss Statistics for 2002 Drought .....	72
Table 29: Commodity Loss Statistics for 2007 Drought .....	73
Table 30: Commodity Loss Statistics for 2012 Drought .....	74
Table 31: Landslide/Subsidence Occurrences.....	81
Table 32: Vulnerability Assessment due to Mine Subsidence.....	83
Table 33: Risk Assessment Findings .....	90
Table 34: Vulnerability Analysis .....	91

Table 35: Ranking of Proposed Mitigation Actions.....	95
Table 36: Actions Addressing Public Safety .....	99
Table 37: Actions Addressing Existing Development.....	100
Table 38: Actions Addressing Future Development.....	101
Table 39: NFIP Continued Participation Proposed Actions.....	101
Table 40: Actions to Incorporate into Other Planning Mechanisms.....	102
Table 41: Additional Mitigation Actions .....	103

## List of Figures

Figure 1: Lawrence County Map .....	17
Figure 2: Lawrence County Land Use Map.....	20
Figure 3: Lawrence County Drainage Basins.....	36
Figure 4: 2nd Street in Ironton, Ohio.....	40
Figure 5: Numbers of Structures Built.....	53
Figure 6: Average Annual Number of Tornadoes .....	55
Figure 7: Annual Tornado Reports.....	59
Figure 8: Epicenters of past earthquakes in Ohio .....	62
Figure 9: USGS Seismic Hazard Map - Ohio.....	63
Figure 10: Modified Mercalli Scale .....	64
Figure 11: Summer PDSI in Climate Division 9 for the past 115 years.....	69
Figure 12: Precipitation for the summer of 1999 .....	75
Figure 13: Percent of Time in Severe or Extreme Drought .....	76
Figure 14: Landslide Prone Areas in Ohio .....	78
Figure 15: Mines in Lawrence County.....	79

## Appendices

Appendix I.....	Sample Plan Adoption Resolutions
Appendix II.....	Core Group Meeting
Appendix III.....	Letter to Reviewers
Appendix IV .....	Public Involvement
Appendix V .....	Multi-Hazards Maps and Dam Locator Map
Appendix VI .....	NCDC Historical Hazard Events
Appendix VII .....	Critical Facilities
Appendix VIII .....	Landslide and Subsidence Data
Appendix IX .....	2003 Action Item Status
Appendix X .....	Action Item Prioritization
Appendix XI .....	Updated Action Item Strategy



## Introduction

This plan is the third update of the **Lawrence County Natural Hazards Mitigation Plan** that was originally developed in 2003 and adopted for implementation by the Lawrence County Commissioners and all incorporated jurisdictions within the County. In 2007, the plan was updated as required by the DMA2K and re-adopted by the Lawrence County Commissioners and all incorporated jurisdictions within the County.

Lawrence County is at risk of damage from a variety of natural hazards: flooding, tornadoes, severe storms, earthquakes, landslides and droughts. This plan explains the analysis of the potential effects of these natural hazards on the structures and infrastructure within Lawrence County and proposes measures to reduce the risk of a natural hazard leading to a disaster with property loss, business disruption, or even loss of life.

In the past, natural hazards have led to costly disasters in Lawrence County resulting in a Presidential Declaration of Major Disaster. These disasters are listed in **Table 1** showing that their causes were flooding, severe storm, tornado, wind, or ice and snow.

**Table 1: Past Presidential Declarations in Lawrence County**

Date	Disaster Declaration Number	Hazard	Public Assistance Received
June 5, 1968	DR-243	Heavy Rains and Flooding	
January 26, 1978	DR-3055-EM	Ice/Snow Storm	
June 6, 1990	DR-870	Severe Storm, Tornadoes, and Flooding	
January 27, 1996	DR-1097	Flooding	\$554,826
June 24, 1996	DR-1122	Severe Storms and Flooding	\$79,491
March 4, 1997	DR-1164	Flash Flooding and Flooding	\$888,384
March 7, 2000	DR-1321	Flash Flooding and Flooding	(IA only)
March 24, 2003	DR-1453	Ice/Snow Storm	\$447,209
September 19, 2004	DR-1556	Severe Storms and Flooding	
September 13, 2005	EM-3250	Hurricane	\$135,205
April 4, 2011	DR-4002	Severe Storms and Flooding	\$5,590,951
June 29, 2012	DR-4077	Severe Storms and Winds	\$26,901

Flooding is a major hazard in terms of total damage costs. In the past decade, there have been four presidential disasters declared in Lawrence County, all of which were flood

related. In 1996, the Ohio River flooded causing a total of \$1.7 million in damages, destroying 19 Lawrence County homes. In March of 1997, the Ohio River flooded again causing approximately \$42 million in damage to public infrastructure (roads, bridges, water-control facilities, public buildings, public utilities, parks and recreation facilities) in Southern Ohio. In Lawrence County alone, damages to public infrastructure totaled approximately \$2.5 million.

## ***Purpose of the Plan***

The emergency management community, citizens, elected officials and others in Lawrence County recognize the potential impacts of natural hazards on their community and have developed this plan to mitigate potential damages and reduce future losses. Hazard mitigation actions reduce the potential for loss of life and destruction of property. Mitigation actions are taken in advance of the occurrence of a potential hazard and are essential for breaking the disaster cycle of damage, reconstruction, and repeated damage.

This plan presents an evaluation of the potential negative consequences of the natural hazards that may affect Lawrence County and proposes strategies that will reduce or mitigate losses.

Adoption and implementation of this plan ensures that Lawrence County and participating jurisdictions continue to be eligible to apply for and receive certain Federal grant funds that are administered by the Ohio Emergency Management Agency (Ohio EMA) for the Federal Emergency Management Agency (FEMA). This plan complies with the requirements of the Disaster Mitigation Act of 2000 and its implementing regulations published in Title 44 of the Code of Federal Regulations (CFR) Section 201.6.

## ***Organization of the Plan***

To make the plan easier to follow, this plan is organized by hazards identified by the Core Group. This plan explains all steps of the mitigation planning process for each hazard. By organizing the plan by hazard, the relationships among a hazard, the potential effect of the hazard, and the actions proposed for mitigating negative effects of that hazard are obvious.

The sections of this plan are:

- **Introduction:** Identifies the purposes of this plan and the jurisdictions that have participated in plan development.
- **Planning Process:** Summarizes the earlier planning process as well as the process of updating this plan.
- **Community Profile:** Discusses existing conditions, including development trends and current local government capabilities.

- **Hazard Identification:** Identifies the natural hazards that may affect Lawrence County.
- **Risk Assessment Sections for Each Identified Hazard:** Includes a summary of changes since the previous plan was adopted, a profile of each hazard, and an assessment of the potential impact of each hazard.
- **Summary of Risk Assessment Findings:** Highlights the conclusions of the previous Risk Assessment Sections.
- **Mitigation Goals:** Presents planning principles, mitigation goals, and objectives.
- **Alternative Mitigation Actions:** Explains the status of actions proposed in the previous plan, presents a comprehensive array of possible actions, and explains how actions were evaluated.
- **Proposed Mitigation Actions:** Explains how actions address existing and future development and continued compliance with the National Flood Insurance Program (NFIP), how actions will be incorporated into other plans, and how actions will be implemented.
- **Plan Maintenance:** Explains how mitigation actions will be monitored and how the plan will be evaluated and updated.
- **Sources of Information:** Lists Web sites and publications used to develop this plan.
- **Appendices:** Include sample plan adoption resolutions, public notices about the planning process, and the survey instruments used by participating jurisdictions.

### ***Jurisdictions Represented in the Plan***

This is a multi-jurisdictional hazard mitigation plan. The jurisdictions that participated in the development of this plan are the same jurisdictions that participated in the development of the initial version of this plan and passed legislation adopting the plan. Along with the County government officials involved, the participating jurisdiction's included: the Village of Athalia, Village of Chesapeake, Village of Coal Grove, Village of Hanging Rock, City of Ironton, Village of Proctorville and Village of South Point. The adjacent Counties of Scioto, Jackson and Gallia in Ohio, in Kentucky, Greenup and Boyd, and in West Virginia, Cabell and Wayne were invited to participate in the planning process. A copy of the letter of invitation to adjacent counties is included in Appendix IV.

### ***Adoption Resolutions***

**Appendix I** provides sample adoption resolutions that participating jurisdictions will adopt after FEMA Region V determines that this plan is approvable pending adoption. An approvable plan meets planning requirements specified in 44 CFR Section 201.6. A plan is fully approved after it is adopted; signed adoption resolutions will be included in **Appendix I** when the plan is submitted for final approval by FEMA Region V.

## Planning Process

The **Lawrence County Natural Hazards Mitigation Plan** represent the work of citizens, elected and appointed government officials, business leaders, and volunteers of non-profit organizations in developing a blueprint for protecting community assets, preserving the economic viability of the community, and saving lives.

### *Planning Process*

#### **Mitigation Core Group**

During the Planning Process, the plan was led by a Mitigation Core Group. Representatives of the previous Mitigation Core Group as well as other community leaders were invited in August of 2012 by the County EMA Office to actively participate in updating the plan; those who accepted the invitation comprise the current Mitigation Core Group members.

Mitigation Core Group members for the 2013 plan were:

- City of Ironton, Fire Chief- Thomas Runyon
- Community Action Partnership- Cindy Anderson (local business)
- Eastham & Associates, Senior Project Engineer- Lester Tinkham (local business)
- Keith McGuire, Citizen
- Lawrence County 911, Director- Lonnie Best
- Lawrence County Auditor, GIS Specialist- Matthew Vance
- Lawrence County EMA, EMA Director- Mike Boster
- Lawrence County Engineer, Deputy Engineer GIS & Mapping- Paul Rubadue
- Lawrence County Engineer, Engineer- Doug Cade
- Lawrence County Floodplain Management, Floodplain Manager- Carrie Yaniko
- Lawrence County Soil and Water Conservation District, Program Manager- Peggy Reynolds
- Ohio University Southern Campus, Director Facilities Management- Adam Riehl (local university)
- Village of Athalia, Mayor- Gary Simpson\*
- Village of Chesapeake, Fire Chief- Ed Webb
- Village of Chesapeake, Mayor- Dick Gilpin
- Village of Coal Grove, Clerk- Debbie Fields\*
- Village of Hanging Rock- Tim Dickens
- Village of Hanging Rock, Chairperson- Jarrod Robinson
- Village of Proctorville, Administrator- Mark Root
- Village of South Point, Mayor- Ron West\*

\*Members were in direct communication with Lawrence County EMA and provided feedback via email because they were not able to attend the meetings

To aid in the development of the plan, the county contracted the services of URS Corporation, a consulting firm with expertise in hazard mitigation planning.

As part of the effort of updating the initial mitigation plan, the Mitigation Core Group decided to re-organize the plan to make it simpler to follow. The Mitigation Core Group prioritized mitigation alternatives through an iterative process of document review during November 15<sup>th</sup>, 2012 Mitigation Core Group meeting until consensus was reached.

## **Jurisdictional Participation**

During the process of updating the plan, each meeting of the Mitigation Core Group was open to representatives of participating jurisdictions. Representatives were invited to attend the meetings in person. Those entities that could not attend were contacted directly both by phone and email to participate in the process.

The first meeting of the Mitigation Core Group was held in the evening to accommodate schedules on October 11<sup>th</sup>, 2012 at the Lawrence County Emergency Operations Center. Representatives from each participating jurisdiction were invited by the Lawrence County EMA Director by letter and email to participate in the meeting, a copy of the e-mail invitation and notes from the meeting are included in **Appendix II**. During this meeting, Core Group members determined that the previous plan goals and action items were insufficient and did not fully represent the objectives the Core Group envisioned for the plan. Discussion for new plan goals and action items were brainstormed for preliminary goals and action items.

At the second Core Group meeting on November 15<sup>th</sup>, 2012, the Core Group approved the new goals there were created at the last meeting and revised leading up to the meeting. Action items generated at the first meeting and over communications leading up to the second Core Group meeting were finalized and prioritized. A unique voting method was utilized which allowed Core Group members to consider multiple factors when selecting the importance of action items. This process is further described in the Alternative Mitigation Action section. Also during this meeting, the Core Group unanimously agreed upon incorporating a new format for the plan that is better organized for the current FEMA requirements.

A digital copy of the draft plan was mailed to each participating jurisdiction along with a letter of explanation. A list of reviewers and a copy of the cover letter sent to jurisdictions is located in **Appendix III**. Eleven comments were received and the plan was modified accordingly.

Additional correspondence occurred throughout the planning process update through the Lawrence County Emergency Management Agency. When there were defined gaps in data, the Lawrence County EMA Director helped the consultant either locate the source of the needed data or directly supplied the data to the consultant for inclusion in the Mitigation Plan.

## Public Involvement

A notice about updating the hazard mitigation plan was posted on the home page of the Lawrence County Engineer's website beginning in November 2011 and continuing throughout the planning update. Residents of Lawrence County and neighboring communities who might be interested in participating in the process were invited to participate by the Lawrence County EMA Agency. On November 9, 2012 an article was published in the Herald Dispatch inviting the public to attend the review meeting on November 15, 2012. A copy of this newspaper clipping is included in **Appendix IV**. Letters were also sent to large local businesses, all school districts, Soil and Water Conservation, Ohio University branch, and all the adjacent County EMA offices on October 6<sup>th</sup>, 2011. A copy of this letter is included in **Appendix IV**. The volunteers that responded to this invitation are included in the Core Group.

The public was provided an opportunity to review and provide comment on the draft Lawrence County Natural Hazards Mitigation Plan throughout the entire planning process. The Plan was posted on the Lawrence County website. Lawrence County received did not receive any comments in this public posting process.

Because public participation in the drafting of the plan has been lacking, a press release inviting review and comment on the plan was issued on December 10, 2012. The press release was sent to local television/cable, newspapers, and radio stations. A copy of the press release is displayed in **Appendix IV**. Another press release was released in correspondence with the Final Draft Plan's release on December 9, 2013 and is displayed in **Appendix IV**. The Final Draft Plan was posted on the Lawrence County Government Website on December 5, 2013 and a copy was available at the Briggs Library in Ironton. Comments were due by December 12, 2013 and a screen shot of the Web page is displayed in **Appendix IV**. Eleven comments were received and the plan was updated accordingly.

The public was provided a final opportunity to comment on the draft of the updated plan at a public hearing when it was presented to the elected officials of each of the participating jurisdictions in Lawrence County for adoption during the months of [*actual dates to be inserted*] 2014. Since this is a 'living' document all comments received after the deadline will be incorporated into the next draft.

## Other Planning Mechanisms

During the process of updating the plan, URS and the Mitigation Core Group reviewed existing planning mechanisms to ascertain community capabilities and identify opportunities for implementing mitigation actions. These plans are further referenced in the Capability Assessment section of this plan. The Lawrence County EMA office staff also worked directly with incorporated communities not present at any of the planning meetings so they have input into the planning process.

## **Gathering New Data**

Gathering and analyzing new data about natural hazards and the community was critical to the process of updating the plan. New data used for the plan are identified throughout the plan; however, because flooding and winter storms are the most common and the most costly natural hazards that occurs in Lawrence County, particular attention was provided to gathering data on these hazards. Extra attention was also used when assessing structures and areas that have been damaged repeatedly by flooding.

## Community Profile

This section provides a large amount of information on the county for community leaders to make better informed decisions when dealing with mitigating natural disasters.

### ***County Information***

Lawrence County is located on the southern tip of Ohio. It is bounded by Jackson County to the north, Scioto County to the northwest, Gallia County to the northeast, and the states of Kentucky and West Virginia to the south. The County Seat is located in the City of Ironton. The County lies on the north shore of the Ohio River. Its river boundary stretches for more than forty-miles. The county is comprised of 453.37 square miles of land.

The county is mostly rural in setting and wooded areas dominate the landscape. It is part of Ohio's Appalachian Region. U.S. Route 93 runs north-south through the county and State Route 52 is the main southeast-northwest thoroughfare in the county and connects the communities bordering the Ohio River. The entire county population is 62,450. Shown in **Table 2** is the growth of the county since the 1800's.

**Table 2: Lawrence County's Overall Growth Since the 1800's**

Year	Total Population	Year	Total Population
1800	N/A	1910	39,488
1810	N/A	1920	39,540
1820	3,499	1930	44,541
1830	5,367	1940	46,705
1840	9,738	1950	49,115
1850	15,246	1960	55,438
1860	23,249	1970	56,868
1870	31,380	1980	63,849
1880	39,068	1990	61,834
1890	39,556	2000	62,319
1900	39,534	2010	62,450

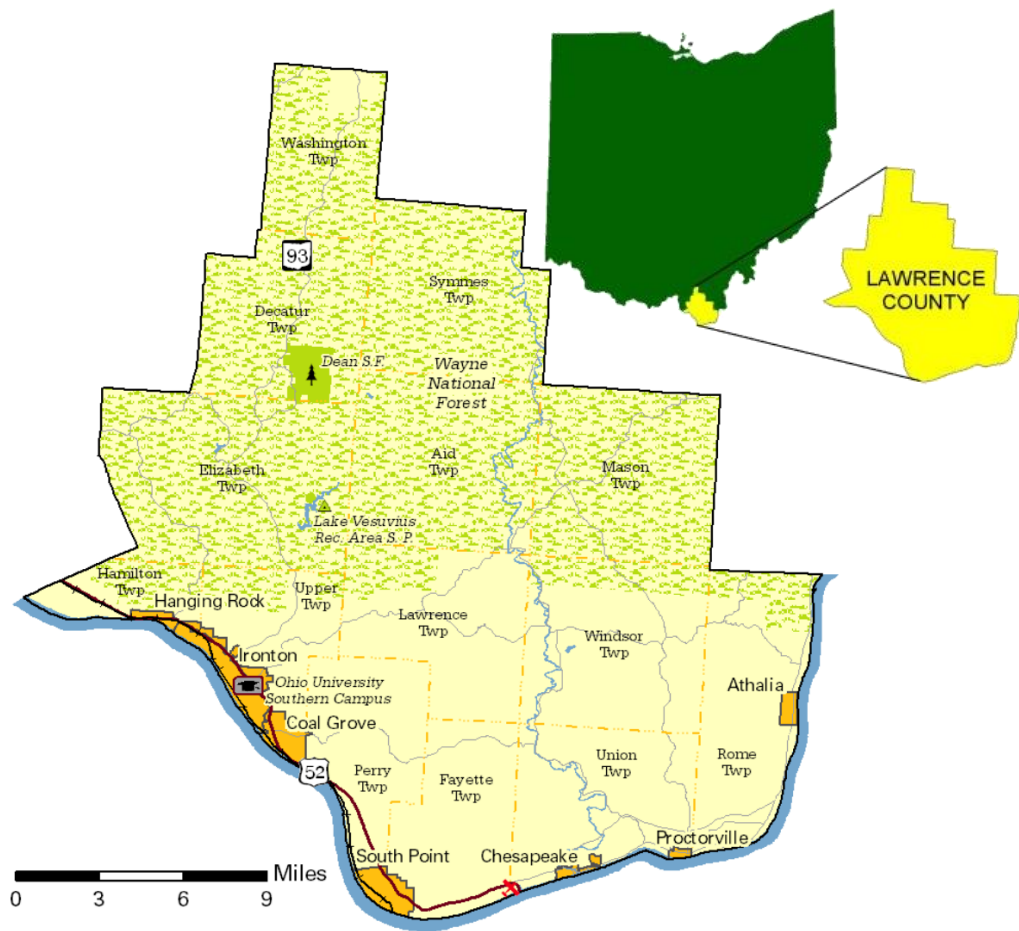
There are 14 townships in Lawrence County. **Table 3**, below, illustrates the change in population over the past decade.



**Table 3: Township Change in Population from 2000 to 2010**

Name	1990 Total	% Change 1990-2000	2000 Total	% Change 2000-2010	2010 Total
Lawrence County	61,834	0.8	62,319	0.2	62,450
Aid Township	811	11.8	907	-3.5	875
Decatur Township	870	-3.6	839	-13.5	726
Elizabeth Township	2,515	15.9	2,914	1.9	2,969
Fayette Township	9,181	-0.1	9,169	0.3	9,194
Hamilton Township	1,899	-4.3	1,817	-2.5	1,772
Lawrence Township	2,484	3.6	2,574	0.2	2,579
Mason Township	1,036	5.7	1,095	1.9	1,116
Perry Township	6,584	3.5	6,813	2.3	6,973
Rome Township	7,579	14.7	8,694	2.3	8,892
Symmestown Township	412	14.1	470	-1.3	464
Union Township	9,139	-1.5	9,002	0.9	9,086
Upper Township	17,136	-8.7	15,648	-1.5	15,418
Washington Township	302	-17.2	250	-4.4	239
Windsor Township	1,886	12.8	2,127	0.9	2,147

A Lawrence County demographic profile is also available on the Ohio Department of Development's website and provides more specific information for Lawrence County and its political jurisdictions. A map of Lawrence County is shown below in **Figure 1**.



**Figure 1: Lawrence County Map**

## ***Jurisdictions***

The incorporated areas of Lawrence County include Athalia, Chesapeake, Coal Grove, Hanging Rock, Ironton, Proctorville and South Point. According to the 2010 Census, the largest areas of population are in City of Ironton (11,129), South Point (3,958), and Coal Grove (2,165).

### **Athalia**

The Village of Athalia encompasses 0.7 square miles. It is located in Rome Township and located along the Ohio River on the eastside of the county.

As of the Census of 2010, there are 373 people, 163 households, and 94 families residing in the village. It is the third smallest populated village in Lawrence County and has a population density of 532 people per square mile.

### **Chesapeake**

The Village of Chesapeake encompasses 0.6 square miles is located in Union Township along the Ohio River.

As of the Census of 2010, there are 745 people, 399 households, and 231 families residing in the village. It is the fifth smallest populated village in Lawrence County and has a population density of 1,241 people per square mile.

### **Coal Grove**

The Village of Coal Grove encompasses 2.1 square miles in Upper Township. It is located south of Ironton on the southeast side of Lawrence County. It is the second largest village in Lawrence County.

As of the census of 2010, there are 2,165 people, 891 households, and 562 families residing in the village. It is the second largest populated village in Lawrence County and has a population density of 1,031 people per square mile.

### **Hanging Rock**

The Village of Hanging Rock encompasses 0.7 square miles. It is northwest of Ironton in Hamilton Township and borders the Ohio River.

As of the Census of 2010, there are 221 people, 102 households, and 75 families residing in the village. It is the smallest populated village in Lawrence County and has a population density of 315 people per square mile.

### **Ironton**

The City of Ironton, which was named by iron master, John Campbell, as a tribute to the pig iron produced in the county, became the county seat in 1852. The City of Ironton encompasses 4.4 square miles. Ironton is located in Upper Township and borders the Ohio River.

As of the census of 2010, there are 11,129 people, 5,382 households, and 3,022 families residing in the city. It is the only city in Lawrence County and has a population density of 2,529 people per square mile.

### **Proctorville**

The Village of Proctorville encompasses 0.3 square miles. Proctorville is located in Union Township and borders the Ohio River. It is the third largest village in Lawrence County.

As of the census of 2010, there are 574 people, 293 households, and 168 families residing in the village. It is the fourth smallest populated village in Lawrence County and has a population density of 1,913 people per square mile.

## **South Point**

The Village of South Point encompasses 2.4 square miles. South Point is located in Perry and Fayette Townships and borders the Ohio River.

As of the census of 2010, there are 3,958 people, 1,699 households, and 1,131 families residing in the village. It is the largest populated village in Lawrence County and has a population density of 1,649 people per square mile.

## ***Land Use and Development Trends***

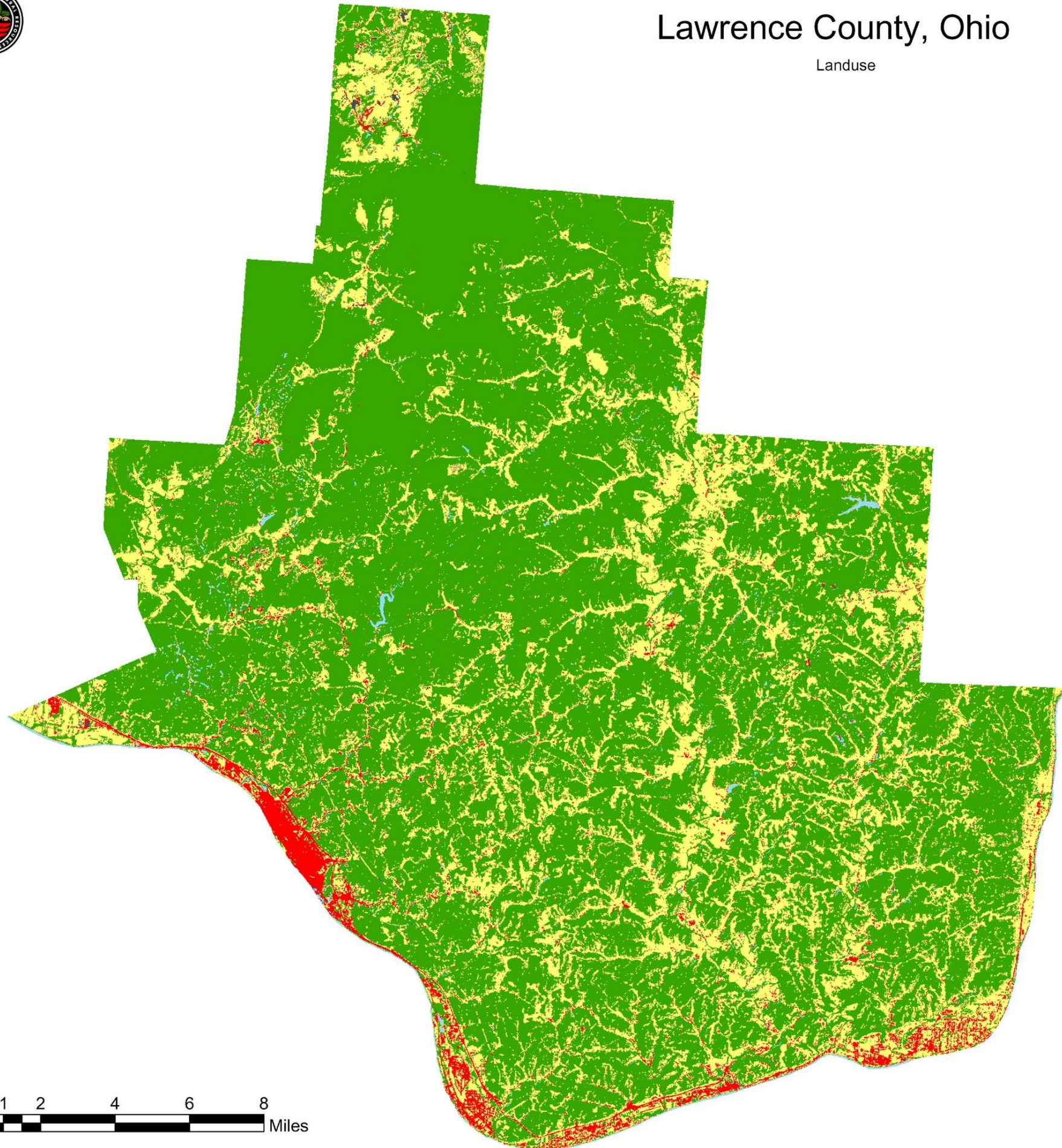
The purpose of including an analysis of land use and development trends in this mitigation plan is to identify the potential for future structures to be at risk of damage due to natural hazards. Lawrence County is predominantly rural in nature, which is evident in the land use map shown below in **Figure 2**. The current development occurring within Lawrence County has been primarily concentrated in the southeastern part of the county. This development is predominantly residential and is centered in Union and Rome Townships.

The county contains approximately 291,455 land acres, of which approximately 65,740 acres are farmland. Of the farmland 27.55% is comprised of cropland, 29.68% is pasture, 35.91% is woodland and 6.86% is categorized as other uses. Land being used for farmland has decreased 7% from 2002 to 2007. The average size of farms has remained the same from 2002 to 2007 at 101 acres. Wayne National Forest encompasses 832,147 acres across twelve counties in southeast Ohio and is divided into three separate units. The Ironton Unit is located in Gallia, Jackson, Lawrence and Scioto Counties, and includes 99,049 acres as of 2002, with over two-thirds of the total area within Lawrence County.

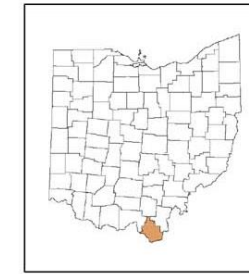


# Lawrence County, Ohio

Landuse



NATURAL HAZARD MITIGATION PLAN  
2003



### Landuse

- 1 - Urban
- 2 - Agricultural/Open Urban
- 3 - Shrubs/Scrub
- 4 - Wooded
- 5 - Open Water
- 6 - Non Forested
- 7 - Barren

#### Descriptions

- 1 URBAN (open impervious surfaces: roads, buildings, parking lots and similar hard surface areas which are not obstructed from aerial view by tree cover.) See 7. BARREN
- 2 AGRICULTURE/OPEN URBAN AREAS (cropland and pasture, parks, golf courses, lawns and similar grassy areas not obstructed from view by tree cover)
- 3 SHRUB/SCRUB (young, sparse, woody vegetation, typically areas of scattered young tree saplings)
- 4 WOODED (deciduous and coniferous)
- 5 OPEN WATER
- 6 NON FORESTED WETLANDS (includes wetlands identified from 1994 Thematic Mapper data as well as from the Ohio Wetlands Inventory)
- 7 BARREN (strip mines, quarries, sand and gravel pits, beaches) Many of the URBAN features identified in this inventory are constructed from materials obtained from the BARREN features. Because of this, there will on occasion be URBAN areas identified as BARREN as well as BARREN areas identified as URBAN.

Scale: 1:95,000  
Projection: NAD 1927 State Plane Ohio South  
Category: Lambert Conformal Conic

Data: The coverage was extracted from the 1994 statewide land cover inventory of Ohio produced by Bruce R. Motsch and Gary M. Schaal of the Ohio Department of Natural Resources.

Created By: Tim Beck  
Date: November 3, 2003

#### Liability

The Ohio Department of Natural Resources (DNR) provides this geographic data "as is." DNR makes no guarantee or warranty concerning the accuracy of information contained in the geographic data. DNR further makes no warranties, either expressed or implied, as to the condition of the product, or its fitness for any particular purpose. The burden for determining fitness for use lies entirely with the user. Although these data have been processed successfully on computers of DNR, no warranty, expressed or implied, is made by DNR regarding the use of these data on any other system, nor does the fact of distribution constitute or imply any such warranty. In no event shall the DNR have any liability whatsoever for payment of any consequential, incidental, indirect, special, or tort damages of any kind, including, but not limited to, any loss of profits arising out of use of or reliance on the geographic data.

Ohio Department of Natural Resources  
Division of Water  
Floodplain Management Program  
1939 Fountain Square Drive, Building E-3  
Columbus, Ohio 43224-1386



Figure 2: Lawrence County Land Use Map

## ***Capability Assessment***

The purpose of the Capability Assessment is to identify strengths and weaknesses that will affect the ability of the county and participating jurisdictions to implement mitigation actions. Capabilities include a variety of regulations, existing planning mechanisms, and administrative capabilities provided through established agencies or authorities.

### **Regulatory Capabilities**

**Table 4** summarizes the regulatory tools used in Lawrence County and participating jurisdictions. These regulations support the goals of this hazard mitigation plan and provide opportunities for further mitigating the potentially negative effects of natural hazards through regulation.

**Table 4: Regulatory Capabilities**

Jurisdiction	Zoning Ordinances	Development Regulations	Floodplain Regulations	Floodplain Management Regulations	Stormwater Management Regulations	Building Codes	Planning Commission	Comprehensive Plan	Capital Improvement Budget	Public Works Budget
Lawrence County	Yes	Yes	Yes	Yes	Yes	Yes	Yes	(none)	Yes	Yes
Village of Athalia	(none)	(none)	(none)	(none)	(none)	(none)	(none)	(none)	(none)	(none)
Village of Chesapeake	(none)	(none)	Yes	Yes	(none)	Yes	Yes	(none)	(none)	(none)
Village of Coal Grove	Yes	(none)	Yes	Yes	(none)	(none)	(none)	(none)	Yes	Yes
Village of Hanging Rock	Yes	Yes	Yes	Yes	(none)	(none)	(none)	(none)	Yes	(none)
City of Ironton	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Village of Proctorville	Yes	(none)	Yes	Yes	Yes	(none)	(none)	(none)	(none)	Yes
Village of South Point	Yes	Yes	(none)	Yes	Yes	Yes	(none)	(none)	(none)	(none)

\* Permits required for house trailers only.

\*\* Building inspections are arranged through the mayor's office.

**Zoning Ordinances:** Regulates development by dividing the community into zones or districts and establishing the type of development allowed within each district. The floodplain can be designated as one or more separate zoning districts in which development is prohibited or allowed only if it is not susceptible to flood damage. Some districts that are appropriate for floodplains are those designated for public use, conservation or agriculture. Zoning works best in conjunction with a comprehensive plan or "road map" for future development and building codes.

**Development Regulations:** Further specify how development can occur. Subdivision Regulations govern how land will be broken up into individual lots. These regulations set construction and location standards for the infrastructure built by the developer, including roads, sidewalks, utility lines, storm sewers, stormwater retention or detention basins, and drainage ways.

The National Flood Insurance Program (NFIP) is a voluntary program which requires the development of a floodplain ordinance. All municipalities and Lawrence County have an approved **floodplain management ordinance**.

**Stormwater Management Regulations:** Provide for the conveyance of stormwater to decrease flooding. Lawrence County currently does not have any drainage regulations in place. However, one of the resulting goals of the Mitigation Plan process is to establish administrative controls for construction practices to promote better drainage to avoid flooding.

Adoption and enforcement of **building codes** ensure that both residential and commercial structures are safe. Building codes provide some of the best methods of addressing all the hazards in this plan. They are the prime measure to protect new property from damage by high winds, tornadoes, earthquakes, hail, and winter storms. When properly designed and constructed according to code, the average building can withstand the impact of most of these forces.

A local **historic district ordinance** enables a community to regulate development in a specific, designated area of historic significance. As of today, no historic district ordinance has been developed in Lawrence County.

Currently, Lawrence County has building regulations and permits within all county, Township and State right-of-ways. Unincorporated areas typically comply with the State of Ohio's codes.

## **Planning Capabilities**

### ***Comprehensive Planning***

Comprehensive plans and land use plans specify how a community should be developed (and where development should not occur). Through these plans, uses of land can be tailored to match the land's hazards. Comprehensive planning reflects what a community



wants to see happen to their land in the future. A comprehensive plan can look 5, 10, or even 20 years into the future to help a community plan and shape how they envision their community. However, planning is only one part of the puzzle and usually has limited authority. Tied with zoning comprehensive planning can be more effective.

A comprehensive plan has not been completed for Lawrence County.

### ***Emergency Operations Planning***

The Lawrence County **Emergency Operations Plan** (EOP) is a requirement of the Ohio Revised Code, Section 5502.271. The purpose of this EOP is to predetermine, to the extent possible, actions to be taken by the governmental jurisdictions of Lawrence County to prevent avoidable disasters and respond quickly and adequately to emergencies in order to protect the lives and property of the residents of Lawrence County.

The EOP is designed to work for all types of natural and man-made disasters. The document has a Basic Plan which defines and identifies areas of potential risk, lists people and organizations involved in response situations, and discusses plan development and maintenance. The Basic Plan is augmented with annexes that describe the details of various aspects of emergency response. Some examples of these annexes include Direction and Control, Notification and Warning, Law Enforcement, Medical, Anti-Terrorism, and Resource Management.

The plan contains guidelines with respect to roles and responsibilities. The Emergency Operations Center (EOC) is responsible for directing and controlling the conduct of emergency operations from that center, or from an alternate facility during emergencies. The EOC, in coordination with the Incident Commander at the site, will be the point of contact for all operating/responding departments and agencies, other counties and the State.

### ***Watershed Planning***

Five different watersheds influence drainage in Lawrence County: The Symmes Creek drains the central portions of the county running north and south, the Pine Creek and Ice Creek drain the western portion of the county in a northeast to southwest direction and Indian Guyan Creek and Sand Fork drain the eastern portion of the county from north to south. All five flow into the Ohio River which is the county's southern boundary.

Currently, Lawrence County does not have a watershed management plan enacted.

### ***Emergency Action Planning for Dams***

In Ohio, most dams are constructed of earth. Dams must have spillway systems to safely convey normal stream and flood flows over, around, or through the dam. Spillways are commonly constructed of non-erosive materials such as concrete. Dams also have a drain

or other water-withdrawal facility to control the pool or lake level and to lower or drain the lake for normal maintenance and emergency purposes.

An Emergency Action Plan (EAP) has only been prepared for the Lake Forest Dam. The EAP addresses ways to safeguard lives and reduce property damage within the inundation area; procedures for effective dam surveillance; procedures for prompt notification of emergency management officials; warning and evacuation procedures; and emergency response actions that will be taken in the event of potential or imminent failure of the dam. According to Ohio Administrative Code Rule 1501:21-13-01, dams are classified as follows:

**Class I:** A dam shall be placed in Class I when failure of the dam would result in probable loss of human life. Dams having a storage volume greater than 5,000 acre-feet or a height of greater than 60 feet shall be placed in Class I.

**Class II:** Dams having a storage volume greater than 500 acre-feet or a height of greater than 40 feet shall be placed in Class II. A dam shall be placed in Class II when failure of the dam would result in at least one of the following conditions, but loss of human life is not envisioned.

**Class III:** Dams having a height of greater than 25 feet, or a storage volume of greater than 50 acre-feet, shall be placed in Class III. A dam shall be placed in Class III when failure of the dam would result in at least one of the following conditions, but loss of human life or hazard to health is not envisioned.

**Class IV:** When failure of the dam would result in property losses restricted mainly to the dam and rural lands, and not loss of human life or hazard to health is envisioned, the dam may be placed in Class IV.

According to the ODNR, Lawrence County has 12 dams within its boundaries that fall under a classification. A map showing the location of dams within Lawrence County is included at the end of **Appendix V**. The number of dams and their classifications are as follows:

- Class I- 4
- Class II+III - 8
- Other- 35

Lawrence County has 35 unclassified dams, which have been determined by the ODNR's Chief of the Division of Water to not constitute a hazard to life, health or property in the event of a failure. (Information was obtained from ODNR Dam Safety Program)

The following information on **Table 5** lists Class I, II, and III dams in Lawrence County.

**Table 5: Lawrence County Dam Summary**

Name	Class	Stream	Owner Type	EAP Status
Bear Run Lake Dam	II	Bear Run	Public, Federal	No Jurisdiction
Izaak Walton Lake Dam	II	Tributary to Johns Creek	Private	Not Approved
Lake Forest Dam	II	Tributary to Symmes Creek	Private, Assn.	Approved
Lake Vesuvius Dam	I	Storms Creek	Public, Federal	Not Approved
Lawco Lake Dam	III	Darby Creek	Private, Assn.	Not Approved
McClure Lake Dam	III	Tributary to Aaron Creek	Private	Not Approved
Payne Lake Dam	III	Tributary to Symmes Creek	Private	Not Approved
Pine Creek Structure No. 8 Dam	II	Tributary to Sperry Fork	Public, C.D.	Not Approved
Randolph Lake Dam	I	Willow Creek	Private	Not Approved
Smith Hollow Dam	II	Tributary to Ellisonville Creek	Public, Federal	No Jurisdiction
Timbre Ridge Lake Dam	I	Tributary to Sand Fork Creek	Public, Federal	Not Approved
Waller Lake Dam	I	Little Ice Creek	Private	Not Approved

According to the National Performance of Dams Program (NPDP), three of these dams had previous incidents but did not experience dam failure. On December 12, 1990 the Lake Vesuvius dam experienced seepage, concrete deterioration, and inadequate spillway capacity. On November 11, 2000 the Lake Forest Dam experienced inadequate spillway capacity. Also on November 11, 2000 the Randolph Lake Dam experienced erosion and undermining. Each dam that has no recorded incidents is expected to have a vulnerability of less than one percent. Each dam that has a recorded incident is given a vulnerability based on how many incidences experienced over the life of the dam. Vulnerabilities for each dam are summarized in **Table 6** below.

**Table 6: Dam Vulnerability**

Name	Class	Year Completed	Number of Incidents	Vulnerability
Bear Run Lake Dam	II			
Izaak Walton Lake Dam	II	1960	0	<1%
Lake Forest Dam	II	1958	1	1.8%
Lake Vesuvius Dam	I	1940	1	1.3%
Lawco Lake Dam	III	1931	0	<1%
McClure Lake Dam	III	1966	0	<1%
Payne Lake Dam	III	1961	0	<1%
Pine Creek Structure No. 8 Dam	II	1972	0	<1%
Randolph Lake Dam	I	Unknown	1	

Smith Hollow Dam	II			
Timbre Ridge Lake Dam	I	1979	0	<1%
Waller Lake Dam	I	1955	0	<1%

Inspection reports were obtained from ODNR for 10 of these dams. Bear Run Dam and Smith Hollow Dam do not require inspection services from ODNR so reports were unavailable for those dams. Information from the report about downstream hazards was extracted and included in the table below to estimate potential damages if the dam were to fail. **Table 7** estimates the dollar amount for damages using average structure values (residential without mobile homes, mobile homes, non-residential, and critical) from **Table 8** based on the structure type and township where each dam is located.

**Table 7: Potential Damages from Dam Failure**

Dam	Number of Structures At-Risk				Damage in Dollars			
	Residential	Non-Residential	Critical	Total	Residential	Non-Residential	Critical	Total
Izaak Walton Lake Dam	5*	0	0	5	\$78,071	\$0	\$0	\$78,071
Lake Forest Dam	2	0	0	2	\$124,276	\$0	\$0	\$124,276
Lake Vesuvius Dam	7	0	2	9	\$446,572	\$0	\$5,306,164	\$5,752,736
Lawco Lake Dam	0	0	0	0	\$0	\$0	\$0	\$0
McClure Lake Dam	0	0	0	0	\$0	\$0	\$0	\$0
Payne Lake Dam	0	0	0	0	\$0	\$0	\$0	\$0
Pine Creek Structure No. 8 Dam	15	0	0	15	\$956,940	\$0	\$0	\$956,940
Randolph Lake Dam	23	0	1	24	\$1,570,900	\$0	\$2,480,196	\$4,051,096
Timbre Ridge Lake Dam	7**	1	0	8	\$302,326	\$47,078	\$0	\$349,404
Waller Lake Dam	3	0	0	3	\$192,321	\$0	\$0	\$192,321

\*Five residential structures include one house and four mobile homes

\*\*Seven residential structures include five homes and two mobile homes

### Additional Capabilities

A variety of additional capabilities are established in Lawrence County. These capabilities can support the implementation of mitigation actions that are proposed in this plan. These capabilities are:

#### State of Ohio Rain Snow Monitoring System (STORMS)

The State of Ohio Rain/Snow Monitoring System (STORMS) is an automated rain gauge system that monitors an area's snow and rainfall for potential flooding while transmitting

current, real-time precipitation data to the State Emergency Operations Center, the ODNR, the NWS and county emergency management agencies. The rain gauges are usually positioned near watersheds and report data 24 hours a day to computers in Columbus and are used by NWS as a prediction tool for flood and flash flood watches and warnings. Local governments are also able to access the data through special computer systems connected to the gauges.

## Other Resources

Support for mitigation planning actions is provided by the State of Ohio and the Federal Government. Programs that complement Lawrence County mitigation planning initiatives are:

- Ohio administered programs include the following:
  - **Hazard Mitigation Assistance Programs:** Provide grants for cost-effective mitigation projects either in the absence of a disaster or after a disaster declaration has occurred.
  - **Ohio Department of Development:** Provide grants for job ready sites and community development block for economic development.
  - **Ohio Department of Natural Resources:** Provide support for land and water conservation efforts.
  - **Ohio Environmental Protection Agency:** Provide grants and loans for capital improvements within a community.
- Federal Government programs include the following:
  - **Hazard Mitigation Assistance Programs:** Provide grants for cost-effective mitigation projects either in the absence of a disaster or after a disaster declaration has occurred.
    - Pre-Disaster Mitigation Assistance Program (PDM)
    - Flood Mitigation Assistance Program (FMA)
    - Repetitive Flood Claims Program (RFC)
    - Severe Repetitive Loss Program (SRL)
    - Hazard Mitigation Grant Program (HMGP)
  - **Community Development Block Grants:** Provides funds to address a wide range of community development needs.
  - **Small Communities Program Fund:** Supports water quality infrastructure projects.
  - **Weatherization Assistance Program:** Enables low-income households to make their homes more energy-efficient.
  - **Firewise Communities Program:** Involves homeowners and community leaders in protecting structures from fire damage.

## Structure Assessment

The purpose of this section is to identify type, quantity, and value associated with each structure within all the jurisdictions. This will provide information when preparing a vulnerability analysis for each hazard. It will also give valuable information for

estimating the damages when a disaster hits. **Table 8** shows the type and value associated with each structure within each jurisdiction within Lawrence County. Unless otherwise stated, the values used throughout this report to estimate the cost due to residential structure loss refer to the category specified as residential without mobile homes.

**Table 8: Structure Inventory**

	Mobile homes		Residential w/o Mobile homes		Residential with Mobile homes		Non-Residential		Critical Facilities	
	Count	Avg. Value	Count	Avg. Value	Count	Avg. Value	Count	Avg. Value	Count	Avg. Value
<b>LAWRENCE COUNTY</b>	1466	\$4,955	18746	\$70,770	20212	\$65,996	4469	\$131,916	74	\$2,165,607
<b>VILLAGE</b>										
Athalia	15	\$3,533	115	\$47,850	130	\$42,736	10	\$39,688	1	\$55,360
Chesapeake	14	\$5,205	332	\$55,725	346	\$53,681	97	\$76,955	3	\$115,607
Coal Grove	37	\$4,645	745	\$49,155	782	\$47,049	78	\$246,771	4	\$2,998,350
Hanging Rock	21	\$1,874	84	\$60,441	105	\$48,727	14	\$154,787	2	\$349,425
Ironton	2	\$1,045	4129	\$55,661	4131	\$55,635	705	\$188,386	18	\$2,365,594
South Point	19	\$7,145	1362	\$79,380	1381	\$78,386	142	\$242,228	6	\$1,619,433
Proctorville	24	\$3,322	222	\$47,044	246	\$42,779	79	\$104,413	3	\$181,800
<b>TOWNSHIP</b>										
Aid	24	\$5,405	145	\$56,451	169	\$49,202	179	\$92,720	3	\$2,468,537
Decatur	28	\$5,166	146	\$55,043	174	\$47,016	93	\$51,098	1	\$285,000
Elizabeth	156	\$3,353	542	\$63,796	698	\$50,287	204	\$189,358	5	\$2,653,082
Fayette	234	\$4,504	1924	\$68,300	2158	\$61,383	407	\$138,735	5	\$2,480,196
Hamilton	36	\$7,144	167	\$63,764	203	\$53,723	51	\$293,235	2	\$57,130
Lawrence	80	\$8,404	558	\$67,642	638	\$60,214	351	\$57,094	3	\$73,367
Mason	36	\$5,688	151	\$58,190	187	\$48,082	264	\$47,078	0	\$0
Perry	141	\$5,822	1485	\$64,107	1626	\$59,053	342	\$177,912	4	\$6,636,000
Rome	159	\$5,834	2897	\$105,067	3056	\$99,904	378	\$139,718	7	\$2,622,391
Symmes	22	\$6,312	71	\$44,648	93	\$35,579	94	\$47,402	0	\$0
Union	233	\$3,473	2392	\$81,395	2625	\$74,479	426	\$150,282	5	\$3,030,836
Upper	86	\$4,277	805	\$58,703	891	\$53,450	186	\$93,909	1	\$524,060
Washington	12	\$9,325	59	\$45,564	71	\$39,439	31	\$35,075	0	\$0
Windsor	87	\$6,289	415	\$62,138	502	\$52,459	338	\$59,893	1	\$47,450

## Hazard Identification

To reduce the potential for damage due to hazards, it is necessary to identify hazards that may affect the county. This process is completed using published information and Web sites that address hazards globally, nationally, within Ohio, or specifically within Lawrence County as well as anecdotal information provided by members of the Mitigation Core Group and the public.

Only natural hazards are identified and examined in this plan update as required by the Disaster Mitigation Act of 2000. The seven identified natural hazards are:

- Flooding
- Winter Storm
- Tornado
- Earthquake
- Drought
- Landslide and Subsidence
- Severe Storm

### ***Description of Hazards***

The descriptions of hazards included in the 2013 Plan are largely based on publicly available data provided by the National Oceanographic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) and the Ohio Department of Natural Resources. The hazard data was evaluated by the Mitigation Core Group. The Mitigation Core Group unanimously agreed upon adopting the old prioritization based off of historical data on the hazards. **Table 9** summarizes each natural hazard that may affect Lawrence County.



**Table 9: Descriptions of Natural Hazards Addressed in This Plan**

Hazard	General Description of Hazard
Flooding	<p>A flood is a natural event for rivers and streams. In Lawrence County excess water from snowmelt or rainfall accumulates and overflows the stream banks into adjacent floodplains.</p> <p>Floods are considered hazards when people and property are affected. Nationwide, hundreds of floods occur each year, making it one of the most common hazards in all 50 states and U.S. territories. In Ohio, flooding can occur during any season of the year. Serious flooding occurs regularly along one or more of Ohio’s major rivers or streams, such as the Ohio River, which is at the southern boundary of Lawrence County.</p>
Winter Storms	<p>Heavy snow and ice are caused by winter storms bringing frozen precipitation and cold temperatures to the area. Heavy accumulations of ice can cause extensive damage by bringing down trees and toppling utility poles and communication towers, which disrupts power and communications. Winter storms may also lead to the collapse of roofs in deteriorated structures.</p>
Tornado	<p>A tornado is an extraordinary feature generally associated with severe thunderstorms or hurricanes. A tornado is characterized by a funnel of violently rotating winds. While the extent of tornado damage is usually localized, the extreme winds of a tornado are among the most destructive and can cause millions of dollars of damage and loss of life when they move through populated, developed areas.</p> <p>Tornadoes can occur at any time but most frequently occur during the late afternoon or early evening, the warmest hours of the day. Peak months for tornado activity are April, May, and June.</p>
Earthquake	<p>Earthquakes are the sudden motion or trembling of the ground caused by the breaking and shifting of rock beneath the surface of the earth. Ground shaking from earthquakes can collapse buildings and bridges and disrupt gas, electric, and phone service.</p>
Drought and Wildfires	<p>A drought is a period of prolonged dryness that contributes to depletion of ground water and surface water. Adverse consequences of drought include insufficient supplies of water for human consumption as well as agricultural and industrial uses and deterioration of water quality. High temperatures, prolonged winds, and low relative humidity can exacerbate the severity of drought. The probability of wildfires increases as the severity and duration of a drought increases.</p>
Landslides and Subsidence	<p>A landslide occurs when masses of rock, debris, or earth roll down steep slopes. Contributing causes of landslides include erosion, removal of vegetation cover and ground shaking from earthquakes.</p>
Severe Storms (Thunderstorms and Hail)	<p>Thunderstorms can occur at any time of the year and just about anywhere in the world. A thunderstorm forms when moist, unstable air is lifted vertically into the atmosphere. Lightning occurs in all thunderstorms.</p> <p>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 ice. Hail forms only in thunderstorms, in cumulonimbus clouds that contain vast amounts of energy in the form of updrafts and downdrafts.</p>

## Flooding Risk Assessment

Due to flooding being a site specific hazard, data about the location and types of structures and infrastructure in the county were reviewed to identify changes in vulnerability. Lawrence County is currently in the beginning stages of getting new digital flood insurance rate maps which will result in a more accurate assessment of their vulnerability to flooding. New digital flood maps are based on a revised Flood Insurance Study that used more accurate topographic data than were available in the past and that accounted for additional impervious ground cover due to new development in the townships.

Information about flood loss was augmented in order to comply with the modifications of 44 CFR Part 201.6 that became effective in October 2007. Regulations now require that local hazard mitigation plans place special emphasis on the mitigation of Repetitive Loss Structures, which are structures insured by the NFIP that have had at least two paid flood losses of more than \$1,000 each in any 10-year period since 1978.

### ***Hazard Profile – Flooding***

Flooding is an important issue for the residents and business owners of Lawrence County. Whether it was flash floods or riverine flooding events that have occurred in the past, lives have been disrupted or lost and damage has been extensive. Because the southern half of the county is situated along the Ohio River, flooding has always been a major concern. Areas that are prone to flooding in Lawrence County are along the banks of the Ohio River and the watersheds of Symmes Creek and Indian Guyan Creek.

Lawrence County has special flood hazard zones identified within the county. The best way to combat disaster losses within these special flood hazard zone areas is through public awareness. All of Lawrence County is in compliance with state floodplain management standards and participates in the National Flood Insurance Program (NFIP). The county has been involved since September 29, 1989. Below, **Table 10** gives the incorporated jurisdictions that participate in the NFIP and the date in which they entered the program.

**Table 10. NFIP Participation**

CID	NAME	Init FHBM Identified	Init FIRM Identified	Curr Eff Map Date	Reg- Emer Date
390325	Lawrence County	2/14/1975	9/29/1989	3/16/2006	9/29/1989
390327	City of Ironton	2/15/1974	7/5/1983	NSFHA	7/5/1983
390698	Village of Athalia	8/1/1975	9/1/1983	3/16/2006	9/1/1983
390608	Village of Chesapeake	1/10/1975	10/18/1983	NSFHA	10/18/1983
39032	Village of Coal Grove	6/14/1974	7/5/1983	3/16/2006	7/5/1983
390599	Village of Hanging Rock	3/28/1975	9/1/1983	3/16/2006	9/1/1983
390700	Village of Proctorville	4/18/1975	8/1/1984	NSFHA	2/4/1987
390630	Village of South Point	1/3/1975	5/2/1983	3/16/2006	5/2/1983

FIRM maps from March 16, 2006 are currently used and have been adopted by the county. Floodplain Administrators at county and local levels helped make floodplain regulations and enforce the regulations. Floodplain Administrators also monitor the floodplain on a regular basis, provide community assistance regarding floodplain ordinances and promote the upkeep of flood insurance.

In 1995, the Flood Damage Prevention Resolution was adopted by the unincorporated areas of Lawrence County. This resolution applies to any areas of special flood hazard, which are defined in the resolution as “the land in the floodplain subject to a one percent or greater chance of flooding in any given year. Areas of special flood hazard are designated by the Federal Emergency Management Agency as Zone A, AE, AH, AO, A1-30, and A-99.”

The areas of special flood hazard have been identified by FEMA in a scientific and engineering report entitled *Flood Insurance Study for Lawrence County-Unincorporated Areas*. Under this resolution, any proposed development must be reviewed and a permit must be obtained from the Floodplain Administrator before construction or development can occur within any area of special flood hazard.

## Location

All of Lawrence County lies within the drainage basin of the Ohio River, which is the largest tributary, by volume, to the Mississippi River. A map of the drainage areas for Lawrence County is provided below in **Figure 3**. The City of Ironton and all the villages in Lawrence County have the Ohio River bordering the south side of each village. The various tributary streams and creeks generally flow north to south, from the foothills of the Appalachian Plateau towards the Ohio River. Symmes Creek, Pine Creek and Indian Guyan Creek are the largest tributaries in the county and travel in a southwardly direction to the Ohio River.

### LAWRENCE COUNTY - HYDROLOGY

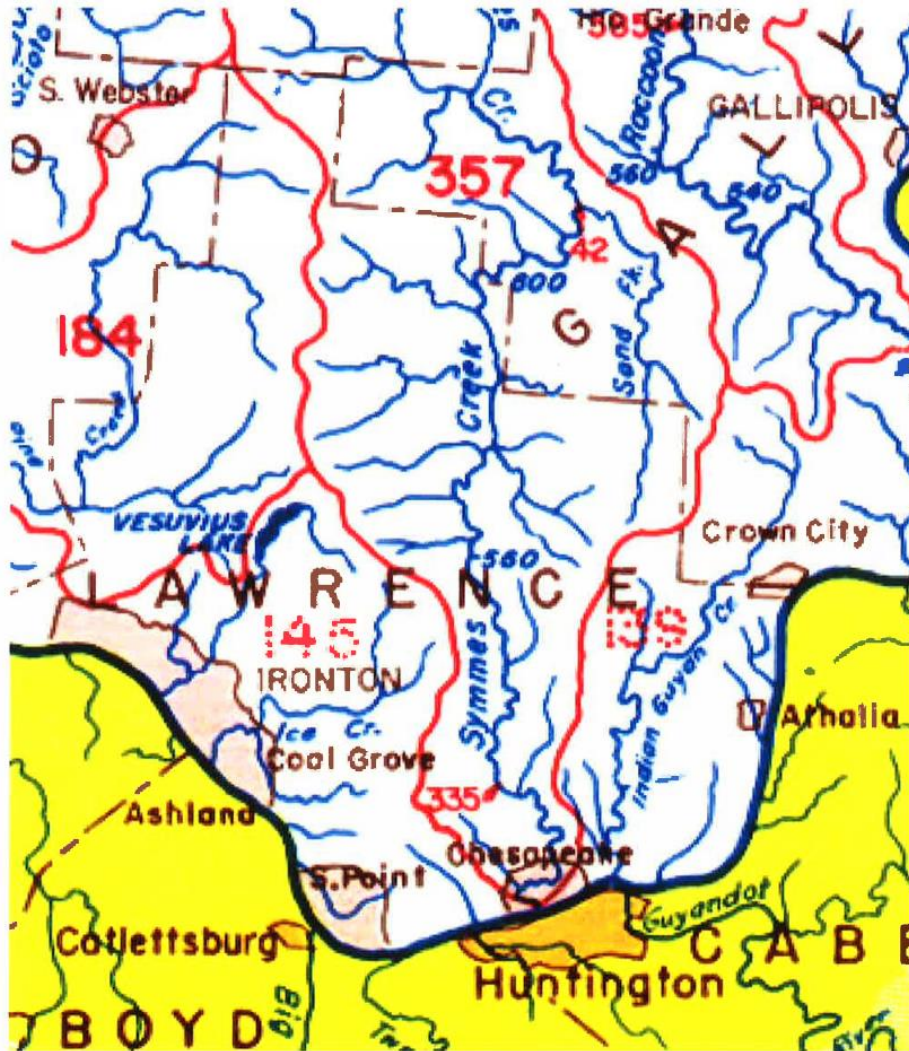


Figure 3: Lawrence County Drainage Basins

According to historical data, of the seven municipalities with Lawrence County, the City of Ironton has suffered the most severe damage from flooding due to extensive development within the floodplain, its proximity to the Ohio River and larger population.

**Table 11** shows which tributaries have the potential to lead to flooding in particular jurisdictions; there is the potential for flooding due to rivers and streams in each jurisdiction in the county.

**Table 11: Rivers and Streams in Lawrence County**

Municipality	Rivers and Streams				
	Ohio River	Pine Creek	Ice Creek	Symmes Creek	Indian Guyan Creek
Athalia	✓				
Chesapeake	✓			✓	
Coal Grove	✓		✓		
Hanging Rock	✓				
Ironton	✓		✓		
Proctorville	✓				✓
South Point	✓				

## Extent

Flooding is a site-specific hazard. Therefore, floodplains are an important planning consideration. A floodplain is any land area susceptible to inundation by floodwaters from any source. Floodplains are measured in terms of the amount of stormwater that it takes to cover a given area of land. These storm events are measured in frequency of occurrence, such as 5-year, 100-year and 500-year, with the standard measurement being the 100-year storm or floodplain. In Lawrence County flooding can happen almost anytime however this number one hazard can be exacerbated when heavy rains occur in late winter and accelerate the melting of snow.

Flooding can also be exacerbated locally by the presence of impermeable surfaces due to buildings and pavement or lack of appropriately sized flood water detention basins.

Flooding in Lawrence County can also be intensified if the flow of water is obstructed in some way such as by an undersized culvert. All of these concerns were addressed by the Mitigation Core Group.

Any development within floodplains can impact the direction, flow and level of the watercourse during periods of high water or flooding. In other words, if fill material is placed or a house constructed in a floodplain, it will alter the boundaries of the floodplain upstream and downstream of that area. This alteration happens because structures or fill utilize valuable space that would otherwise act as a natural retaining area for floodwaters to spread and slow. Not only does development in the floodplain increase dangers downstream, developments within the floodplain are at higher risk of damage due to flooding. This damage includes fill material and debris from destroyed structures

upstream colliding with structures in the floodplain downstream of an affected area. Many bridges are washed out in floods because river borne debris clogs their free-flow area.

There are a total of 5,195 structures in Lawrence County considered to be at-risk due to flooding. Of this number, approximately 3,639 of the structures are located in the unincorporated areas of the county. (This information was collected from the ODNR's Division of Water Floodplain Geographical Information Management System (GIMS) Project.) All the at-risk structures are located on the Multi-Hazard Maps in **Appendix V**. These at-risk structures are located within the 100-year floodplain and are therefore susceptible to damage during a flood.

At-risk structures in areas of flash flooding areas, which are not within the 100-year floodplain were not identified by the ODNR's GIMS project and consequently have not been mapped.

### Previous Occurrences

The National Climatic Data Center (NCDC) has comprehensive information available on flood events back to 1994, shown in **Appendix VI**. The county has suffered damage from numerous major floods and localized flash flooding. Flooding is the second most frequent disaster event: hail being the most common. The costliest disaster is flooding, with a total amount over fifty-four million dollars.

There were forty-three flooding events documented between 1994 and 2011, as shown in the **Appendix VI**.

There have been several large-scale flooding events in Lawrence County. The main flooding source in the county is the Ohio River. Major floods were recorded on the Ohio River in February 1884, March 1913, January 1937, March 1945, April 1948 and March 1997. Listed in **Table 12 – Table 14** are the top ten crests of the flood gages around Lawrence County. This information was obtained from the NOAA Ohio River Forecast Center.

**Table 12: Lloyd Greenup Lock Stage History**

Date	Greenup Gage (flood stage is 54 feet)
1/27/1937	74.7 feet = 547.7 elev.
3/31/1913	64.5 feet = 537.5 elev.
2/12/1884	64.0 feet = 537 elev.
3/04/1997	62.3 feet = 535.3 elev.
3/09/1945	61.7 feet = 534.7 elev.
12/11/1978	59.2 feet = 532.2 elev.
2/28/1979	59.19 feet = 532.19 elev.
3/13/2011	56.8 feet = 529.8 elev.
1/10/2005	56.64 feet = 529.64 elev.

Date	Greenup Gage (flood stage is 54 feet)
1/09/2005	56.4 feet = 529.4 elev.
River mile 341.5 Kentucky side (100-year flood = 540.5)	

**Table 13: Ashland Stage History**

Date	Ashland Gage (flood stage is 52 feet)
1/27/1937	74.2 feet = 555.7 elev.
3/31/1913	70.7 feet = 552.2 elev.
2/12/1884	69.4 feet = 550.9 elev.
4/17/1948	65.9 feet = 547.4 elev.
3/9/1945	64.5 feet = 546.0 elev.
1/2/1943	64.0 feet = 545.5 elev.
3/8/1955	63.83 feet = 545.33 elev.
3/23/1936	63.3 feet = 544.8 elev.
3/21/1933	62.1 feet = 543.6 elev.
2/5/1939	61.2 feet = 542.7 elev.
River mile 322.5 Kentucky side (100-year flood = 547.5)	

**Table 14: Huntington Stage History**

Date	Huntington Gage (flood stage is 50 feet)
1/27/1937	69.4 feet = 559.7 elev.
3/31/1913	66.2 feet = 556.5 elev.
2/12/1884	64.6 feet = 554.9 elev.
4/16/1948	61.6 feet = 551.9 elev.
1/1/1943	60.11 feet = 550.41 elev.
3/09/1945	59.86 feet = 550.16 elev.
3/7/1955	59.54 feet = 549.84 elev.
3/22/1936	58.82 feet = 549.12 elev.
3/18/1907	58.4 feet = 548.7 elev.
3/5/1997	57.52 feet = 547.82 elev.
River mile 311.5 Ohio side (100-year flood = 552)	

**Flood of 1913.** The booklet “Flood Views of Ironton, Ohio, March 31, 1913” (published by Emmel Howard, Chillicothe, Ohio), reported that, “Water covered over two-thirds of the City ranging from 6 to 12 feet deep. Property losses were estimated at over \$27 million at today’s dollar value. Two thousand residents were homeless, 24 houses were washed away and 68 houses were taken off their foundations.”

**Flood of 1937.** The Herald Dispatch published information about the 1937 flood in the January 25, 1987 edition, to commemorate 50 years since the flood. In the 1987 edition, it was reported that 90% of the City was under water and 10,000 residents were homeless. As a result of the flood, the Ironton floodwall was started in March 1938, at an



estimated cost of \$47,500,000 at today's dollar value. This project consisted of levees, floodwalls and pumping stations to protect the City of Ironton. **Figure 4** below shows the magnitude of the flood looking down 2<sup>nd</sup> Street.

The following information about the flood of 1937 was obtained in a U.S. Army Corps of Engineers report from June of 1973, entitled "Floodplain Information for the Ohio River, Lawrence County, Ohio." This report stated that:

About 75% of the City of Ironton was inundated to an average depth of 11 feet. The most damage was done in the Storms Creek area due to strong currents.



**Figure 4: 2nd Street in Ironton, Ohio**

Depths of 12 feet to 15 feet were recorded in the main business section.

Approximately 3,000 dwellings, 275 stores, 12 schools, one hospital and 15 industries were in the flooded area.

The report also listed newspaper reports for the Village of Proctorville indicating that the entire town was inundated above the second floor of structures. The 1937 flood took 12 days to crest and remained out of bank for over two weeks.

**Flood of March 1997.** Rainfall amounts of up to 12 inches produced by thunderstorms during March 1st and 2nd, 1997, resulted in severe flooding throughout much of southern Ohio. Eighteen counties were declared Federal and State disaster areas, including Lawrence County. Approximately 6,500 residential dwellings and more than 800 businesses were affected by flooding. Nearly 20,000 people were evacuated and 5 deaths were attributed to the flooding.

Severe flooding was generally confined to stream reaches within 50 to 70 miles of the Ohio River. The most severe flooding in Ohio was in Adams, Brown, Gallia, Meigs, Lawrence and Scioto Counties.

According to the Ohio Emergency Management Agency (OEMA), 93 roads were closed as a result of the flooding on March 2, 1997. OEMA estimated that by March 5th, 1,200 residents of southern Ohio were without natural gas, 2,032 were without electricity, and 1,785 were without telephone service.

The March 1997 flood resulted in approximately \$42 million in damage to public infrastructure (roads, bridges, water-control facilities, public buildings, public utilities, and parks and recreation facilities) in southern Ohio. **Table 15**, below, provides detailed

information for Lawrence County on infrastructure-damage estimates related to the March 1997 flood:

**Table 15: Lawrence County Infrastructure Damage**

Debris Removal	Emergency Protective Measures	Roads and bridges	Water-control facilities	Public buildings, facilities, equipment	Public utilities	Parks and recreation	Total dollars
\$43,000	\$72,000	\$2,300,000	\$5,000	\$38,000	\$0	\$0	\$2,458,000

Source: U.S. Geological Survey Water-Resources Investigations Report 97-4 149

Preliminary assessments of damage to residential structures in Lawrence County as a result of the March 1997 flood are listed below in **Table 16**:

**Table 16: Residential Damage Assessments**

Damage Assessments (In Numbers of Structures)		
Destroyed / Major	Minor	Affected
246	201	28

Source: U.S. Geological Survey Water-Resources Investigations Report 97-4 149

Lawrence County received over \$4.5 million in disaster assistance for housing and small businesses and grants for individuals and families. **Table 17**, shown below, shows a breakdown of the disaster assistance received by Lawrence County:

**Table 17: Disaster Assistance Received by Lawrence County**

FEMA Housing		Small Business		Individual and Family Grant Program				Flood Insurance Policies Purchased
# Apps.	\$ Asst.	# Apps.	\$ Asst.	# Apps. Rec.	# Apps. Denied	# Appr.	\$ Award	
607	1,300,511	124	2,465,800	616	426	190	981,767	66

Showers and thunderstorms dumped 4 to 9 inches of rain across southeast Ohio from the predawn hours of Saturday, March 1st, through the morning hours of Monday, the 3rd. The heaviest rain rates were on Saturday and Saturday night, with a lull in the rain during Sunday, the 2nd. The early Saturday downpours were concentrated across the extreme south, lifting north, into the Hocking and lower Muskingum Valleys late Saturday. The early Monday rains, contributed little to the overall damage, but kept some of the larger streams out of their banks. The full spectrum of flooding occurred.

The worst effects were over Lawrence and Jackson Counties. The least damage was over Perry and Morgan Counties. Lawrence, Gallia, Jackson, Vinton, Meigs, Washington, Athens, and Morgan Counties were all declared a federal disaster by President Clinton. Only one death occurred in southeast Ohio. An elderly man died Sunday night after driving his vehicle into high water along Route 7, near Eureka of Gallia County. No significant injuries were reported.

On the order of 2,800 residents received individual assistance from FEMA, over 1,000, of which, were from Lawrence County alone. Jackson County had nearly 600 citizens get federal assistance. Throughout southeast Ohio, around 700 homes received major damage or were destroyed, by either the small stream or the river flooding. Of the 700, around 600 were from Lawrence, Jackson, Gallia, and Meigs Counties. The majority of the homes affected were low income dwellings. Many small private bridges were damaged or destroyed. Secondary roads were undermined by flooding streams. The first flooding was from small feeder streams across Lawrence County early Saturday morning. However, it was the larger streams that eventually did more damage. Residents of Aid along Symmes Creek reported the water covering the valley from hillside to hillside. Dozens were evacuated early Sunday around Aid and Arabia. Residents ran low on supplies, as access roads remained flooded into Monday and Tuesday, the 3rd and 4th.

The Ohio River rose rapidly on the 2nd, at about a half foot per hour. Upriver of the Hocking and Little Kanawha Rivers, the crest on the Ohio River did not caused major problems. The crest at Marietta was below flood stage. The crest reached 1 to 2 feet above flood stage around Belpre, increasing in magnitude downriver. The crest was 4 to 8 feet above flood stage in the Pomeroy, Gallipolis, Proctorville, and Ironton reach of the river. The crest did not reach Ironton until the predawn hours on the 5th. Specific crests were 50.9 feet at Pomeroy, and 55 feet at the lock and dam near Gallipolis. Water was 1 to 3 feet deep on the ground floor of most businesses along Pomeroy's Main Street. The last time the water was higher at Pomeroy was late February in 1979. The village of Proctorville received heavy damage from the Ohio River. Water was about 3 to 4 feet deep in many businesses in that Lawrence County river town. Damage was less in Chesapeake. Main Street of Coal Grove was flooded.

### Probability of Future Flooding

In this plan, the term special flood hazard area is used in conjunction with floodplain to clarify that the area under consideration is identified on the Flood Insurance Rate Maps as having at least a 1-percent chance of flooding in any given year. Historically, the area with a 1-percent chance of flooding in any given year has been called the “100-year floodplain” and the area with a 0.2-percent chance of flooding in any given year has been called the “500-year floodplain.” As these terms can be misleading by suggesting that there will be a flood only every 100 or 500 years respectively they are not used in this plan.

The NCDC data indicates that there have been 43 events in the past 18 years. Therefore, the probability of future events is  $43/18 = 2.39$  or 100 percent chance annually.

### Vulnerability Assessment – Flooding

#### Overview of Vulnerability

Flood vulnerability is described in terms of what community assets, structures, and infrastructure lay in locations where flooding is anticipated.

**Table 18: Summary of Past Losses Due to Flooding**

	Estimated Property Damages
Total Losses Due to Flooding (1994–2011)	\$55,132,000
Average Annual Losses for 18 years	\$3,062,889

According to NCDC and reflected above in **Table 18**, estimated significant property damage in Lawrence County attributable to flooding during the years 1994 through 2011 is \$55,132,000. Thus the average annual loss for these 18 years is  $\$55,132,000/18 = \$3,062,889$ .

## Potential Impact of Flooding

Flooding can lead to property loss as well as to loss of life. Flooding damages structures, including homes and businesses, vehicles, and infrastructure, including roadways. People who are surrounded by flood waters can require evacuation placing their lives as well as the lives of rescuers in danger. Flooding can disrupt the operation of businesses and schools and recovery from flood damages can be time consuming and costly.

## Identifying Structures

### *Plan Update Notes*

The initial version of this mitigation plan revealed that 2,615 structures in the county were located in Special Flood Hazard Areas. Current data compiled using the recently updated county GIS database shows that 5,195 structures are located in Special Flood Hazard Areas and have at least a 1-percent chance of flooding in any given year. The current best available data for this analysis was unable to determine the structure type or average values.

### *Exposure of Existing Buildings to Damages Due to Flooding*

The total number of at-risk structures for each jurisdiction in the 100-year floodplain and the estimated property values are shown below in **Table 19**. At-risk values were estimated based off the value shown in **Table 8** by averaging all structures within that jurisdiction. For each jurisdiction, the percentage of residential and commercial structures was calculated from the values in **Table 8**. Then using the total at-risk structures from the Multi-hazard map in **Appendix V**, residential and commercial at-risk structures were estimated for each jurisdiction.

**Table 19: Jurisdiction Inventory of At-Risk Structures**

Jurisdiction	Residential At-Risk Structures	Median Value of Housing Units	Commercial At-Risk Structures	Median Value of Commercial Structures	Potential Residential Dollars Lost	Potential Commercial Dollars Lost
Athalia	139	\$47,850	12	\$39,688	\$6,651,114	\$476,256
Chesapeake	318	\$55,725	93	\$76,955	\$17,720,626	\$7,156,848
Coal Grove	216	\$49,155	23	\$246,771	\$7,225,785*	\$5,675,728
Hanging Rock	51	\$60,441	9	\$154,787	\$3,082,482	\$1,393,084
Ironton	55	\$55,661	9	\$188,386	\$3,061,362	\$1,695,475
Proctorville	235	\$47,044	83	\$104,413	\$11,055,364	\$8,666,282
South Point	283	\$79,380	30	\$242,228	\$22,464,427	\$7,266,843
Unincorporated	2833	\$63,915	806	\$112,393	\$181,070,640	\$90,589,134
<b>Total</b>	<b>4,130</b>		<b>1,065</b>		<b>\$252,331,800</b>	<b>\$122,919,652</b>

\*Note: Information for Coal Grove was obtained from tax cards for the properties pulled by the village clerk, allowing for more detailed and accurate cost estimates.

The total potential dollars lost for both residential and commercial structures was just over \$375,250,000.

A number of critical facilities are also located in flood-prone areas. These include fire stations, police stations, schools, and office buildings. Other facilities including motels, churches, and retirement facilities that may also require special attention during times of flooding for evacuation purposes are also located in flood-prone areas. **Appendix VII** lists critical facilities and **Appendix V** provides a map of critical facilities within the floodplain. Based off the Multi-hazard map in **Appendix V** there are an estimated 110 critical facilities within the floodplain in the county. The estimated damage to these structures is \$238,216,770 for a 100-year flood. The estimated value uses the average value for critical structures in Lawrence County in **Table 8** multiplied by the number of critical facilities in the floodplain in the county.

An additional assessment of at-risk structures was performed for Lawrence County using a HAZUS flood simulation. HAZUS is a multi-hazard loss estimation model developed by the Federal Emergency Management Agency (FEMA) and the National Institute of Building Sciences (NIBS). The HAZUS flood event report for Lawrence County identified 1,281 critical facilities within flood-prone areas. The estimated exposure for critical facilities in this scenario is approximately \$154 million for a 100-year flood. The estimated exposure for residential and non-residential facilities is approximately \$2,093 million and \$515 million, respectively. The total number of buildings exposed is 17,331 and 4,245, respectively. The results of the HAZUS flood simulation are included in **Appendix VII**.

### ***Repetitive Loss Properties***

Some structures in Lawrence County have been flooded repeatedly and have received more than one payment through the National Flood Insurance Program (NFIP) for flood damages. A repetitive loss structure is defined as an NFIP-insured structure that has had at least two paid NFIP claims of more than \$1,000 each in any 10-year period since 1978. There are three structures in Lawrence County that have been classified as repetitive loss structures and six total losses. In **Table 20**, the repetitive loss properties are separated by jurisdictions with the total value of losses.

**Table 20: Repetitive Loss Structures**

Community	Structure Type	Properties	Losses	Building Payments	Contents Payments	Total Payments
Chesapeake	Residential:	0	0	\$ -	\$ -	\$ -
	Non-Residential:	1	2	\$52,645.42	\$7,566.04	\$60,211.46
Proctorville	Residential:	1	2	\$36,615.82	\$27,894.61	\$64,510.43
	Non-Residential:	0	0	\$ -	\$ -	\$ -
South Point	Residential:	1	2	\$85,725.49	\$3,650.92	\$89,376.41
	Non-Residential:	0	0	\$ -	\$ -	\$ -
Unincorporated <sup>1</sup>		39	107	\$1,141,170.49	\$214,531.13	\$1,355,701.62

Note 1: BureauNet Report (2/28/15)

There are no recorded severe repetitive loss structures in the county.

***Exposure of Future Buildings to Damages Due to Flooding***

Current zoning and development regulations allow future development to occur within the Special Flood Hazard Area; this suggests that there is potential for additional loss due to flooding in the future. Special Flood Hazard Area development regulations relate to the base flood elevation, which is the estimated level of flooding that has a 1-percent chance of being equaled or exceeded in any given year. Because Special Flood Hazard Area or floodplain development regulations specify that residential structures must be elevated to or above the base flood elevation and commercial structures must either be elevated or flood-proofed to or above this level, the degree to which future structures are exposed to flood damages should be minimal.

However, calculations of base flood elevations are based on models that rely upon data about previous flood events; should future floods be greater than those experienced in the past, the base flood elevation may not provide sufficient protection. Therefore, mitigation strategy of this plan includes that communities adopt more stringent Special Flood Hazard Area or floodplain development regulations causing future structures to be built with freeboard, i.e. above the current base flood elevation.

**Current Development Trends**

Any development within floodplains can impact the direction, flow and level of the watercourse during periods of high water or flooding. If fill material is placed or a house constructed in a floodplain, the boundaries of the floodplain downstream will be altered. This results because structures or fill utilize valuable space that would otherwise act as a natural retaining area for floodwaters to spread and slow. As dangers in the floodplain increase downstream, developments within the floodplain are at higher risk of damage due to flooding. This damage includes upstream fill material and debris from destroyed structures colliding with edifices in the floodplain downstream. Many bridges are washed out during floods because river borne debris clog their free-flow area.

Because of the potential for loss of life, damage to public and private property, and financial considerations such as loans and insurance, five villages and the City of Ironton have floodplain development ordinances. The Villages of Athalia, Chesapeake, Coal Grove, Proctorville, and South Point all have a floodplain development ordinance in place.

Lawrence County is primarily rural in nature. The current development within Lawrence County has been primarily concentrated in the southeastern part of the county. This development is predominantly residential and is centered in Union and Rome Townships. The Villages of Proctorville and Chesapeake are located within Union Township and the Village of Athalia is located within Rome Township. These three villages have floodplain ordinances that should serve as a guide in keeping new development from being constructed in high hazard areas with respect to flooding.

### **Flood Damage Prevention Resolution**

In 1995, the Flood Damage Prevention Resolution was adopted by the unincorporated areas of Lawrence County. This resolution applies to any areas of special flood hazard, which are defined in the resolution as “the land in the floodplain subject to a one percent or greater chance of flooding in any given year. Areas of special flood hazard are designated by the Federal Emergency Management Agency as Zone A, AE, AH, AO, A1-30, and A-99.” The areas of special flood hazard have been identified by FEMA in a scientific and engineering report entitled “Flood Insurance Study for Lawrence County-Unincorporated Areas.”

Under this resolution, any proposed development must be reviewed and a permit must be obtained from the Floodplain Administrator before construction or development can occur within any area of special flood hazard.

### **Estimating Potential Loss**

#### ***Plan Update Notes***

The 2003 plan had a method for estimating potential losses due to flooding using historical data from the NCDC. The method utilized in this update is based upon the same historical data updated through 2011, provided by NCDC.

#### ***Methodology***

Damages due to one flooding event in the county have varied from no cost for damages to \$25.5 million.

According to NCDC, estimated property damage in Lawrence County attributable to flooding or flash floods over the period 1994 through 2012 is \$55,132,000. Past losses provided in NCDC are used to estimate the potential for annual losses due to flooding.



### ***Estimated Potential Dollar Losses***

Since the total loss over these 18 years is \$54,132,000, the average annual loss is  $\$54,132,000/17 = \$3,007,333$ .

## Winter Storms Risk Assessment

For this plan, features of winter storms that may cause damage are treated separately; heavy snow or ice is discussed as one hazard because damage from either of these hazards is due to their weight on power lines and roofs. Damage caused by high winds, another potentially damaging feature of winter weather, is described in the section about severe storms.

### ***Hazard Profile – Winter Storms***

#### **Location**

Lawrence County is located in the south portion of the state and is susceptible to winter storms, which encompass snow and ice. Lawrence County, like most communities in Ohio, is susceptible to severe winter storms. The winter of 2003, Lawrence County as well as 20 other counties located in Southern Ohio experienced nature's wrath in the form of a severe ice storm. Winter storms are a countywide hazard and can affect any of its areas and jurisdictions.

#### **Extent**

Because the area receives a moderate amount of snowfall and can be stricken by ice storms, all of the structures erected in the county are susceptible to damage if not designed to the proper snow loading parameters.

Anecdotal evidence indicates that ice storms in Lawrence County can cause as much damage as traditional winter storms due to the ice built up on trees and utility wires. As recently as 2003, freezing rain resulted in the accumulation of 1 to 2 inches of ice on power lines and tree limbs. Roads were blocked for several days.

Since 1993, there have been 1,595 recorded injuries and 6 recorded deaths due to winter storms. Because the number of winter events affecting Lawrence County is relatively small but the intensity tends to be high, the potential for death and injury is moderate. One of the biggest problems associated with winter storms is the lack of public education and awareness. Citizens are not aware of the warnings and dangers associated with severe weather, such as driving on ice and snow and medical conditions relative to frost bite and hypothermia.

#### **Previous Occurrences**

According to the NCDC, there have been 42 winter storm events in Lawrence County reported since 1996, with total property losses of \$66.75 million and crop losses of \$5.5 million. Since 1993 the average annual losses reported for the county have been approximately \$3.5 million. The years 1994 and 2003 proved to be the most costly with losses totaling \$56.25 million in property damage and \$5.0 million in crop damage from ice storms alone.

However, with the exception of the ice storms in February 1994, Lawrence County has not suffered any crop damage since the record began. Due to the intensity of the ice storms that hit the area, the susceptibility to property damage due to winter weather is moderate.

Lawrence County has had experienced several winter storms causing significant damage. Some of the most memorable and costly are described below.

**Ice Storm 2003.** The ice storm that hit Lawrence County during the winter of 2003 caused significant damages. One Lawrence County trustee described the area as resembling a war zone. Ice accumulated on utility lines, trees, and roadways and caused major infrastructure damage. The Ironton area reported power outages for 5,959 of its residents. The Chesapeake area reported power outages for 1,015 of its residents. Businesses were also without power and lost inventory and suffered economic losses from lack of customers. Restoration of services was very slow due to the widespread nature of the emergency and due to road inaccessibility. It was estimated that 80-90% of the roadways had been impacted by the storm by fallen trees and utility lines immediately following the storm.

After the ice storm of 2003, many residents of Lawrence County received aid through the Individuals and Households Program (IHP). The IHP is a combined FEMA and State program. When a major disaster occurs, this program provides money and services to people in the declared area whose property has been damaged or destroyed and whose losses are not covered by insurance.

**Table 21**, below, shows the FEMA Individual Assistance Update for the winter ice/snow storms of Feb. 14 – March 18, 2003:

**Table 21: FEMA Individual Assistance for Winter Storm of 2003**

Individuals and Households Program (IHP)			SBA: Home/Personal Property Loans		SBA: Business Loans	
Registrations	Approved	Amount	Approved	Amount	Approved	Amount
449	216	\$276,729.62	11	\$106,300	1	\$4,100

For more details regarding the winter 2003 storm event, please see **Appendix VI**.

February 11, 1994 - Ice Storm - \$5.5 Million. Heavy freezing rain, for the second time within a week, accumulated one-half to one and one-half inches. One to two inches of snow fell in many areas before the change to freezing rain. Power lines and trees were downed, and some areas were without electricity for several days. A number of roads were closed due to the icy conditions and many other roads became virtually impassable. A number of falls and accidents occurred and numerous traffic accidents were reported. The thick glaze continued to severely hamper travel into the 12th.

February 11, 1995 - Extreme Cold - \$100 Thousand. Arctic air spread across all of Ohio on the 11th, producing low temperatures between zero and 10 below on the morning of the 12th and close to zero on the 13th. In Columbus (Franklin 055) a 19-month-old child was found dead of exposure in her parents' backyard apparently after slipping outdoors unnoticed. A couple apparently got lost in their car near Newark (Licking 056). The husband, age 82, set out on foot to find help and was found frozen to death. His wife, age 79, froze to death in the car. In Ironton (Scioto 088) an 18-year-old woman was found dead of exposure after her car went over an embankment and was not found until sometime later. A number of water line breaks occurred.

February 3, 1998 - Winter Storm - \$250 Thousand. A slow moving coastal storm and a prolong period of easterly wind aloft, resulted in several periods of snow, sleet, and freezing rain. The deepest snow cover over southeast Ohio was in Lawrence, Gallia, Jackson and Vinton Counties. On the 6th, Ironton had 9 inches on the ground, South Point and Waterloo had 7 inches, Patriot of Gallia County had 8 inches, the City of Jackson had 5 inches, while McArthur had 4 to 5 inches. No old snow was on the ground prior to the storm. A roof to a South Point home caved in, due to the weight of the snow. More sleet than snow fell further to the northeast, resulting in 1 to 3 inches of snow and ice over Meigs and Athens Counties.

## **Probability of Future Winter Storms**

Anecdotal evidence indicates that winter storms typically occur every year in Lawrence County. The NCDC data supports this showing that there were three damaging ice storms and three damaging snow storms for a total of 6 damaging winter storms over the 19 years between 1993 and 2011. There were other snow storms or ice storms during this period for which no damages were reported. Thus, the average number of damaging winter storms in Lawrence County is  $6 / 19 = 0.32$  storms per year. So the probability of the occurrence of a winter storms in Lawrence County in any given year is 32 percent.

## ***Vulnerability Assessment – Winter Storms***

### **Overview of Vulnerability**

The most vulnerable structures are those that were poorly built or are dilapidated. The weight of winter storms may lead to structural collapse or to minor damage. Some shed roofs that protect township and borough road maintenance or firefighting equipment have large span roofs that may collapse under the weight of winter storms.

### **Potential Impact of Winter Storms**

Vulnerability to the effects of winter storms on buildings is considered to be somewhat dependent on the age of a building because as building codes become more stringent, buildings are capable of supporting heavier loads and as building age, various factors may deteriorate their structural integrity. Vulnerability also depends upon the type of construction and the degree to which a structure has been maintained.

In Lawrence County, accumulations of snow and/or ice during winter months are expected and normal. The most common detrimental effects of snow and/or ice are not collapsed structures but traffic accidents and interruptions in power supply and communications services.

Because winter storms affect the entire county, all structures within the county are at some risk. The total number and value of structures can be found in **Table 8**.

The leading cause of death during winter storms is transportation accidents. Preparing your vehicle for the winter season, and knowing how to react if stranded or lost on the road are vital to safe winter driving. Another major problem is the lack of concern; citizens have for frigidly cold temperatures during the Ohio winters, when the wind chill can dramatically affect the temperature outside, causing frostbite in a matter of minutes.

## **Identifying Structures**

### ***Plan Update Notes***

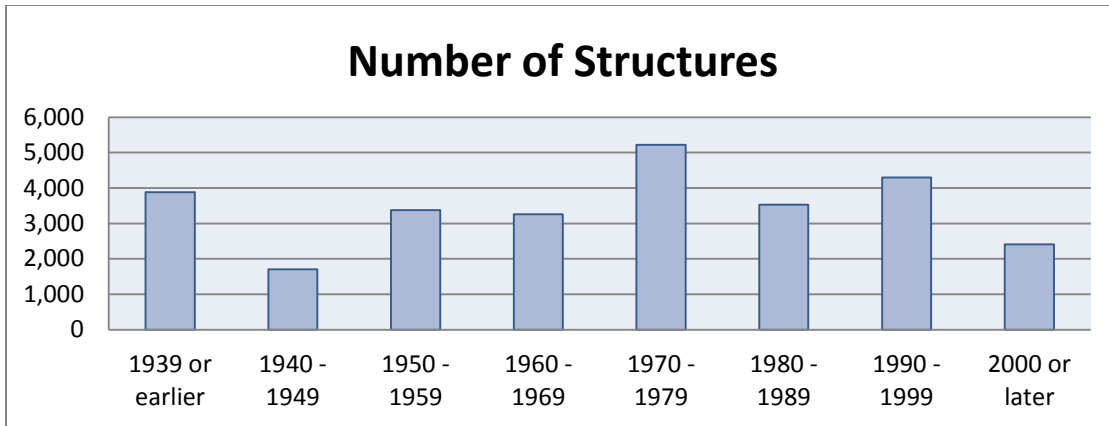
For this mitigation plan, structures identified as potentially vulnerable to damage from winter storms are structures older than 50 years that may have deteriorated over time. Data on the age of structures was not available when the previous version of this plan was prepared, so an analysis of vulnerability was not completed.

### ***Exposure of Existing Buildings to Winter Storms***

Because the area receives a moderate amount of snowfall and can be stricken by ice storms, all of the structures erected in the county are susceptible to damage. If not designed to the proper snow loading parameters, extreme conditions could result in a roof collapse.

Structures identified as potentially vulnerable to damage from heavy snow and ice are structures older than 50 years that may have deteriorated over time. Data is only available for housing units. Therefore, only housing unit structures will be evaluated.

It is not necessarily the case that older structures are at greater risk of damage due to heavy snow or ice. There are 14.0 percent of structures standing in Lawrence County that were built before 1939 and a third of the structures in the county are more than 50 years old, and these have withstood many heavy snow and ice storms. Nevertheless, for this review, because the National Trust for Historic Preservation identifies structures greater than 50 years old as being eligible for designation as historic, the assumption is made that structures built before 1960 are at some risk of at least minor damage due to heavy snow and/or ice. There are 8,963 structures in the county that were built before 1960, thus the percent of structures considered to be particularly vulnerable to damage due to heavy snow or ice is 32.4 percent. **Figure 5** shows the number of structures built in Lawrence County and illustrates the fact that a large number of structures in the county are more than 50 years old.



**Figure 5: Numbers of Structures Built**

### ***Exposure of Future Buildings to Winter Storms***

All structures and infrastructure in Lawrence County will be exposed to heavy snow and ice. Yet, because all of Lawrence County has adopted and enforced the 2009 International Building Code (IBC) and IRC, building yet to be constructed will be able to withstand the weight of winter storms.

Due to the non-site specific nature of this hazard, current development trends have no effect. Lawrence County is primarily rural in nature. Current development within Lawrence County has been primarily concentrated in the southeastern part of the county. This development is predominantly residential and is centered in Union and Rome Townships. Developers in these areas should give greater consideration to the importance of road design to maximize accessibility during a winter storm event. In these townships especially, more effort should be placed on maintenance of trees in utility areas to reduce the number of power outages due to fallen trees and/or branches due to the accumulation of ice and/or snow.

### **Estimating Potential Loss**

#### ***Plan Update Notes***

The previous plan did not estimate potential loss from winter storms. For this plan, potential loss is estimated using NCDC data.

#### ***Methodology***

Because winter storms are random in nature, the Core Group has chosen to look at historic events to determine Lawrence County's susceptibility. According to the National Climatic Data Center (NCDC), there have been 13 ice or snow events in Lawrence County since 1993, totaling over \$60 million in damages. (Please see **Appendix VI** for more detailed information on each storm event.) In 2000 and 2002, there were two winter storm events. The Ice Storm of 2003 caused significant damages in infrastructure

as well as widespread power outages. The county received \$387,129 in assistance from FEMA after the event. Estimated property damage in Lawrence County attributable to major heavy snow and/or ice storms over the period 1993 through 2012 is \$66,753,000. Past losses provided in NCDC are used to estimate the potential for annual losses due to winter storms.

### ***Estimated Potential Dollar Losses***

Since the total loss over these 19 years is \$66,753,000, the average annual loss is  $\$66,753,000 / 19 = \$3,513,000$ .

### ***Maximum Potential Dollars Lost***

To predict the structural cost associated to a worst case scenario snow storm, it will be assumed that all structures older than 50 years will be damaged significantly. This analysis is based on the perception that building codes have become more stringent and that new buildings can withstand the 30 pounds per square foot snow loads expected for Ohio. To estimate the non-residential values, the same percentage of structures will be assumed to be built over 50 years ago, which is 32.4 percent. According to **Table 8**, the total value of residential and commercial structures is \$1.33 billion and \$590 million, respectively. This estimates the maximum damage that is expected for a worst case scenario winter storm to be \$432 million and \$191 million, respectively. This estimate does not represent the total cost associated with the winter storm, which will also include damaged utilities and emergency services.

## Tornadoes Risk Assessment

This plan uses the Enhanced Fujita Scale, which has been used since 2007, to describe the extent of tornadoes. No new data was available through NCDC since no new occurrences were observed. The existing NCDC data was used in the estimated potential loss section, which was not available in the old plan.

### Hazard Profile – Tornadoes

#### Location

Tornadoes can pose a threat to life and property in any part of Lawrence County by destroying most of everything in the path of one. Tornado forces have destructive impacts to trees, power lines and other utilities, which ultimately impacts residents. Downed trees also block roadways throughout the county and have to be cleared quickly to ensure emergency response vehicles continued to have access. All citizens should become familiar with locations of shelters in which they can seek safety in the event of severe weather that have the potential for developing tornadoes.

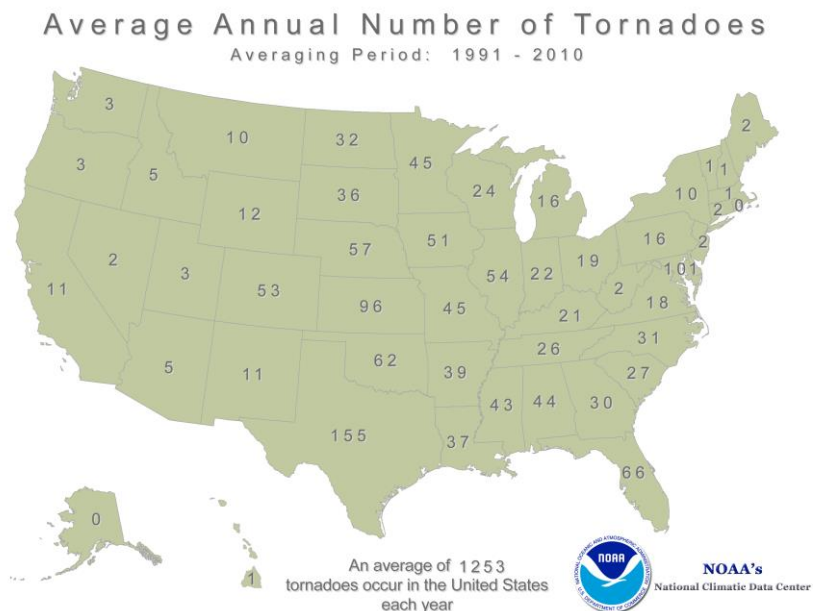
Since tornadoes typically present localized hazards, several homes may need repair, but typically homeowners will have insurance to cover these expenses and will not suffer any long term financial hardship. The populations located in mobile home parks and campgrounds should take particular care to seek adequate permanent shelter with approaching severe weather.

#### Extent

Tornadoes are considered the most violent atmospheric

phenomenon on the face of the earth, having winds estimated at 300 mph in large tornadoes.

Although the number of tornadoes in Ohio does not rank high compared to other states in the United States, the State does average around 19 tornadoes a year as shown in **Figure 6**. Ohio's peak tornado season runs from April through July, with most tornadoes occurring between 2-10 p.m. Even though June has been the month with the most tornado occurrences, many of the State's major tornado outbreaks have taken place in April and May. However, history has shown that tornadoes can occur during any month



**Figure 6: Average Annual Number of Tornadoes**



of the year and at any time of the day or night. Many of these tornadoes are weak (F0 or F1 on the Fujita Scale), but Ohio has been struck by some of the most destructive (F5) tornadoes ever, including the April 3, 1974 tornado which devastated Xenia, killing over 30 people and destroying 2,000 buildings.

Tornadoes can occur anywhere in the State of Ohio. All of Lawrence County is exposed to the hazards associated with tornadoes. Tornadoes can theoretically occur any time of the year, however the greatest chances of an occurrence is in the spring and summer months.

Since 2007 an Enhanced Fujita Scale (EF Scale) has been used in the United States to describe the magnitude of tornadoes. Prior to 2007, the Fujita Scale was commonly used to describe magnitude. This scale is based on new information about the relationship between wind speed given in miles per hour (mph) and corresponding damages. The EF Scale categorized tornadoes from EF0 to EF5 with EF0 being the most commonly occurring type of tornado. The most damaging and deadliest tornado recorded in Union Township was a category 3 or EF3 tornado. **Table 22** shows the relationship between the Fujita and the Enhanced Fujita Scales.

**Table 22: Enhanced Fujita Scale**

Fujita Scale		Enhanced Fujita Scale	
F Number	3-Second Gust (mph)	EF Number	3-Second Gust (mph)
0	45–78	0	65–85
1	79–117	1	86–110
2	118–161	2	111–135
3	162–209	3	136–165
4	210–261	4	166–200
5	262–317	5	Over 200

**Table 23**, below, provides a description of the types of damages that can be expected with each category of tornado.

**Table 23: Expected Tornado Damages**

F or EF Scale	Examples of Possible Damage
0	Light damage. Some damage to chimneys; broken tree branches; shallow-rooted trees pushed over; damage to sign boards.
1	Moderate damage. Surface peeled off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off roads.
2	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light-object missiles generated.
3	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; cars lifted off ground and thrown.
4	Devastating damage. Well-constructed houses leveled; structures with weak

F or EF Scale	Examples of Possible Damage
5	foundations blown off some distance; cars thrown and large missiles generated. Incredible damage. Strong frame houses lifted off foundations and carried considerable distance to disintegrate; automobile-sized missiles fly through the air in excess of 100 yards; trees debarked.

## Previous Occurrences

Lawrence County is moderately susceptible to tornadoes. According to the NCDC, there have been 5 tornado and 2 funnel cloud events in Lawrence County reported since 1950, with total property losses of \$2.75 million.

**F-5 Tornado of April 1968.** The tornado passed through the top of panhandle of Lawrence County on April 23, 1968. A tornado moving in an east-northeast direction at a speed of 45 mph crossed the Ohio River from Kentucky and first hit a train leaving several cars overturned. This storm then crossed US Route 52 into the northwestern portion of Wheelersburg, Ohio. In the Wheelersburg area, seven people were killed and 75 were injured while approximately 550 homes were destroyed or sustained damage. Golf ball and baseball size hail and heavy rain were reported in this area. The majority of injuries and property damage occurred in a residential area on Dogwood Ridge Road (about 4 miles east-northeast of Wheelersburg). After leaving this community, the storm tracked through Olive Furnace and the panhandle of Lawrence County and into Gallia County. Damage was reported in Lyra. About 2.2 miles north of the junction of State Routes 141 and 233, the width of the funnels was nearly 0.4 miles wide. In this area, a home was completely demolished while another home lost its roof. Baseball size hail was reported about 6 miles south of Rio Grande on Route 325. At this point, trees to the north along the storm's path lay generally toward the west while those to the south were laying mostly to the east. Those in the middle were twisted in all directions. In the Gallipolis area, damage was heaviest along Chillicothe and McCormick Roads where 6 house-trailers, 8 homes, and 4 farm buildings were demolished. Damage in the Lawrence County panhandle was estimated at \$300.

**F-1 Tornado of June 1980.** On June 2, a tornado went by Blackfork, Ohio, south of Irish Hollow. No information was received from Ohio or West Virginia to be published in "Storm Data," Volume 22, Number 6. There was \$2.5 million sustained in property damage from this event.

**F-1 Tornado of July 1980.** On July 12, a mini tornado touched down just northeast of Ironton in a rural area between Ice Creek and Richey Hollow. Some farm buildings were destroyed. Damage was estimated at \$25,000.

**F-0 Tornado of June 1981.** On July 21, a mini tornado touched down northeast of Ironton and north of Kelley Cemetery in a rural area, damaging farm buildings and two houses. Damage was estimated at \$25,000.

**F-1 Tornado of August 2000.** On August 9, a tornado passed through the area of Athalia, Ohio. The path began on County Route 12, where a trailer was destroyed. The path proceeded across County Route 42 to near State Route 7. All along the path, trees were snapped off and homes received structural damage. A pole barn was destroyed on County Route 402. Wooden pieces of the barn, from 1 to 5 feet in length, became projectiles. The wood was scattered about the area, with some pieces wedged into the ground. Two homes received minor damage. Farm equipment and one truck were also damaged. The storm then crossed the Ohio River and struck the Cox Landing region of Cabell County, West Virginia. Damage was estimated at \$200,000.

## **Probability of Future Tornadoes**

The NCDC data lists 5 damaging tornadoes for Lawrence County for the entire 1950–2012 period. Thus the calculated probability of a damaging tornado in the county in any given year is  $5/62 = .081$ , or 8.1 percent.

Based off the image below from the NOAA Storm Prediction Center, Lawrence County falls on the line between having less than one tornado per 1,000 square miles and having one to three tornadoes per 10,000 square miles as shown in **Figure 7**. At an area of 455.4 square miles, Lawrence County would be at 4.5 percent chance of having a tornado every year if we assumed one tornado per 1,000 square miles based off the NOAA Storm Prediction Center.

For the purposes of this plan, the percent from the average occurrences will be used, 8.2 percent. This number is more conservative and based off of more current data.

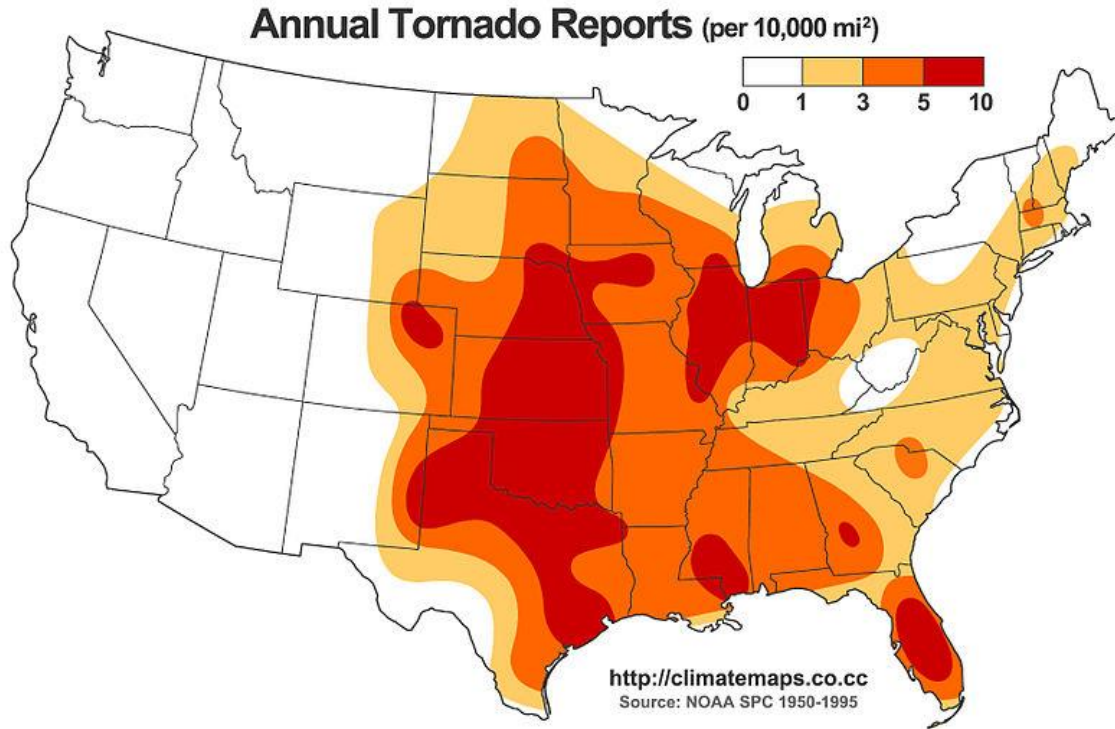


Figure 7: Annual Tornado Reports

## ***Vulnerability Assessment – Tornadoes***

### **Overview of Vulnerability**

For tornadoes, aged and dilapidated structures or structures not built to applicable building codes are more susceptible to damage. Mobile homes and campgrounds are especially susceptible to damage due to tornadoes. Strong winds can rip roofs off of any dilapidated structures and overturn mobile homes. Past experience with tornadoes in Lawrence County and adjacent counties shows that death and injury are indeed a possibility.

Based on the knowledge that tornadoes are a random event, the Core Group has decided to look at tornadoes as a hazard of chance. The best way to deal with a random hazard event is to look at historic information and try to be as prepared as possible. There have been five tornado events and two funnel clouds reported in Lawrence County since 1968. The Core Group realized that tornadoes are usually accompanied by other hazards when they affect their community. In fact, when tornadoes hit a community they are typically coupled by other natural events such as high winds, thunderstorms, lighting and possibly flash floods.

## Potential Impact of Tornadoes

Vulnerability to the effects of tornadoes is somewhat dependent upon the age of a structure because as building codes become more stringent, buildings are capable of enduring greater wind forces. However, all parts of the county have the same probability of tornado touching down in the area.

In a worst case scenario summer storm, Lawrence County could be hit with an EF-5 tornado that would travel through the two largest municipalities in the county. To predict the structural cost associated with a worst case scenario for a tornado; an analysis will be run with an EF-5 tornado traveling on a straight path through the most densely populated and developed areas within the county. This analysis assumes that the tornado were to completely encompass both Ironton and South Point. If the tornado went through the heart of any of the villages within the county, then that village would be expected to be completely destroyed. This is due to all villages being relatively small compared to a footprint of an EF-5 tornado. Even with the current building codes, most buildings cannot handle the force an EF-5 is capable of. To perform this analysis the county auditor's information of the property values for each village were used.

In **Table 24**, an assessment shows the total value loss that is expected per type of structure. It also shows the value of damage that is expected for this worst case scenario. Even though a tornado path covering these two municipalities is unlikely, if one of the villages were hit while an EF-5 passed through the entire county, then the expected damages could be very similar to this estimate. Apart from the devastation within the path of the tornado, large regions of the county can also be expected to be without power.

**Table 24: Damage Assessment for an EF-5 Tornado through Lawrence County**

Damage Assessment by Land Use and Appraised Value			
<u>Ironton</u>	Count	Average Value	Total
Residential	4131	\$55,635	\$229,828,863
Non-Residential	705	\$188,386	\$132,812,243
Critical	18	\$2,365,594	\$42,580,690
<u>South Point</u>			
Residential	1381	\$78,386	\$108,250,762
Non-Residential	142	\$242,228	\$34,396,390
Critical	6	\$1,619,433	\$9,716,600
Total	6383		\$557,583,548

## **Identifying Structures**

### ***Plan Update Note***

The methodology for identifying structures potentially at risk of damage due to tornadoes is the same as the methodology used for identify structures potentially at risk of damage due to winter storms and severe storms. However, there may be less deviation between the amounts of damage from one age group to the other because of the destructive power a tornado can impose on a structure.

### ***Exposure of Existing Buildings to Tornadoes***

All structures and infrastructure might be exposed to the effects of a tornado. Depending upon the severity of a tornado, any existing structures can be damaged to some extent. However, in Lawrence County, there are 8,963 structures that were built before 1960. Thus the percentage of existing buildings considered at slightly higher risk of damage due to tornadoes is 32.4 percent.

### ***Exposure of Future Buildings to Tornadoes***

Any future structures might be exposed to tornadoes as this hazard does not occur in specific locations. However, future buildings will be somewhat better protected from the effects of tornadoes as they will meet the most current state building code requirements for bracing and roof design.

## **Estimating Potential Loss**

### ***Plan Update Notes***

In the previous plan, data was not used to estimate potential loss due to tornadoes. In this update, NCDC data is used to estimate potential loss.

### ***Methodology***

According to the NCDC, the estimated property damage in Lawrence County attributable to tornadoes accounts for \$2,750,030 in damage. This amount is attributed to five occurrences and was observed from 1950 to 2011.

### ***Estimated Potential Dollar Losses***

The total costs due to tornadoes over 61 years is \$2,750,030 therefore the average annual losses due to tornadoes is  $\$2,750,030/61 = \$45,082$ .

# Earthquake Risk Assessment

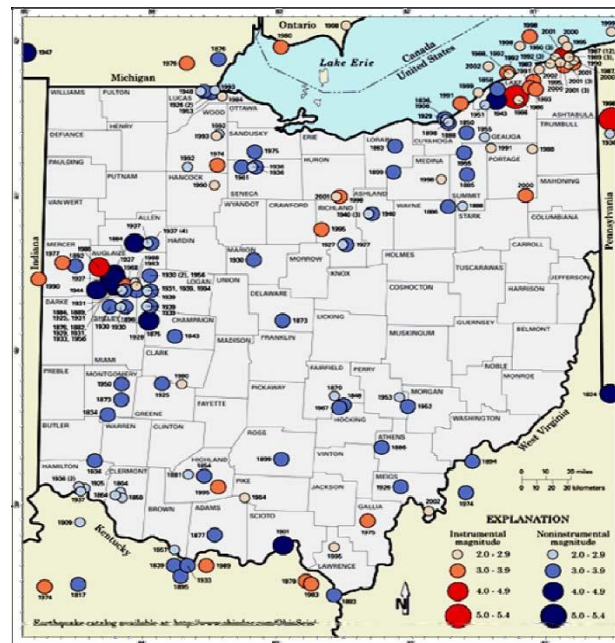
## Hazard Profile – Earthquake

### Location

As seen in the hazard profile and as determined by the Core Group, Lawrence County has a very low risk of incurring damage from earthquakes. Southeastern Ohio has been the site of at least 10 felt earthquakes with epicenters in the State since 1776 as shown below in **Figure 8**. The 1776 event, recorded by a Moravian missionary, has a very uncertain location. Earthquakes near Portsmouth (Scioto County) in 1901, near Pomeroy (Meigs County) in 1926, and near Crooksville (Perry County) in 1952 caused minor to moderate damage. There have been two earthquakes recorded in Lawrence County. The first one occurred in 1883, and was between a 3.0 and 3.5 in magnitude. No further information is available about this event. The second earthquake, which occurred on May 14, 1995, was found to be an earthquake of 2.5-magnitude.

It would be surprising to many Ohioans that the State has experienced more than 120 earthquakes since 1776, and that 14 of these events have caused minor to moderate damage. The largest historic earthquake in Ohio was centered in Shelby County in 1937. This event, estimated to have had a magnitude of 5.5 on the Richter scale, caused considerable damage in Anna and several other western Ohio communities, where at least 40 earthquakes have been felt since 1875. Northeastern Ohio, east of Cleveland, is the second most active area of the state. At least 20 earthquakes are recorded in the area since 1836, including a 5.0 magnitude event in 1986 that caused moderate damage. A broad area of southern Ohio has experienced more than 30 earthquakes. Earthquakes are a countywide hazard and can affect any of its areas and jurisdictions.

**Figure 8: Epicenters of past earthquakes in Ohio**



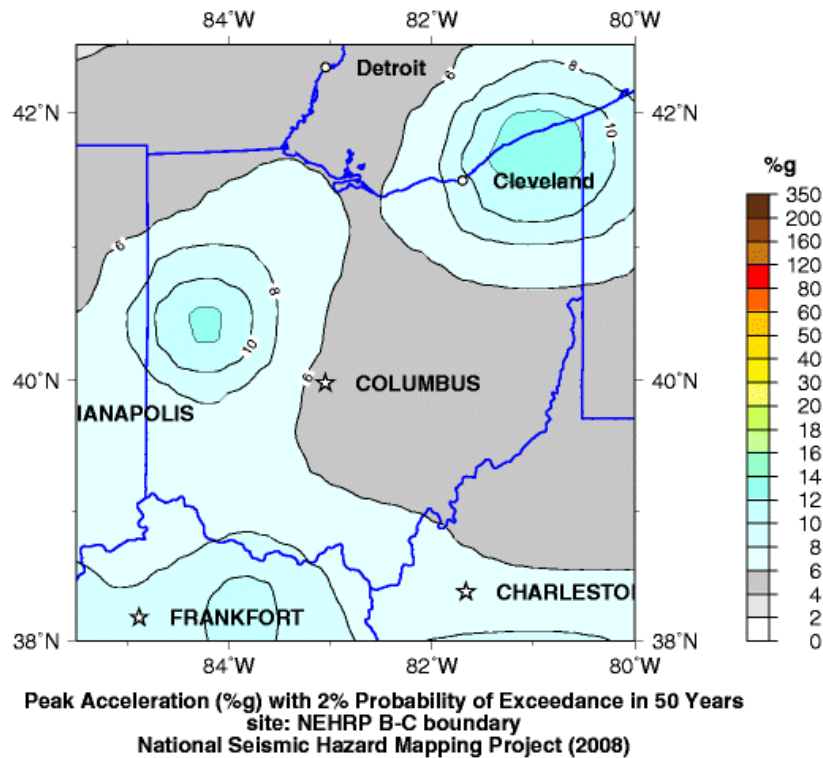
**Epicenters of past earthquakes in Ohio.**

### Extent

Although Ohio is not thought of as an earthquake-prone state, at least 160 earthquakes with epicenters in Ohio have been felt since 1776. Most have been felt only locally and have caused no damage or injuries. The largest historic earthquake in the state occurred in 1937. This event had an estimated Magnitude 5.4 and caused considerable damage in

the town of Anna and in several other western Ohio communities. Ohio is on the periphery of the New Madrid Seismic Zone, an area in Missouri and adjacent states that was the site of the largest earthquake sequence to occur in historical times in the continental United States. In 1980, an earthquake with a magnitude of 5.3 on the Richter Scale and centered in Sharpsburg, Kentucky, was strongly felt throughout Ohio and caused minor damage in communities along the Ohio River in southwestern Ohio. In 1998, a Magnitude 5.2 earthquake occurred in western Pennsylvania and caused some damage in the epicentral area. Two regions of Ohio have been identified as susceptible to seismic activity; however neither Lawrence County nor its contiguous counties are included in these regions.

There are two different ways of describing the magnitude of an earthquake. One way measures peak ground acceleration. Peak ground acceleration is the maximum horizontal ground acceleration measured in centimeters per second per second ( $\text{cm}/\text{sec}^2$ ). Peak ground acceleration can range from zero for an earthquake that is noticed by very few people to 350, which would be a catastrophic event. A peak ground acceleration of  $10 \text{ cm}/\text{sec}^2$  means that the shaking is equivalent to about 1 percent of the acceleration due to gravity. Generally, ground acceleration must exceed  $15 \text{ cm}/\text{sec}^2$  for significant damage to occur. According to the U.S. Geological Survey (USGS) Earthquake Hazard Program and as shown in **Figure 9**, peak ground acceleration in Lawrence County during an earthquake would measure between 6 and 8  $\text{cm}/\text{sec}^2$ .



**Figure 9: USGS Seismic Hazard Map - Ohio**



Another way of measuring the intensity of an earthquake is the Modified Mercalli Intensity Scale, shown below in **Figure 10**. Measures on this scale range from 1, an earthquake that is not generally noticeable, to 12, an earthquake that causes complete destruction. On the Modified Mercalli Intensity Scale:

- A measure of 4 is a moderate earthquake that is felt indoors by many people and rattles dishes, windows, and doors.
- A measure of 5 is a rather strong earthquake that is felt outdoors by most people and causes some dishes and windows to break.
- A measure of 6 is a strong earthquake that frightens people, causes windows, dishes, and glassware to break, and overturns or moves some heavy furniture but that causes slight structural damage.

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

Figure 10: Modified Mercalli Scale

## Previous Occurrences

ODNR and OhioSeis report that an earthquake happened on Sunday, May 14, 1995, at 4:21 p.m. local time, a 2.5-magnitude earthquake was recorded. The epicenter was in northern Lawrence County, in southern Ohio. Although this earthquake was large enough to have been felt in the epicentral area, no felt reports were received from this sparsely populated county. No earthquakes have previously been documented from this area.

Due to the infrequency of earthquakes occurring in Lawrence County, the impact on the county's infrastructure is quite low. An earthquake of the previous occurrences magnitudes is not expected to cause damage to infrastructure.

## **Probability of Future Damaging Earthquakes**

Given that USGS lists zero damaging earthquakes occurring between 1776 and 2007, one might conclude that the probability of a damaging earthquake is less than 1 percent in any given year. The USGS database shows that there is a 0.814% chance of a Magnitude 5.0 earthquake within 31 miles (50 kilometers) of Pedro within the next 50 years. This means that there is 0.0163% chance that a Magnitude 5.0 will occur in any given year.

The level of damage expected from an earthquake in Lawrence County is very low. It would be expected to be on the order of a Magnitude 3.0-3.9 quake, or lower. A quake of this magnitude would be felt by most people and include some breakage of dishes, windows and plasters. For this plan, the estimated probability of a damaging earthquake affecting Lawrence County in any given year is estimated at less than 1 percent per year.

As part of the 2013 Lawrence County Natural Hazards Mitigation Plan it was decided that utilizing HAZUS would benefit Lawrence County and the other jurisdictions involved to determine loss estimates for this regional hazard. These loss estimates are utilized primarily to plan and stimulate efforts to reduce risks from natural hazards and to prepare for emergency response and recovery. Since an earthquake is a wide spread hazard HAZUS was utilized for this particular hazard in order to generate more accurate loss estimations for the planning effort.

## ***Vulnerability Assessment – Earthquake***

### **Overview of Vulnerability**

All structures and infrastructure in Lawrence County are equally at risk of experiencing an earthquake. However, in a mild earthquake of the magnitude typically experienced in Ohio, none to minimal structural damage is anticipated. In most cases, damages are expected to be limited and examples of anticipated damages are broken dishes and windows and cracked plaster.

### **Potential Impact of Earthquake**

Based on historical occurrences of earthquakes in the county, the odds of an earthquake striking Lawrence County in any given year would be less than 1% (0.01). Within the past 235 years, there has been one epicenter recorded in Lawrence County. However, scientists speculate that the New Madrid Fault line, which runs in close proximity to the State of Ohio, has a high probably of activity within the next 50 years.

A very large earthquake affecting Lawrence County might cause structural damage in dilapidated structures or structures that do not meet current building codes. Roads and bridges might be damaged and trees and power lines might fall.

Thus the impact of an earthquake might range from negligible to minor damage. Based on over 200 years of experience in Lawrence County, there will most likely be no damage or very slight damage. If in the worst case scenario a magnitude 5.4 earthquake, the strongest earthquake in Ohio’s history, were to have an epicenter in Ironton, Lawrence County, then moderate damage would be expected.

HAZUS estimates that there are 29,000 buildings in the region which have an aggregate total replacement value of 2.03 billion dollars. For a 5.4 magnitude earthquake, HAZUS estimates that about 3,772 buildings will be at least moderately damaged. This is 13% of the total number of buildings in the scenario. There are an estimated 130 buildings that will be completely destroyed by having over 50% damage to the structure. **Table 25** shows an estimated total damage for each occupancy type within Lawrence County that can be expected.

**Table 25: Building Exposure for a 5.4 Magnitude Earthquake**

Occupancy	Expected Buildings Damaged				
	None	Slight	Moderate	Extensive	Complete
Single Family	13,815	3,869	1,723	408	93
Other Residential	4,783	1,483	1,028	182	23
Commercial	627	187	145	49	9
Industrial	174	43	33	11	2
Agricultural	61	14	11	3	0
Religion	94	31	23	8	2
Government	34	9	7	2	0
Education	26	7	6	2	1
Total:	19,614	5,644	2,975	666	130

The total building related economic losses are \$238,600,000. For capital stock losses only, losses are \$199,080,000; 65.8% of which was residential and 34.2% is non-residential. No damage is expected for critical facilities. However, functionality of these buildings will be limited. Zero hospital beds were estimated to be available before the earthquake; therefore zero hospital beds were estimated to be available after the event. Of the 4 police stations and 17 fire stations there will be 1 (25%) and 8 (47.1%) stations, respectively, with greater than 50% functionality on day 1 of the event.

Please note that this is one data point and the use of HAZUS as part of the earthquake analysis generated slightly different number of structures within the region. It is still important to know that this tool is out there and can be updated to reflect the more accurate information contained in HAZUS.

## **Identifying Structures**

### ***Plan Update Notes***

Structures identified as potentially at risk of damage due to an earthquake are older structures as assumed in the previous plan.

### ***Exposure of Existing Buildings to Earthquake Damages***

All existing buildings in Lawrence County have the potential to experience an earthquake. Given no history of damage in Lawrence County due to earthquake, damages are estimated to be limited to the more dilapidated structures and structures with unreinforced masonry.

### ***Exposure of Future Buildings to Earthquake Damages***

All future structures will also have the potential to experience an earthquake. However, some of the jurisdictions have adopted building codes to mitigate the potential for damage from an earthquake.

## **Estimating Potential Loss**

### ***Plan Update Notes***

Potential loss estimates for damage due to earthquake have not changed from the previous plan and are very low.

### ***Methodology***

USGS data was used to identify that there is no evidence that an earthquake has caused any damage in Lawrence County. Therefore, no dollars have been lost to earthquakes.

### ***Estimated Potential Dollar Losses***

Estimated annual potential dollar losses, due to the type of very small earthquake, anticipated for Lawrence County are \$0.00.

# Drought Risk Assessment

## Hazard Profile – Drought

### Location

History has shown that in the event of a drought, the entire county will be affected. A drought is an extended period of months or years when a region notes a deficiency in its water supply whether surface or underground water. Droughts occur when a region receives consistently below average precipitation. In the event of a drought it is more likely that multiple counties will be affected. That is why drought conditions are monitored by areas. Lawrence County is in Ohio Climate Division 9. During an average year in Ohio, an estimated 15,000 wildfires and natural fuel fires occur. Although droughts can persist for several years, even a short drought with intense heat can cause significant damage and harm to the local economy. With Lawrence County's close proximity to the Ohio River, most droughts will have smaller effect on water supplies.

### Extent

The Palmer Drought Severity Index is used to describe abnormally wet to abnormally dry conditions. Zero represents normal rainfall and temperature conditions; drought condition indices are described in **Table 26**.

**Table 26: Palmer Drought Severity Index**

Index	Description of Conditions
4.0 or more	Extremely wet
3.0 to 3.99	Very wet
2.0 to 2.99	Moderately wet
1.0 to 1.99	Slightly wet
0.5 to 0.99	Incipient wet spell
0.49 to -0.49	Near normal
-0.5 to -0.99	Incipient dry spell
-1.0 to -1.99	Mild drought
-2.0 to -2.99	Moderate drought
-3.0 to -3.99	Severe drought
-4.0 or less	Extreme drought

Data provided by NCDC show that drought conditions in Ohio Climate Division 9 have resulted in Palmer Drought Severity Index level as low as -5.02 for a four month period in 1988. **Figure 11**, below, shows the PDSI for the four month period of May-August between 1895-2011. Ohio has a generally temperate climate and infrequently has a severe drought experience over an extended period of time. Over the summer months when drought conditions are most severe and would have the greatest effect on crops,

region 9 in Ohio where Lawrence County is located, has only experienced 12 moderate drought conditions, 3 severe drought conditions and 1 of which was categorized as extreme drought.

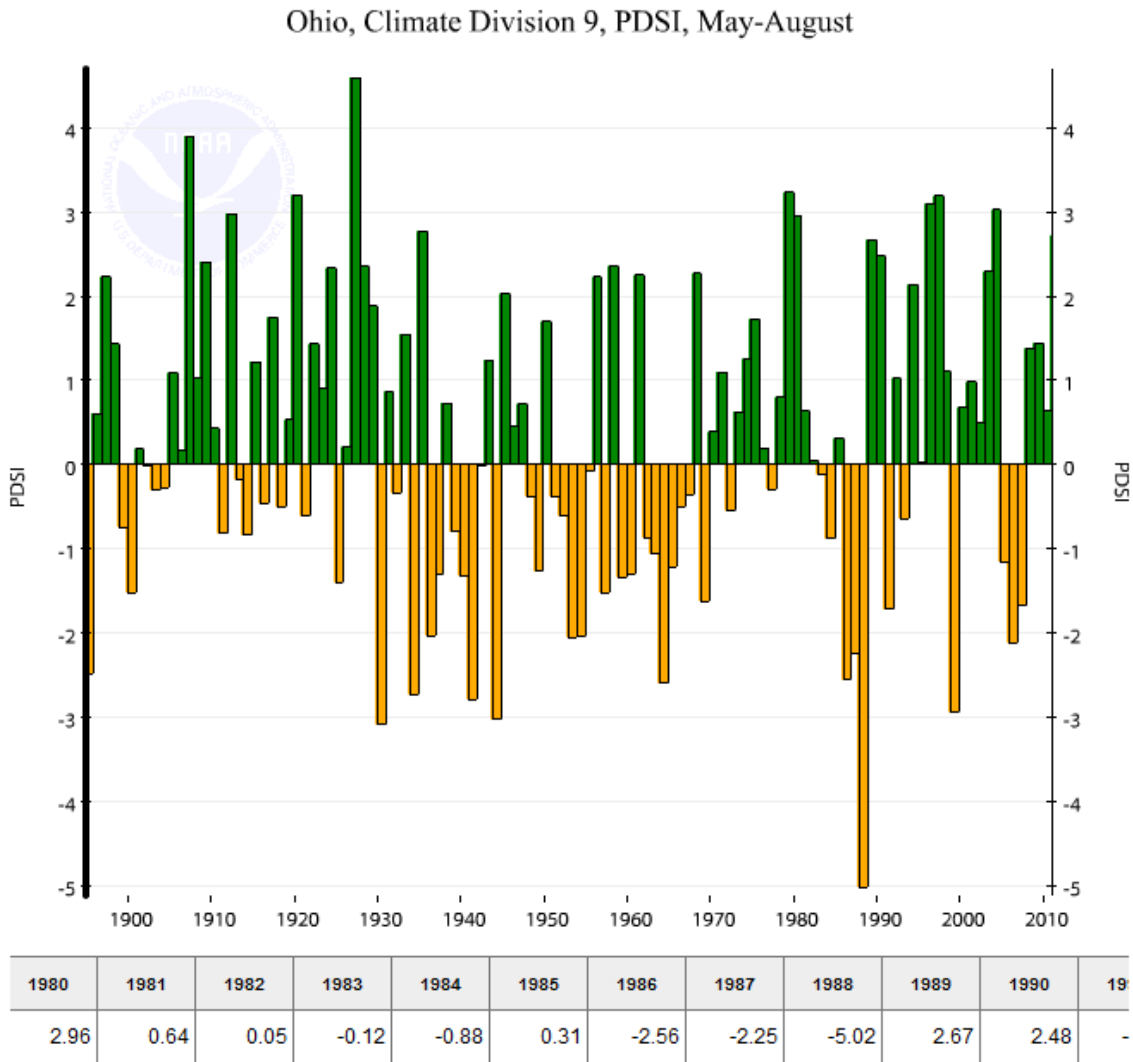


Figure 11: Summer PDSI in Climate Division 9 for the past 115 years

### Previous Occurrences

According to the NCDC, Lawrence County has experienced two severe droughts of significance in the past 115 years.

**Drought of 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 Jackson had only 1.3 inches for the entire month, McArthur had 1.5 inches, while South Point measured 1.9 inches.

By June, 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 on 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 97n degrees on the 10<sup>th</sup>.

During July, 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 Jackson 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 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.

In September, the drought severity either increased, or remained 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.

Through October, the drought severity eased as monthly rainfall was near normal. Amounts of 2.5 to 3 inches were common. Ground water shortages were still a concern at the end of the month.

Below in **Table 27**, commodity loss statistics are shown for the year 1999 and compared with a non-drought year of 1998.

**Table 27: Commodity Loss Statistics for 1999 Drought**

COUNTY:		Lawrence				
COMMODITY	Non-Drought		Drought Year		CHANGE	AMOUNT
	Year	1998	1999	UNITS		
Corn - planted		1,400	1,600	acres	up	200
Corn, grain - harvested		1,100	1,000	acres	down	100
	Yield	78.57%	62.50%		down	16.07%
Corn, grain - production		113,400	89,900	bushels	down	23,500
Corn, grain - yield		103.1	89.9	bushels/acre	down	13.2
Hay - harvested		8,000	8,500	acres	up	500
Hay - production		18,800	14,500	tons	down	4,300
Hay - yield		2.35	1.71	tons/acre	down	0.64
Tobacco - harvested		280	280	acres	unchanged	0
Tobacco - production		508,000	462,000	pounds	down	46,000
Tobacco - yield		1,815.0	1,650.0	pounds/acre	down	165.00

Source: U.S. Dept. of Agriculture, National Agricultural Statistics Service

**Drought of 2002.** 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. Commodity loss statistics are included below in **Table 28**.



**Table 28: Commodity Loss Statistics for 2002 Drought**

COUNTY:		Lawrence				
COMMODITY	Non-Drought		Drought Year		CHANGE	AMOUNT
	Year	2001	2002	UNITS		
Corn - planted		1,700		1,700 acres	unchanged	0
Corn, grain - harvested		1,300		1,200 acres	down	100
	Yield	76.47%		70.59%	down	5.88%
Corn, grain - production		119,000		130,200 bushels	up	11,200
Corn, grain - yield		91.5		108.5 bushels/acre	up	17.0
Hay - harvested		9,300		8,400 acres	down	900
Hay - production		20,800		19,500 tons	down	1,300
Hay - yield		2.32		2.24 tons/acre	down	0.08
Soybeans - planted		1,500		1,200 acres	down	300
Soybeans - harvested		1,400		1,100 acres	down	300
	Yield	93.33%		91.67%	down	1.67%
Soybeans - production		54,600		41,600 bushels	down	13,000
Soybeans - yield		39.0		37.8 bushels/acre	down	1.2
Tobacco - harvested		230		240 acres	up	10
Tobacco - production		432,400		388,800 pounds	down	43,600
Tobacco - yield		1,880.0		1,620.0 pounds/acre	down	260.00

Source: U.S. Dept. of Agriculture, National Agricultural Statistics Service

**Drought of 2007.** After a dry month of May, the heat and dry weather of June caused drought conditions to develop and intensify to the D2 drought classification over extreme southeast Ohio. Rain-fed crops were struggling to mature. Much needed rain did arrive during the last week of the month.

The drought conditions that developed in June continued through July. However, topsoil moisture did improve with monthly rainfalls of 3.5 to 4.5 inches being observed.

Extreme southeast Ohio remained on the northern fringe of the summer drought, as temperatures averaged hotter than normal during August and September.

A rare October heat wave, during the 1<sup>st</sup> and 2<sup>nd</sup> weeks of the month, helped peak the severity of the drought. On the 11<sup>th</sup>, 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 23<sup>rd</sup> and the 24<sup>th</sup>. 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 on 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.

Commodity loss statistics are included below in **Table 29**.

**Table 29: Commodity Loss Statistics for 2007 Drought**

COUNTY:		Lawrence			
COMMODITY	Non-Drought	Drought Year		CHANGE	AMOUNT
	Year 2006	2007	UNITS		
Hay - harvested	7,800	7,900	acres	up	100
Hay - production	19,000	16,500	tons	down	2,500
Hay - yield	2.44	2.09	tons/acre	down	0.35
Soybeans - planted	1,500	1,200	acres	down	300
Soybeans - harvested	1,400	1,100	acres	down	300
	Yield	93.33%	91.67%	down	1.67%
Soybeans - production	54,800	38,900	bushels	down	15,900
Soybeans - yield	39.1	35.4	bushels/acre	down	3.7

Source: U.S. Dept. of Agriculture, National Agricultural Statistics Service

**2012 North American Drought.** The 2012-2013 North American Drought is an expansion of the 2010-2012 U.S. 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 included most of the US and Ohio. Among many counties, Lawrence 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 had not yet been in place as long. However, the drought inflicted catastrophic economic ramifications. In most measures, the drought 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 US Department of Agriculture 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 the Loss Assessment Reports and determined that there were sufficient production losses in 85 counties to warrant a Secretarial disaster designation. On September 5, 2012, Lawrence County was one of those designated counties.

Below in **Table 30**, commodity loss statistics are shown for 2012.

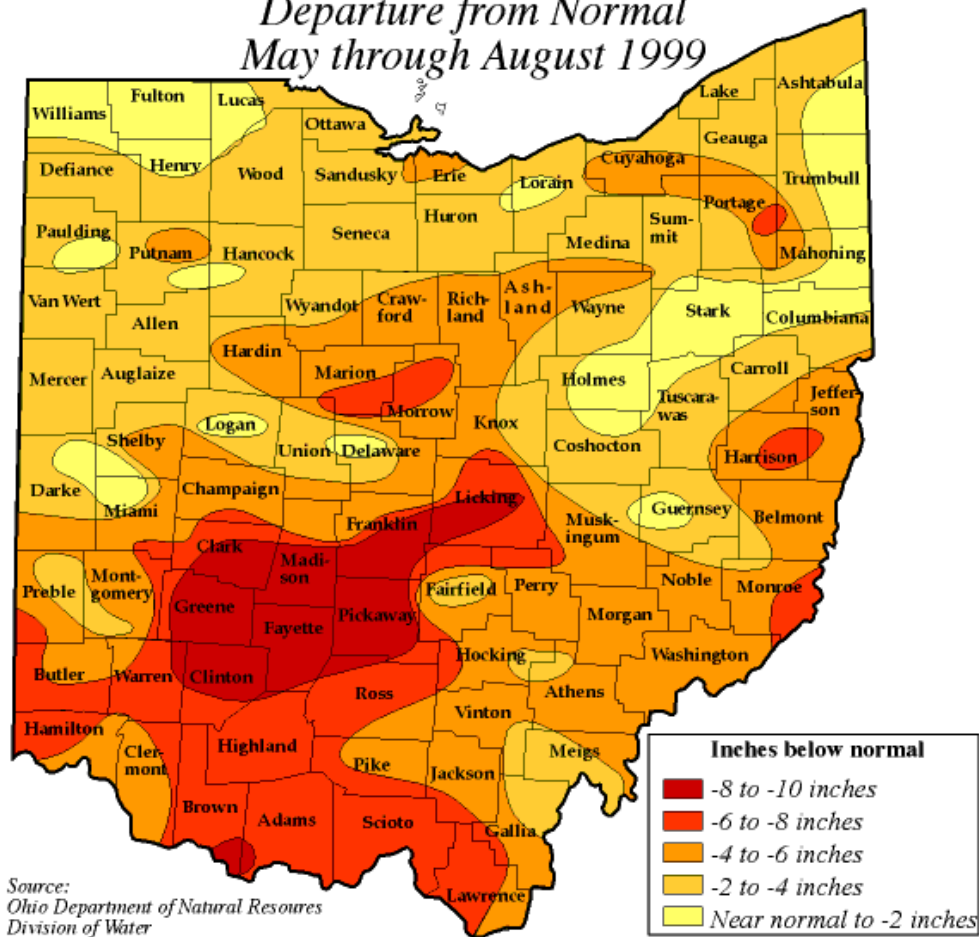
**Table 30: Commodity Loss Statistics for 2012 Drought**

COUNTY:		Lawrence				
COMMODITY	Non-Drought		Drought Year		CHANGE	AMOUNT
	Year	2011	2012	UNITS		
Corn - planted		1,000		1,200 acres	up	200
Corn, grain - harvested		760		950 acres	up	190
	Yield	76.00%		79.17%	up	3.17%
Corn, grain - production		100,000		105,000 bushels	up	5,000
Corn, grain - yield		131.6		110.5 bushels/acre	down	21.1
Hay - harvested		9,300		9,100 acres	down	200
Hay - production		19,100		16,800 tons	down	2,300
Hay - yield		2.05		1.85 tons/acre	down	0.20
Soybeans - planted		1,400		1,400 acres	unchanged	0
Soybeans - harvested		1,380		1,350 acres	down	30
	Yield	98.57%		96.43%	down	2.14%
Soybeans - production		55,000		45,000 bushels	down	10,000
Soybeans - yield		39.9		33.3 bushels/acre	down	6.6

Source: U.S. Dept. of Agriculture, National Agricultural Statistics Service

Based on historical information, Lawrence County can expect to endure on average a moderate drought every ten years. In 2007, according to the National Resource Inventory, 52% of the land in the county was crop land and 34% was pasture land. In 1999, Lawrence County created a Drought Action Plan to guide their efforts. **Figure 12**, shown below, shows the precipitation for the summer of 1999.

## Precipitation Departure from Normal May through August 1999



**Figure 12: Precipitation for the summer of 1999**

### Probability of Future Damaging Drought

Having experienced 27 periods of at least mild drought conditions over the course of 115 years from 1896 to 2011, probability of a mild drought in any given year is estimated to be  $27/115 = 0.23$  or 23 percent. By looking at the 4 events of severe drought conditions over the course of 115 years, probability of a severe drought occurring in any given year is estimated to be  $3/115 = 0.026$  or 2.6 percent.

However, not all drought periods lasted for a full year. **Figure 13**, below, is from the National Drought Mitigation Center at the University of Nebraska Lincoln shows the locations of severe drought conditions between 1895 and 1995. It also shows that severe and extreme drought occurs in the Lawrence County area in south Ohio between 5 and 9.99 percent of the time. For the purpose of this plan, 5 to 9.99 percent chance will be used to evaluate this hazard.

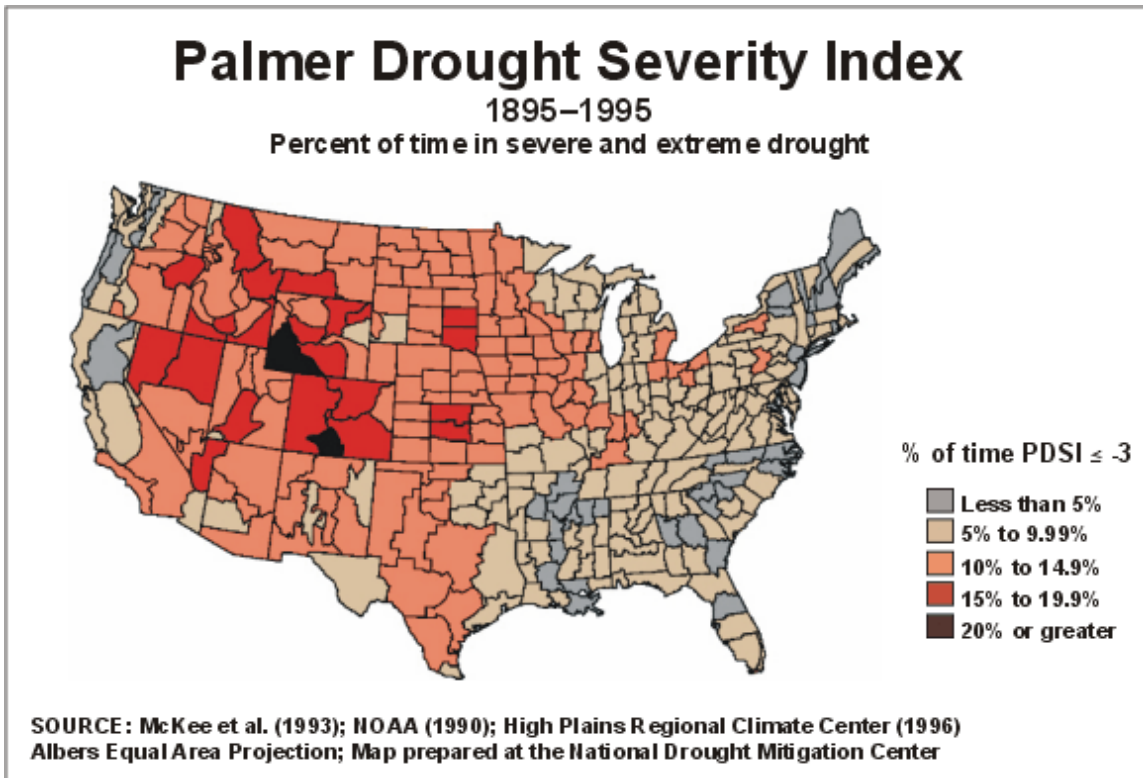


Figure 13: Percent of Time in Severe or Extreme Drought

## ***Vulnerability Assessment – Drought***

### **Overview of Vulnerability**

A drought in Lawrence County can have significant detrimental effect on the domestic water supply, especially for well-water, agriculture, and water-dependent recreational activities. Economic effects in Lawrence County would include crop loss. No structural damage due to drought is anticipated in Lawrence County.

### **Potential Impact of Drought**

Negative impacts of drought would be experienced by agricultural interests, and the community would need to reduce its usage of water.

No damage to structures or infrastructure is anticipated due to drought.

### **Identifying Structures**

No structures would experience damage due to drought.

### ***Plan Update Notes***

Since no structures would experience damage due to drought, this updated plan, like the previous plan, does not identify existing or future buildings at risk of loss due to drought.

### ***Exposure of Existing Buildings to Damages Due to Drought***

No existing buildings are exposed to damage due to drought.

### ***Exposure of Future Buildings to Damages Due to Drought***

No future buildings will be exposed to damage due to drought.

## **Estimating Potential Loss**

### ***Plan Update Notes***

There is no change in this updated plan in the estimate of loss due to drought.

### ***Methodology***

Estimated potential dollar loss due to drought is based on damages provided from NCDC and USGS, which is \$0.

### ***Estimated Potential Dollar Losses***

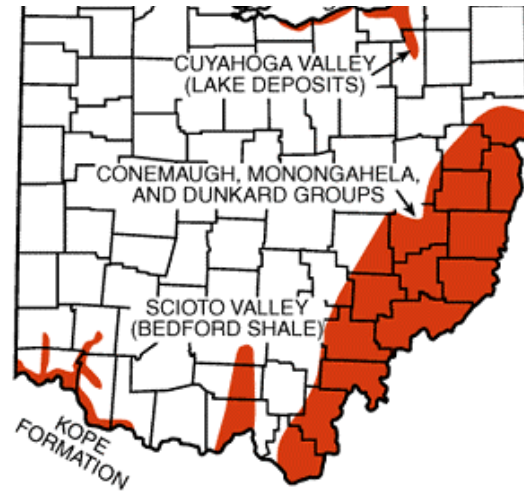
The estimate potential dollar loss annually in Lawrence County due to structural damage due to drought is \$0.

## Landslide and Subsidence Risk Assessment

### Landslide and Subsidence Update

Steep slopes and local relief of several hundred feet characterize portions of eastern and southern Ohio. In addition, bedrock of Mississippian, Pennsylvanian, and Permian ages, thick colluvium (deposits of broken and weathered bedrock fragments), and thick lake silts and outwash formed in association with Pleistocene glaciers make this area particularly prone to slope failures. The most slide-prone rocks in eastern Ohio are red mudstones (“red beds”) of Pennsylvanian and Permian age, areas in red in **Figure 14**. These rocks tend to lose strength when they become wet, forming rotational slumps or earthflows. About 85% of slope failures in this region are in red beds of the Pennsylvanian-age Conemaugh and Monongahela Groups.

**Figure 14: Landslide Prone Areas in Ohio**



*Landslide Prone Areas in Ohio*

The discussion of landslide has been re-organized and rewritten.

### Hazard Profile – Landslide and Subsidence

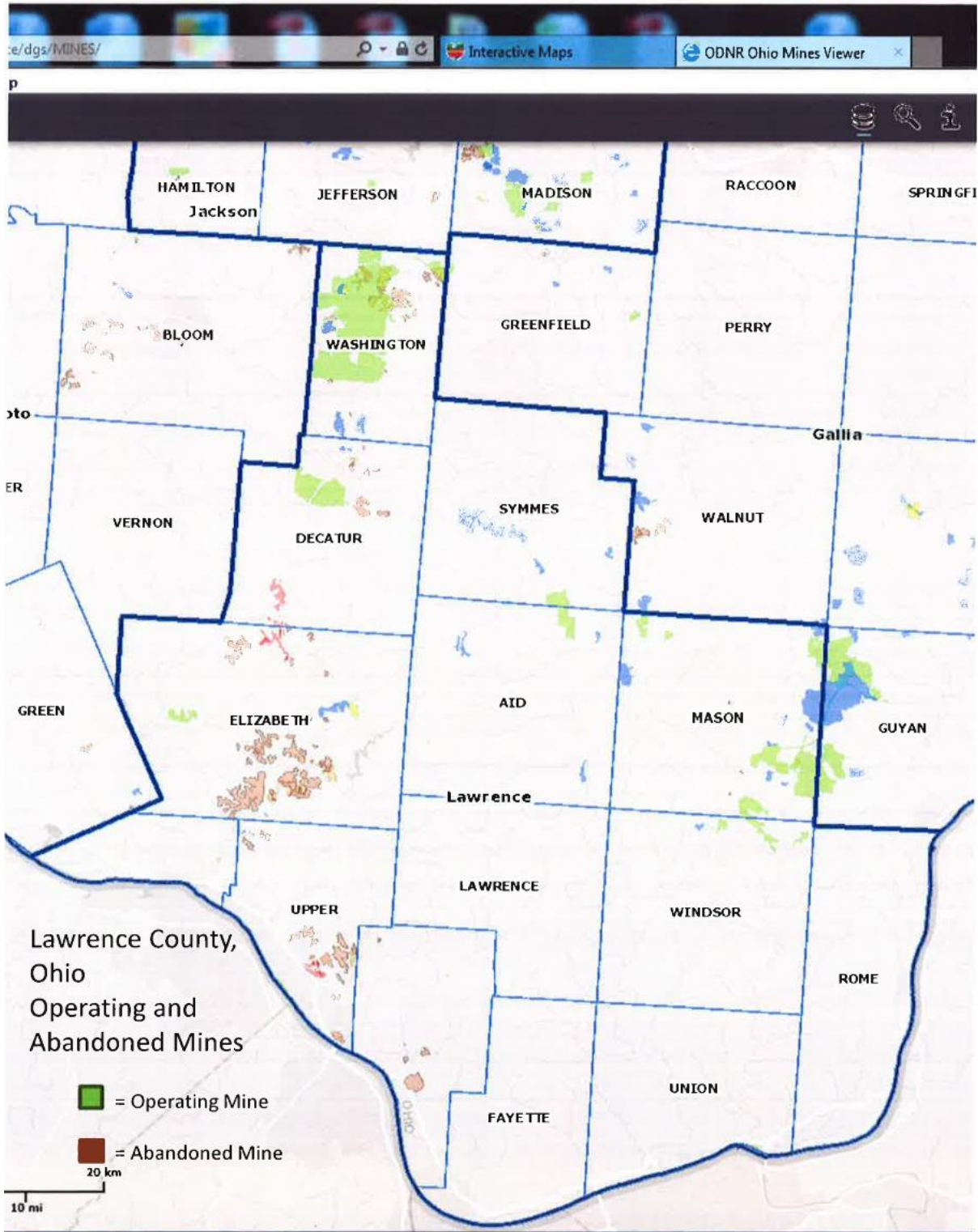
#### Location

A landslide is a natural geologic process that has played a large part in shaping the landscape in southeast Ohio. Landslide is a general term for mass movement of soil, rock, or a combination of materials down a slope. Areas of potential landslides and subsidence are not well documented within Lawrence County. Therefore, all areas within the county will be anticipated as being prone to landslides and subsidence. A map of operating and abandoned mines is shown on the next page in **Figure 15**.

Note: The Core Group identified the lack of mapping and documenting of these areas within the county and has created an action item to map these areas.

#### Extent

Landslide velocity can vary from rapid to slow and the amount of material moving in a landslide can range from a relatively small amount to a large amount. Landslides can include falling, sliding, or flowing of rocks and soil or a combination of these different types of motion. Landslides in Lawrence County have reportedly involved a small amount of rocks tumbling down a hillside; a small amount means an amount sufficient to





fill the shoulder of a road for a linear distance of about 10 feet with rock, but not enough to block the entire roadway.

Steep slopes and local relief of several hundred feet characterize portions of eastern and southern Ohio. In addition, bedrock of Mississippian, Pennsylvanian, and Permian ages, thick colluvium (deposits of broken and weathered bedrock fragments), and thick lake silts and outwash formed in association with Pleistocene glaciers make this area particularly prone to slope failures. The most slide-prone rocks in eastern Ohio are red mudstones (“red beds”) of Pennsylvanian and Permian age. These rocks tend to lose strength when they become wet, forming rotational slumps or earthflows. About 85% of slope failures in this region are in red beds of the Pennsylvanian-age Conemaugh and Monongahela Groups. (See the **Figure 14** on page 78.)

Lawrence County is comprised of two plateaus, the Ironton Plateau and the Marietta Plateau. The Ironton Plateau can be characterized by moderately high relief (300 feet) and coarser grained coal-bearing rock. The Marietta Plateau can be characterized by high relief, generally 350-600 feet near the Ohio River and mostly fine-grained rocks, red shales and red soils. Landslides are common for this plateau.

Landslides are a significant problem in several areas of Ohio. The Cincinnati area has one of the highest per-capita costs due to landslide damage of any city in the United States. Many landslides in Ohio damage or destroy homes, businesses and highways, resulting in annual costs of millions of dollars. Upon occasion, they can be a serious threat to personal safety. On Christmas Eve of 1986, an individual traveling in an automobile was killed by falling rock along U.S. Route 52 in Lawrence County. Although this is Ohio's only recorded landslide fatality, there have been numerous near misses.

## **Previous Occurrences**

Historical information was not readily available from Lawrence County or the ODNR regarding landslides. Therefore, frequency and probability of future occurrence could not be estimated. The County Engineer reported that typically there are one to two landslides per year. However, in May 2011 the County Engineer reported 150 landslides, 113 of which were FEMA eligible projects and are recorded in **Appendix VIII**. The Lawrence County EMA and the State Highway Patrol were contacted regarding landslide information but no information was on file. The information on landslide/subsidence occurrences listed below in **Table 31** was obtained from the Ohio Department of Natural Resources.

Maps from the Ohio State Mitigation Plan, created by URS, are included in **Appendix VIII** and provide information on landslide susceptibility and structure loss estimates.

**Table 31: Landslide/Subsidence Occurrences**

<b>Complaint Type</b>	<b>Date Received</b>	<b>Address</b>	<b>City</b>	<b>Status</b>
Earthslip/Landslide	3/17/1998	933 County Rd. 21	Ironton 45638	Under Investigation
Earthslip/Landslide	5/6/1998	3001 South 6th Street	Ironton 45638	Under Investigation
Subsidence	7/9/1998	57 Private Road, 755 County Road	South Point 45680	Under Investigation
Earthslip/Landslide	5/13/1998	17797 State Route 93	Pedro 45659	Referred to Abandoned Mine Land Program
Subsidence	10/10/2002	118 Oakwood Drive	Coal Grove 45638	Under Investigation
Subsidence	7/27/1998	3218 State Route 141	Ironton 45638	Under Investigation
Earthslip/Landslide	2/2/1998	Ironton City Center, 301 South 3rd	Ironton 45638	Non Mine Related
Earthslip/Landslide	2/18/1998	1011 Township Road 199	Pedro 45659	Non Mine Related
Earthslip/Landslide	1/26/1998	738 Township Road 266	Kitts Hill 45645	Non Mine Related
Earthslip/Landslide	2/19/1998	15245 State Route 93	Pedro 45641	Under Investigation

### **Probability of Future Damaging Landslides and Subsidence**

The probability of landslides and/or rock falling from a steep slope, using the ten occurrences in the past 15 years, is  $10/15 = 0.667$  or about 67 percent. Nine of the 10 occurrences were reported in 1998, which skews the probability greatly.

### ***Vulnerability Assessment – Landslide and Subsidence***

#### **Overview of Vulnerability**

The county is located on steep slopes that pose a risk of damage due to landslide. A higher level of vulnerability is given to areas where there has been soil disturbance on steep slopes.

## Potential Impact of Landslide and Subsidence

A landslide might cause a structure to collapse or might cause minor damages such as broken windows. A landslide might cause a roadway to be temporarily blocked. Landslides within Lawrence County are exacerbated by flooding.

### Identifying Structures

#### *Exposure of Existing Buildings to Landslide and Subsidence Damages*

All buildings located on or directly beneath steep slopes are susceptible to a landslide. Any building located near a location where the slope of a hill has been undercut is at an even greater chance of being subject to a landslide occurrence.

To evaluate a landslide for a worst case scenario is almost impossible because there are no parameters to which a landslide have been recorded or predicted for a specific area. Expenses that occur from an event would, at a minimum, include structural value for houses impacted, relocation and cleanup.

#### *Exposure of Future Buildings to Landslide and Subsidence Damages*

The areas within the County that are experiencing a higher rate of development will be more at risk for the occurrence of a landslide. Future structures on or near steep slopes may be a risk of damage due to landslide. If development on steep slopes were to disturb the land and vegetation to an unprecedented degree, the potential for damage due to landslide may increase.

### Estimating Potential Loss

#### *Estimated Potential Dollar Losses*

Attempts were made to obtain more detailed information on the history of landslide occurrences within Lawrence County in order to better predict both future occurrences and dollars lost associated with those occurrences. However, the only information found was from the Ohio State Mitigation Plan (2011). Lawrence County was ranked as a high potential loss area by USGS and estimated to lose 10 structures. The Ohio State Mitigation Plan used an average structure cost in Lawrence County to estimate the structural damage. The table of average structural values used in that report was \$66,516 and the table shown in **Appendix VIII**. Since that average structure value is similar to the average residential structure cost of \$70,770 in this report compared to the average non-residential structure cost of \$131,916, this report will assume the structures affected by landslide are residential. Therefore, the estimated potential loss of 10 residential structures is \$707,700

Additionally, data from the Ohio Mine Subsidence Insurance Underwriting Association Annual Reports for 2005-2013 is included in **Appendix VIII**. There are 18 reported

claims per year with an average of \$36, 100 per claim. Experience nationwide shows that 2-5 structures may be damaged by sinkholes, mine subsidence, etc. Therefore, the following vulnerability assessment is estimated below in **Table 32** due to mine subsidence.

**Table 32: Vulnerability Assessment due to Mine Subsidence**

Building Type	Number of Buildings	Exposure for the Scenario
Residential	5	\$347,410
Non-Residential	5	\$915,644
Critical Facilities	2	\$1,159,614

***Maximum Potential Dollar Losses***

Due to the lack of information regarding dollars lost associated with landslide occurrences, the value for the maximum potential dollar losses is not able to be accurately calculated. To estimate this number, the value for estimated potential loss will be used. Therefore, the estimated maximum potential loss is \$707,700.

# Severe Storms Risk Assessment

## **Hazard Profile – Severe Storms**

### **Location**

Severe storms and potentially damaging high winds occur throughout Ohio. A severe storm may be experienced at any location in Lawrence County. Because severe storms are random in nature, the entire county population is susceptible and should be prepared. All citizens should become familiar with locations of shelters in which they can seek safety in the event of severe weather.

Since severe storms typically present localized hazards, several homes may need repair, but typically homeowners will have insurance to cover these expenses and will not suffer any long term financial hardship. The populations located in mobile home parks and campgrounds should take particular care to seek adequate permanent shelter with approaching severe weather.

### **Extent**

Severe storms occur throughout the State of Ohio. All of Lawrence County is exposed to the hazards associated with severe storms. Severe storms can occur throughout the year. These storms can contain hail, thunder and lightning and high wind.

High winds from severe storms that move in a straight line can cause extensive damage, much like a tornado. High winds are defined as sustained wind speeds of 40 mph or greater lasting for 1 hour or more, or winds of 58 mph or greater for any duration.

### **Previous Occurrences**

Lawrence County is highly susceptible to severe storms, which encompasses thunderstorms, tornadoes, high winds, and hail.

According to the NCDC, there have been 175 severe storm events in Lawrence County reported since 1968, with total property losses of \$4.577 million.

**July 17, 2007 near Proctorville, Ohio.** Small clusters of thunderstorms intensified near the Ohio River. A small portion of the roof to Fairland Middle School was damaged. A large camper was rolled over. Small structures on the fairgrounds were damaged. Several trees were knocked down. One tree fell into a second floor bedroom of a home, causing heavy damage. Total damage was estimated at \$250,000.

**June 29, 2012, Countywide Derecho (DR-4077).** On the second day of a developing heat wave, under a sunny sky, afternoon temperatures reached the upper 90s to above 100 degrees across most of southeast Ohio. For example, Waterloo in Lawrence County reached 104 degrees that Friday afternoon. Marietta had 100 degrees. Meanwhile, an

area of multi-cellular convection had moved out of northern Illinois that morning. It continued to organize and strengthen, as it propagated east and southeast across northern Indiana into western Ohio during the afternoon. As it moved toward southeast Ohio, it had already formed into a large arch of storms, or bow, with a developing cool pool in its wake. The temperature contrast between the air ahead of the developing derecho, compared to that in its wake was reaching 30 to 35 degrees. The resultant wind shift in the cool pool resulted in strong moisture convergence on the leading edge of the complex. This in turn, helped drive the storms further southeast, away from the mid and upper level wind support. However, the complex was diving right into that hot air that had obtained large convective available potential energy (CAPE), on the order of 4000 to 5000 j/kg.

The derecho reached southeast Ohio near the hottest time of the day, after 4:00 pm. It was racing southeast around 65 mph. The gust front began to outrace the rain as it moved into southeast Ohio. As the system matured, the strong gusts were longer in duration, in some cases around 10 minutes. That gust front then crossed the Ohio River into northeast Kentucky and western West Virginia on either side of 5:30 pm. The storms and showers only provided about a quarter to a half inch of rain.

Widespread wind gusts of 60 to 85 mph were likely with the leading gust front across southeast Ohio. A department of highways garage in Perry County measured 62 mph at 4:50 pm. Ohio University at Athens measured 64 mph at 5:12 pm. The airport near Albany of Athens County had a gust to 59 mph at 5:15 pm. The department of highways garage in Gallia County near Kerr had 62 mph at 5:31 pm.

The wind caused trees and large branches to fall in scattered locations throughout the 9 counties in southeast Ohio. There was some structural damage. Corrugated metal and siding were ripped off a few buildings. Trees fell onto houses and vehicles. Out of the 9 counties only 4 counties reported individual damage to the state. Those counties included Athens, Jackson, Lawrence and Meigs. The fallen trees and power lines also caused roads to be temporarily blocked. However, the largest impact was on the electric power grid. Prolonged power outages occurred. Some areas were without electricity for 4 to 7 days.

Luckily there were no direct deaths or injuries. One indirect death can be attributed to the storm.

The lack of electricity in the midst of the heat wave, disrupted the daily routines of most citizens for several days. Water and ice were in high demand. An emergency declaration by the President allowed federal supplies to be quickly delivered. Family and retail refrigerated food lost was substantial. Rural citizens with private wells may have been hit harder than those living in towns on public water systems. Citizens that relied on well water had no power to pump the water from their wells. Water had to be hauled just to flush the toilet. Some people slept outside on porches where it was cooler. With limited gas stations available to pump gas, long lines developed for a few days in the wake of the

storm. Workers trying to restore the electricity had to take frequent breaks due to the heat and the safety equipment they had to wear.

Due to the public damage, a federal major disaster was eventually declared for this episode. A few others episodes during the first few days of July were also included. The public infrastructure damage assessment was around \$239,000.

Scattered locations throughout the county had large trees and branches blown down. Around 13,400 customers lost electricity. The county engineer said the 911 center encountered a large volume of calls from people who were dependent on oxygen machines and were without electricity. He summarized the whole event by saying, we just had a bad evening. Two overnight shelters were opened and supported by faith-based organizations for 4 days. These were in Ironton and Chesapeake. The South Point Volunteer Fire Department also provided shelter accommodations.

On South Third Street in Ironton, a vacant building saw an entire wall of bricks blown out from its upper floor. The bricks toppled to the sidewalk below. One tree on Sixth Street fell onto a parked car. Trash cans, potted plants, lawn furniture and other debris were blown around town.

In Pedro, a mobile home was destroyed by the wind when its roof was removed. Two other mobile homes had minor damage, with roof damage and leakage. Also, the storm caused a leaking ceiling to a single family house in Coal Grove. Sections of the ceiling eventually collapsed. Meanwhile, a tree fell through the roof of a single family house on 3rd Avenue in Chesapeake. The roof was crushed with damage to rafters and ceiling joists. Large trees and branches were blown down in Proctorville. One single family house had shingles and a support structure blown off.

**June 10, 2014 near South Point, Coryville and Proctorville, Ohio.** Ahead of a slow moving mid-level trough in Missouri, warm and humid air returned to extreme southeast Ohio on the 10<sup>th</sup> of June. Sunshine helped temperatures reach into the mid-80s during the afternoon. An arch of thunderstorms moved northeast out of Tennessee during the late afternoon, through eastern Kentucky and into southeast Ohio during the evening. A well-defined shelf cloud was observed on the leading edge of the squall line. Wind gusts of 45 to 50 mph were widespread. A few spots received slightly stronger wind gusts.

A mile northwest of Coryville, a large tree fell down and hit a passing car on 5th Street. A parked police cruiser was also damaged. Several large tree limbs were blown down in South Point and large trees were blown down in Proctorville.

**June 22, 2008 near Chesapeake, Ohio.** Hail size was approximately 1 inch. Thunderstorms formed in northeast Kentucky and southeast Ohio around midday, along a low level moisture gradient. The freezing level was only around 11,000 feet. The storms quickly became hail producers. Even larger hail fell, further east, in West Virginia.

The last round of hail producing thunderstorms moved through the mid-Ohio Valley around sunset.

**June 2, 2009, southwest of Sherritts, Ohio.** Hail size was approximately 1 inch. Thunderstorms fired across southeast Ohio during the heat and instability of the afternoon. The area was well south of an east to west front. The storms became multicellular and formed short lines. Numerous outflow boundaries were produced. Large hail was noted quickly, with strong surface wind gusts developing as the episode unfolded. The heaviest downpours were noted in southern Washington County, causing street flooding in the city of Marietta. Nickel size hail fell along Aarons Creek.

**May 10, 2011, South Point, Ohio.** Hail Size was recorded between 1.00 to 1.75 inches. Repetitive showers and thunderstorms, moved southeast through western Vinton County, Jackson County, and western and central portions of Lawrence County between 3:00 pm and 6:30 pm on Tuesday, the 10th. This convection was just northeast of the surface warm front. A sharp dew point gradient existed along the front. Surface dew points were around 70 degrees just southwest of the boundary. Luckily, later that same evening, a repetitive convection occurred in the Scioto River Valley, missing this area just to the west.

Initially, the main impact was large hail. As back building caused repetitive showers and thunderstorms, flooding became the primary issue. Maximum rain amounts of 3 to 4 inches were observed. Jackson measured 3.35 inches. Waterloo observed 3.76 inches. South Point had 3.25 inches of rain. Luckily, no injuries or fatalities occurred. Damage was estimated at approximately \$32,000 total.

State assistance money was committed to aid uninsured homeowners and renters.

## **Probability of Thunderstorms High Winds**

There were 84 thunder storm events in Lawrence County over 44 years between 1968 and 2011. Thus the probability of a high wind event in the county in any given year is estimated to be  $84/44 = 1.91$  or 100 percent.

The NCDC data lists five high wind events between 1993 and 2011 resulting in property damage is \$185,000 in damages. Wind data for the 18-year period 1993 through 2011 are used in this plan to estimate probability of a damaging wind event. Thus the calculated probability of a damaging high winds in the county in any given year is  $5/18 = 0.278$ , or 27.8 percent.

A total of 69 hail events occurred in the county over 61 years between 1975 and 2011. Thus the probability of a high wind event in the county in any given year is estimated to be  $69/37 = 1.86$  or 100 percent.



## ***Vulnerability Assessment – Severe Storms***

### **Overview of Vulnerability**

For severe storms, aged and dilapidated structures or structures not built to applicable building codes are more susceptible to damage. Mobile homes and campgrounds are especially susceptible to damage due to severe storms. Strong winds can rip roofs off of any dilapidated structures and overturn mobile homes. Past experience with tornadoes in Lawrence County shows that death and injury are indeed possibilities.

### **Potential Impact of Severe Storms**

Vulnerability to the effects of severe storms is somewhat dependent upon the age of a structure because as building codes become more stringent, buildings are capable of enduring greater wind forces.

In Lawrence County, high winds occur annually. The most common detrimental effects are interruptions in power supply and communications services due to downed wires and blocked roadways due to downed trees.

### **Identifying Structures**

#### ***Plan Update Note***

The methodology for identifying structures potentially at risk of damage due to severe storms is the same as the methodology used for identify structures potentially at risk of damage due to winter storms.

#### ***Exposure of Existing Buildings to Severe Storms***

All structures and infrastructure might be exposed to the effects of a tornado or other high winds. Depending upon the severity of a severe storm, any existing structures might be damaged to some extent. However, in Lawrence County, there are 8,963 structures that were built before 1960. Thus the percentage of existing buildings considered at particular risk of damage due to severe storms is 32.4 percent. The age of structures indicates which structures had building codes in place when built and the amount of potential deterioration it may have. For this example, structures that are 50-years or older are expected to be at a higher risk than structures less than 50-years old.

#### ***Exposure of Future Buildings to Severe Storms***

Any future structures might be exposed to severe storms as this hazard does not only occur in specific locations. However, future buildings will be somewhat protected from the effects of severe storms as they will meet the most current state building code requirements for bracing and roof design.

## Estimating Potential Loss

### *Plan Update Notes*

In the previous plan, estimate potential loss due to severe storms was not evaluated. In this update, NCDC data was used to estimate potential loss.

### *Methodology*

According to the NCDC, estimated property damage in Lawrence County attributable to the four hazards associated with severe storms are thunderstorms, hail, high winds, and tornadoes account for \$4,461,530 in damage. Damage attributable to thunderstorms from 1968 through 2011 is \$1,109,000. Damage attributable to hail from 1975 through 2011 is \$417,500. Damage attributable to high winds from 1993 through 2011 is \$185,000. This data is used to estimate potential annual dollar losses due to severe storms.

### *Estimated Potential Dollar Losses*

Due to severe storms having four combined hazards that have been historically documented over different periods of time, potential dollar losses from severe storms will be broken down off each hazard. The total loss for thunderstorms over 44 years is \$1,109,000, the average annual loss is  $\$1,109,000 / 44 = \$25,205$ . The total loss for hail over 37 years is \$417,000, the average annual loss is  $\$417,000 / 37 = \$11,270$ . The total loss for high winds over 19 years is \$185,000, the average annual loss is  $\$185,000 / 19 = \$9,737$ . Therefore, to total annual estimated potential dollar losses due to severe storms is \$46,212.

### *Maximum Potential Dollars Lost*

To predict the structural cost associated to a worst case scenario severe storm, it will be assumed that all structures older than 50 years will be damaged significantly. This analysis is based on the perception that building codes have become more stringent and that new buildings can withstand the 30 pounds per square foot snow loads expected for Ohio. To estimate the non-residential values, the same percentage of structures will be assumed to be built over 50 years ago, which is 32.4 percent. According to **Table 8**, the total value of residential and commercial structures is \$1.33 billion and \$590 million, respectively. This estimates the maximum damage that is expected for a worst case scenario winter storm to be \$432 million and \$191 million, respectively. This estimate does not represent the total cost associated with the severe storm, which will also include damaged utilities and emergency services.

## Summary of Risk Assessment Findings

The purpose of completing a rigorous assessment of risk is to inform decision-making about the mitigation actions that are most appropriate for the county. **Table 33** shows that Lawrence County can expect the greatest losses from flooding. Annualized anticipated losses due to flooding are more than three times the losses anticipated due to all hazards combined. Thus, the majority of actions proposed in this mitigation plan address potential damage due to flooding.

**Table 33: Risk Assessment Findings**

Hazard	Vulnerable Locations	Annual Probability of Occurrence in Lawrence County	Estimated Annual Dollar Loss
Flood	Special Flood Hazard Areas	100%	\$3,007,333
Winter Storms	Entire County	32%	\$3,513,000
Tornado	Entire County	8.1%	\$45,082
Earthquake	Localized	<1%	\$0.00
Drought	Entire County	13%	\$0.00
Landslide/Subsidence	Localized	67%	\$707,700
Severe storms	Entire County	100%	\$46,212

The conclusion of the risk assessment is that the greatest damages attributable to a single hazard occurring in Lawrence County can be expected to be caused by winter storms. This calculation is skewed due to the heavy property damage record for the February 8, 1994 ice storm. If that data is removed, the greatest damages attributed to a single hazard would be expected to be caused by Flooding. Landslides do not have any official historical damage records. The available information suggests that there is potential for high losses, landslides should remain a priority for mitigation.

Worst case scenarios were also performed for each hazard. A vulnerability analysis of these scenarios is shown in **Table 34**. Unlike the annual estimated losses, the total anticipated losses due to a worst case scenario cannot be compared due to the significance variations for each one of these hazards. For example, even though the damage value is on the same magnitude for flooding and earthquakes, the probability of a major flood event occurring is significantly higher than a catastrophic earthquake in Lawrence County. It is also important to note that this table represents the total number of at-risk structures. Based off of multiple circumstances that are unpredictable in nature, the damage values may over/underestimate the actual damage if a worst case scenario were to happen. **Table 34** demonstrates the worst case scenario potential damage as it relates to each hazard and delineates residential, non-residential and critical structures throughout Lawrence County. The number of structures at-risk due to flooding is broken out into residential and non-residential based on the results of a HAZUS-MH Flood Event Report.

**Table 34: Vulnerability Analysis**

Hazards	Number of Structures At-Risk				Damage in Dollars (\$1000)			
	Residential	Non-Residential	Critical	Total	Residential	Non-Residential	Critical	Total
Flood	17,331	4,245	1,281	3,745	\$2,092,675	\$514,669	\$154,232	\$2,761,576
Winter Storms	6,549	2,414	0	8,963	\$432,188	\$191,009	\$0	\$623,197
Tornado	5,512	847	24	6,383	\$338,080	\$167,209	\$52,297	\$557,586
Earthquake	8,809	571	34	9,414	\$187,063	\$31,972	\$19,565	\$238,600
Drought	0	0	0	0	\$0	\$0	\$0	\$0
Landslide	15	5	2	10	\$1,055	\$916	\$1,160	\$3,131
Severe storms	6,549	2,414	0	8,963	\$432,188	\$191,009	\$0	\$623,197

For each hazard, aside from flooding, tornadoes and earthquakes, all critical facilities are assumed to withstand normal forces and events based on the hazards affecting Lawrence County. This is assumed because these facilities are typically designed to meet building code and they are usually maintained by the personnel occupying the building. Therefore, no damages are assumed for these types of facilities. In the case of flooding and earthquakes, the estimated value for structures is the total value of the structure and may be overestimated if only a portion of the building is damaged. In the case of flooding of critical facilities, the total average value of the determined structures was given which is an overestimation because not all of the structures will be totally damaged. To evaluate the amount of damage to critical facilities in the worst case scenario for a tornado, each facility in the path of most destruction was evaluated on an individual basis and assigned a value. This is the same path that the other structures were evaluated on. The value for this item is merely an estimate and can greatly differ by the path of the tornado. The damage to critical facilities for an earthquake was taken from the HAZUS report and buildings with any damage in the education and government categories were counted as critical facilities. Damage estimates for an earthquake represent the estimate from the HAZUS report and number of structures at-risk includes structures with slight to complete damage. Therefore, the estimated value of structures is not the total value of structures due to the varying degree of impact an earthquake has on structures depending on structural characteristics.

## Mitigation Goals

### ***Mitigation Goals Update***

Goals express aspirations about long-term conditions rather than specific measures. The goals expressed in this plan regarding natural hazards are basically the goals that were established when the plan was initially developed for adoption in 2003, but the presentation of goals, objectives, and actions has been re-written.

### ***Mitigation Planning Principles***

Goals were needed for this planning effort to guide the review of the possible mitigation measures. The recommended actions of this plan are consistent with what is appropriate for Lawrence County. Mitigation goals reflected community priorities and should be consistent with other plans for the county.

After the determination of the draft problem statements, the Mitigation Core Group agreed to goals that they wanted to achieve for each hazard. These goals are listed in the following section.

### ***Goals***

#### **1) Prevention**

- a) Implement activities and involve the public media to give residents as much advanced warning as possible for imminent natural disasters to reduce risk, damages to property and loss of life
- b) Assure coordination of existing plans, reports, and strategies already in place with mitigation actions to put them to more effective use
- c) Strengthen communication between agencies and communities throughout the county and with adjacent counties including those in Ohio, Kentucky and West Virginia

#### **2) Protection of Life, Property and Natural Resources**

- a) Build a comprehensive framework to document past natural hazard events to evaluate effects and establish trends
- b) Develop practices and activities to protect lives and reduce damages to homes, businesses, industries and agricultural areas in Lawrence County.
- c) Implement regulations to improve hazard mitigation
- d) Rehabilitate, protect and enhance natural systems already in place to preserve the culture, natural resources and environment found in Lawrence County

#### **3) Emergency Services**

- a) Continue to improve coordination and support between emergency response services and resources throughout the county

#### **4) Public Outreach**

- a) Promote public awareness of risks associated with natural hazard and develop ways to mitigate those risks

## Alternative Mitigation Actions

### ***Mitigation Alternatives Update***

Actions that were proposed in the previous mitigation plan were reviewed by the Lawrence County EMA Director and members of the Mitigation Core Group to determine their status. These actions are recorded in this updated plan as having been completed, deleted, deferred, or ongoing. The Mitigation Core Group felt that by going through this exercise that they were benefiting their community and their alternative mitigation actions as well.

These actions were part of the review of range of actions suggested for inclusion in this updated plan.

During this planning process vernacular such as "action items" and "alternatives" was used interchangeably to describe those activities that the participating jurisdictions, including the county, evaluated or considered for implementation.

### ***Review of Previously Proposed Mitigation Actions***

**Appendix IX** lists the 58 mitigation actions that were proposed in the previous version of the Lawrence County mitigation plan that relate to natural hazards. **Appendix IX** indicates the status of actions. Actions are either reworded and combined with other actions in the plan update, ongoing and included in the plan update, or deleted because they are no longer relevant.

### ***Benefit Cost Review of Mitigation Alternatives***

A number of different criteria were used during plan development to prioritize suggested mitigation actions. The Mitigation Core Group subjectively prioritized alternatives through an iterative process of document review during 2013 planning process until consensus was reached.

Additional measures were taken to evaluate the benefit/cost of each of the alternatives. A weighted voting system was recommended as an effective way to analyze the benefit/cost of each alternative. Each voter was given four high priority votes, four medium priority votes, and four low priority votes. Each voter had to consider each alternative in regards to social, technical, administrative, political, legal, economic, environmental, or other impacts in order to decide how to use their 12 votes. These considerations are the basis for the STAPLEE method of prioritization typically used for planning purposes; when a local jurisdiction applies for a Federal grant for project implementation.

STAPLEE stands for:

**S – Social:** Mitigation actions are acceptable to the community if they do not adversely affect a particular segment of the population, do not cause relocation of lower income people, and if they are compatible with the communities social and cultural values.

**T – Technical:** Mitigation actions are technically most effective if they provide long-term reduction of losses and have minimal secondary adverse impacts.

**A – Administrative:** Mitigation actions are easier to implement if the jurisdiction has the necessary staffing and funding.

**P – Political:** Mitigation actions can truly be successful if all stakeholders have been offered an opportunity to participate in the planning process and if there is public support of the action.

**L – Legal:** It is critical that the jurisdiction or implementing agency have the legal authority to implement and enforce a mitigation action.

**E – Economical:** Budget constraints can significantly deter the implementation of mitigations actions. Hence, it is important to evaluate whether an action is cost-effective, as determined by a cost-benefit review, and possible to fund.

**E – Environmental:** Sustainable mitigation actions that do not have an adverse effect on the environment, that comply with Federal, State, and local environmental regulations, and that are consistent with the community’s environmental goals, have mitigation benefits while being environmentally sound.

Although each category of the STAPLEE method was not explicitly ranked in the voting process, it is still a good model with important considerations to review before a voting process.

Each Mitigation Core Group member was given four blue stickers, four red stickers and four yellow stickers. Voting was performed in three stages, one stage for each color. Blue stickers were used in the first stage, followed by yellow stickers in the second stage and yellow stickers in the final stage. After voting, the action items were put in order from greatest number of votes at the top to least number of votes at the bottom. In the case of a tie, a weighted system was used based on the sticker color. Blue stickers were given priority over red stickers, and red stickers were given priority over yellow stickers. In a case where one action item ‘x’ had two yellow stickers and four red stickers and action item ‘y’ had three yellow stickers and three red stickers, priority was given to action item ‘x’ because neither item had blue stickers and action item ‘x’ had more red stickers than action item ‘y.’ If a tie still remained, the Core Group agreed to give priority based on the associated hazard with the action item. Whenever both action items were associated with the same hazard the Core Group discussed until a consensus was reached about which action item received priority. Pictures were taken of the action items after voting and are shown in **Appendix X**. The action items, in order of priority as ranked by the Mitigation Core Group, are shown below in **Table 35**.

**Table 35: Ranking of Proposed Mitigation Actions**

Hazard	Proposed Mitigation Action	Total Number of Votes
All	Seek funding for additional EMA personnel to assist current staff with needed disaster planning and prevention activities and programs.	8
All	Develop a county GIS map showing areas and specific sites vulnerable to natural hazards and make available to the public.	7
All	Adopt a resolution requiring all government agencies in the county to provide a list of typed equipment and assets along with qualifications and certifications of employees and personnel that can be used by our County Emergency Management office during major events. This information should be uploaded and managed by the NIMS Incident Resource Inventory System (IRIS).	6
Flooding	Mitigate all Repetitive Loss Structures with Lawrence County.	6
All	Buildings are not properly constructed to resist the forces and elements that can be encountered during a natural disaster event. This is due to a lack of a local building code and inspection system. Investigate developing building codes and inspection system in jurisdictions without building codes and educate the public regarding regulations designed to protect themselves from hazards.	6
All	Establish a NOAA Weather Radio program for all schools, libraries, government buildings, large industries, nursing homes, festivals, fairgrounds, etc.	6
Tornadoes/ Winter & Severe Storms	Trees are often destroyed in high winds and ice storms, taking down power and communication lines. Encourage maintenance of trees in right-of-way areas.	6
All	Communication systems often fail during disaster events. Develop back-up plans in the EOP for cases of communication failure.	5
All	Prepare a list of available emergency shelters including city and county facilities, churches, schools, Salvation Army, others, etc.	5
All	Publish a Disaster Preparation hand-out brochure or flier for distribution thru county court house offices, restaurants, banks etc.	5
Winter Storms	There is a lack of available equipment and contractors to handle snow removal. Develop a list of equipment resources and contractors.	5
Landslide/ Subsidence	There is a lack of or conflicting information of where the high hazard areas are. Identify landslide, mined areas and problem soil areas.	5
Landslide/ Subsidence	Landslides and subsidence can destroy utilities. Identify areas where additional utility cut-offs are needed to isolate systems in high-risk zones.	4



Hazard	Proposed Mitigation Action	Total Number of Votes
Landslide/ Subsidence	Additional investigation and mapping is needed to determine where old mines are. Seek funding for mapping and subsurface investigations.	4
All	Mobile homes are more prone to high wind damage. Propane tanks can become airborne during a tornado or float away during flooding events, causing an additional explosion hazard. Adopt & enforce anchoring criteria for mobile homes, propane tanks and any other objects that can become hazardous during natural hazard events. Seek funding for anchoring of existing mobile homes.	4
Dam Failure	There are dams that have been constructed without review or state oversight. Identify dams throughout county to determine if they fall under state regulation.	4
Severe Storms	People are not always around media to alert them to severe weather. Develop an audible alert system.	3
All	The public is not aware of the risks from natural hazards. Educate public about severe weather risks and damage prevention.	3
Dam Failure	Seek funding to create an EAP for each small dam on private property using Standards of the International Committee of Dam Safety (ICODS), developed in compliance with OAC requirements and including an update of the design floods and the downstream hazards. Findings to be provided to ODNR and to dam owners.	3
All	Develop a program for presentations in high schools, to Civic organizations (e.g. Rotary and Kiwanis clubs) & Chambers of Commerce, etc. to acquaint the public with county emergencies, responses, programs, shelters, etc. using personal appearances, and/or video presentations.	3
Tornadoes	Evaluate where tornado shelters are needed throughout the county and seek funding to construct the shelters.	3
All	Promote periodic public workshops either by Lawrence County alone or with other counties, held in such venues as OUSC to call public attention to the EMA programs and concerns and to seek public input.	3
All	The public is not always aware of imminent dangerous weather situations. Educate the public on the benefits of weather radios and what to do in cases of imposing danger.	3
Drought/ Wildfires	Provide public notification of regulated Fire Burning Seasons and drought conditions to prevent ignition of wildfires either from unsupervised brush burning or failed camp fire extinguishment. Also to help regulate fire hazards created by disposal of debris.	3

Hazard	Proposed Mitigation Action	Total Number of Votes
Flooding/ Wildfires/ Landslides	There are no severe storm warning sirens throughout the county. Seek funding to complete a tornado warning siren program for all populated areas within the county. Make warning system capable of addressing other hazards within other hazard prone areas.	2
Flooding	Reevaluate floodwall work with USACE. The floodwall pump stations control systems are failing and replacement parts are not available. Seek emergency funding to replace floodwall pump station control system.	2
Flooding/ Landslides	Logging often increases the risk of landslides and flooding. Coordinate with NRCS to improve logging practices including Best Management Practices in construction of haul roads, drainage facilities and silt/sediment controls.	2
Drought/ Wildfires	Address the problem of arson within the county by increasing enforcement and prosecution and provide a no way to report suspected arsonists.	2
Flooding	Combined sanitary sewers often fill with flood waters, which then back up into structures. Seek funding for back-flow preventers in areas of combined sanitary sewers.	1
Drought/ Wildfires	Additional fire break lines are needed. Identify areas where fire break lines are needed.	1
Flooding	Critical facilities should have an extra level of protection. Require new/improved critical facilities to be elevated/flood protected to the 500-year flood level.	0
Earthquakes	Utility lines are often damaged during earthquakes, increasing risks to people and structures. Identify areas where additional utility cut-offs are needed to isolate utility systems.	0
Dam Failure	There is a lack of maintenance of the dams. Coordinate with ODNR Division of Water regarding lack of maintenance and inspection of dams.	0

After rating the actions relative to the feasibility criteria, the Mitigation Core Group reviewed the results and selected actions for inclusion in the plan ensuring that there would be actions directed toward mitigating the effects of each identified hazard, actions addressing existing structures, and actions addressing future structures. Alternatives that were not proposed below for implementation during the next 5 years may very well be proposed when this plan is next updated.

## ***Prioritization Methodology***

### ***Plan Update Notes***

The original plan prioritized the action items taking into account the risk assessment for each hazard, which included the historical events and cumulative costs for each potential hazard. Then action items within each hazard were further prioritized.

For the plan update, prioritization was based entirely from the cost/benefit of the specific action item. This method allows the freedom for the most important action items to be prioritized even if the hazard it is associated with is prioritized differently.

### ***Method of Prioritization***

A number of different criteria were used during plan development to prioritize suggested mitigation alternatives. The Mitigation Core Group chose a total of 33 potential mitigation alternatives. Prioritization of the alternatives was based on the ranking process from the benefit cost review. The Mitigation Core Group subjectively prioritized alternatives through an iterative process of document review during 2013 planning process until a consensus was reached. The Mitigation Core Group reached consensus on the prioritization based directly off the benefit cost review where weighted votes were cast for each alternative. An updated matrix with the proposed Action Item prioritization is displayed in **Appendix XI**.

## Proposed Mitigation Actions

### ***Mitigation Actions Update***

Mitigation actions that were proposed in the earlier version of this plan and have been completed are not included in this section of the plan. Mitigation actions that were proposed in the earlier version of this plan and have not been completed have been revised for better implementation and proposed again. A few previously proposed mitigation actions are no longer relevant and have been deleted from the mitigation plan for the county.

### ***Selected Actions***

Actions selected and proposed for implementation are grouped together as:

- Actions that reduce risk to human population
- Actions that reduce risk to existing structures/infrastructure
- Actions that reduce risk to future structures/infrastructure
- Actions that address continued participation in the NFIP
- Actions that incorporate mitigation into other community plans
- Other proposed actions such as further study or data collection

Some actions fit into more than one of these categories and are listed in more than one of the tables presented below.

### **Selected Actions Addressing Public Safety**

Some mitigation actions address the public safety and reduce the potential to injury or death. The 10 actions listed in **Table 36** will reduce the likelihood of harm to the county population.

**Table 36: Actions Addressing Public Safety**

Hazard	Proposed Mitigation Action
All	Establish a NOAA Weather Radio program for all schools, libraries, government buildings, large industries, nursing homes, festivals, fairgrounds, etc.
All	Communication systems often fail during disaster events. Develop back-up plans in the EOP for cases of communication failure.
All	Prepare a list of available emergency shelters including city and county facilities, churches, schools, Salvation Army, others, etc.
All	Publish a Disaster Preparation hand-out brochure or flier for distribution thru county court house offices, restaurants, banks etc.
Severe Storms	People are not always around media to alert them to severe weather. Develop an audible alert system.

Hazard	Proposed Mitigation Action
All	The public is not aware of the risks from natural hazards. Educate public about severe weather risks and damage prevention.
All	Develop a program for presentations in high schools, to Civic organizations (e.g. Rotary and Kiwanis clubs) & Chambers of Commerce, etc. to acquaint the public with county emergencies, responses, programs, shelters, etc. using personal appearances, and/or video presentations.
All	Promote periodic public workshops either by Lawrence County alone or with other counties, held in such venues as OUSC to call public attention to the EMA programs and concerns and to seek public input.
All	The public is not always aware of imminent dangerous weather situations. Educate the public on the benefits of weather radios and what to do in cases of imposing danger.
Drought/Wildfires	Provide public notification of regulated Fire Burning Seasons and drought conditions to prevent ignition of wildfires either from unsupervised brush burning or failed camp fire extinguishment. Also to help regulate fire hazards created by disposal of debris.

## Selected Actions Addressing Existing Development

Some mitigation actions will provide further protection to existing structures and infrastructure. The seven actions listed in **Table 37** will reduce the likelihood of damage due to natural hazards in existing structures.

**Table 37: Actions Addressing Existing Development**

Hazard	Proposed Mitigation Action
Flooding	Mitigate all Repetitive Loss Structures with Lawrence County.
Tornadoes/Winter & Severe Storms	Trees are often destroyed in high winds and ice storms, taking down power and communication lines. Encourage maintenance of trees in right-of-way areas.
All	Mobile homes are more prone to high wind damage. Propane tanks can become airborne during a tornado or float away during flooding events, causing an additional explosion hazard. Adopt & enforce anchoring criteria for mobile homes, propane tanks and any other objects that can become hazardous during natural hazard events. Seek funding for anchoring of existing mobile homes.
Dam Failure	There are dams that have been constructed without review or state oversight. Identify dams throughout county to determine if they fall under state regulation.
Dam Failure	Seek funding to create an EAP for each small dam on private property using Standards of the International Committee of Dam Safety (ICODS), developed in compliance with OAC requirements and including an update of the design floods and the downstream hazards. Findings to be provided to ODNR and to dam owners.

Hazard	Proposed Mitigation Action
Flooding	Reevaluate floodwall work with USACE. The floodwall pump stations control systems are failing and replacement parts are not available. Seek emergency funding to replace floodwall pump station control system.
Earthquakes	Utility lines are often damaged during earthquakes, increasing risks to people and structures. Identify areas where additional utility cut-offs are needed to isolate utility systems.

## Selected Actions Addressing Future Development

Some proposed mitigation actions will affect the degree to which future structures and infrastructure are protected against damage due to natural hazards. **Table 38** lists two actions in this category.

**Table 38: Actions Addressing Future Development**

Hazard	Proposed Mitigation Action
All	Buildings are not properly constructed to resist the forces and elements that can be encountered during a natural disaster event. This is due to a lack of a local building code and inspection system. Investigate developing building codes and inspection system in jurisdictions without building codes and educate the public regarding regulations designed to protect themselves from hazards.
Flooding	Critical facilities should have an extra level of protection. Require new/improved critical facilities to be elevated/flood protected to the 500-year flood level.

## Selected Actions Addressing Continued Participation in the NFIP

All local jurisdictions in Lawrence County participate in the NFIP. Nevertheless, flooding continues to threaten the safety and security of county residents. The two mitigation actions displayed in **Table 39** address participation in the NFIP beyond meeting the usual minimum NFIP standards.

**Table 39: NFIP Continued Participation Proposed Actions**

Hazard	Proposed Mitigation Action
Flooding	Mitigate all Repetitive Loss Structures within Lawrence County
Flooding	Establish a NOAA Weather Radio program for all schools, libraries, government buildings, large industries, nursing homes, festivals, fairgrounds, etc.

## Selected Actions That Incorporate Mitigation into Other Plans

Some mitigation actions involve the incorporation of mitigation strategies into existing planning mechanisms. Eleven proposed mitigation actions, not necessarily different from those listed elsewhere in this section, involve such incorporation.

**Table 40** lists proposed mitigation actions that will involve the incorporation of hazard mitigation actions into other planning mechanisms.

**Table 40: Actions to Incorporate into Other Planning Mechanisms**

Hazard	Proposed Mitigation Action	Related Planning Mechanism(s)
All	Seek funding for additional EMA personnel to assist current staff with needed disaster planning and prevention activities and programs.	Emergency Operation Plan
All	Develop a county GIS map showing areas and specific sites vulnerable to natural hazards and make available to the public.	Emergency Operation Plan
All	Adopt a resolution requiring all government agencies in the county to provide a list of typed equipment and assets along with qualifications and certifications of employees and personnel that can be used by our county Emergency Management office during major events. This information should be uploaded and managed by the NIMS Incident Resource Inventory System (IRIS).	Emergency Operation Plan Lawrence County Soil and Water Conservation District
All	Buildings are not properly constructed to resist the forces and elements that can be encountered during a natural disaster event. This is due to a lack of a local building code and inspection system. Investigate developing building codes and inspection system in jurisdictions without building codes and educate the public regarding regulations designed to protect themselves from hazards.	Emergency Operation Plan Lawrence County Engineers Office
All	Communication systems often fail during disaster events. Develop back-up plans in the EOP for cases of communication failure.	Emergency Operation Plan
Winter Storms	There is a lack of available equipment and contractors to handle snow removal. Develop a list of equipment resources and contractors.	Emergency Operation Plan

Hazard	Proposed Mitigation Action	Related Planning Mechanism(s)
Landslide/ Subsidence	There is a lack of or conflicting information of where the high hazard areas are. Identify landslide, mined areas and problem soil areas.	Emergency Operation Plan Lawrence County Soil and Water Conservation District Lawrence County Engineers Office
Landslide/ Subsidence	Landslides and subsidence can destroy utilities. Identify areas where additional utility cut-offs are needed to isolate systems in high-risk zones.	Emergency Operation Plan Lawrence County Engineers Office Lawrence County Soil and Water Conservation District
Landslide/ Subsidence	Additional investigation and mapping is needed to determine where old mines are. Seek funding for mapping and subsurface investigations.	Emergency Operation Plan Lawrence County Engineers Office
Dam Failure	Seek funding to create an EAP for each small dam on private property using Standards of the International Committee of Dam Safety (ICODS), developed in compliance with OAC requirements and including an update of the design floods and the downstream hazards. Findings to be provided to ODNR and to dam owners.	Emergency Operation Plan Lawrence County Engineers Office
Tornadoes	Evaluate where tornado shelters are needed throughout the county and seek funding to construct the shelters.	Emergency Operation Plan

## Other Selected Mitigation Actions

Some proposed mitigation actions call for further planning or community education efforts. While these may eventually result in actions that will reduce the likelihood of damage due to natural hazards, the five actions displayed in **Table 41** do not necessarily affect existing or future structures, do not augment participation in the NFIP, and do not involve other planning mechanisms.

**Table 41: Additional Mitigation Actions**

Hazard	Proposed Mitigation Action
Flooding/ Wildfires/ Landslides	There are no severe storm warning sirens throughout the county. Seek funding to complete a tornado warning siren program for all populated areas within the county. Make warning system capable of addressing other hazards within other hazard prone areas.
Flooding	Reevaluate floodwall work with USACE. The floodwall pump stations control systems are failing and replacement parts are not available. Seek emergency funding to replace floodwall pump station control system.



Hazard	Proposed Mitigation Action
Flooding/ Landslides	Logging often increases the risk of landslides and flooding. Coordinate with NRCS to improve logging practices including Best Management Practices in construction of haul roads, drainage facilities and silt/sediment controls.
Droughts/Wildfires	Address the problem of arson within the county by increasing enforcement and prosecution and provide a no way to report suspected arsonists.
Flooding	Combined sanitary sewers often fill with flood waters, which then back up into structures. Seek funding for back-flow preventers in areas of combined sanitary sewers.
Droughts/Wildfires	Additional fire break lines are needed. Identify areas where fire break lines are needed.
Dam Failure	There is a lack of maintenance of the dams. Coordinate with ODNR Division of Water regarding lack of maintenance and inspection of dams.

## Implementation Strategies

**Appendix XI** provides an overview of the strategy that will be utilized in order to implement each of the proposed mitigation actions. For each proposed alternative, the associated strategy identifies the agency or job title that will be responsible for initiating the work and potential sources of funding for the work. Each strategy also indicates when the action will happen and identifies all of the parties responsible for implementation of each action.

The county plans on using the Lawrence County Natural Hazards Mitigation Plan to help in updating and developing other plans in the county as well as information needed for applying for grants. These other plans would include:

- The County Emergency Operations Plan (EOP)
- Various Emergency Action Plans (EAP) for festivals and community functions
- Various grants as they become available
- Emergency Action Plans for other potential emergency situations within individual jurisdictions

To implement mitigation strategies into local government plans, the Core Group will be responsible for identifying which local plans the mitigation plan can benefit from. With having a wide range of government representatives within the Core Group, the Core Group members are best suited to identify local plans that align with the mitigation action items; such as comprehensive or capital improvement plans. It will be the Core Group member's responsibility to align both parties interested to maximize the potential for action item completion.

## Plan Maintenance

### ***Plan Maintenance Update***

An annual review of mitigation actions will be conducted. The process for evaluating the plan has been modified slightly from that presented in the previous version of the plan. The protocols for updating the plan and continued public involvement have been elaborated upon in this version of the plan.

Previously, the ownership of this plan had been transferred between different organizations within the Lawrence County. This made plan maintenance minimal to nonexistent since the plan was created. Currently, the Lawrence County EMA office has ownership of the plan and will govern the document for the foreseeable future. With sole proprietorship of the plan, the EMA office will be able to organize the proper meeting and document any changes for proper plan maintenance.

### ***Monitoring Mitigation Actions***

The Lawrence County EMA Director will monitor the progress made on the implementation of the identified action items annually at about the anniversary date of plan adoption. Monitoring will be accomplished by calling or e-mailing each county or municipal agency that, through adoption of the plan, has assumed the responsibility of implementing one or more mitigation actions.

By monitoring mitigation actions, when the plan is next updated, information about the status of proposed mitigation actions will be readily available. The updated plan will include a section explaining if previously proposed mitigation actions have been implemented, completed, or deferred. The updated plan will identify actions that are no longer appropriate for the community and should be deleted. The updated plan will identify obstacles to implementation that caused proposed actions to be deferred and will recommend strategies for overcoming those obstacles.

The Mitigation Core Group will not only monitor the implementation of mitigation actions proposed in this plan, but will also monitor actions of participating jurisdictions and surrounding communities that may affect the ability of Lawrence County to withstand the effects of natural hazards or to recover from a disaster in the future. The method for gathering information about actions beyond those proposed in this plan will be informal; as active members of the Lawrence County community, Mitigation Core Group members will bring their own knowledge of the area to monitoring meetings to provide information about actions of participating jurisdictions as well as of nearby communities.

## ***Evaluating the Plan***

One month after conducting the annual monitoring of mitigation actions, the Lawrence County EMA Director will schedule an annual meeting of the Mitigation Core Group to evaluate the mitigation planning process, implementation of the plan, and conditions in Lawrence County that suggest the need to modify either planning data or planning actions. Participating incorporated jurisdictions' and townships will be invited to attend the evaluation meetings. The evaluation meeting will include a presentation of the results of the monitoring of mitigation actions and will answer the following questions:

- Do mitigation goals and objectives reflect current community concerns as well as the finding of the risk assessment?
- Have conditions in the county changed so that findings of the risk assessment should be updated?
- What hazards have caused damage in the county since the plan was written? Were these anticipated and evaluated in the plan or should these hazards be added to the plan?
- Have conditions in the county changed so that the magnitude of risk as expressed in this plan has changed?
- Are new sources of data available that will improve the risk assessment?
- Are current resources sufficient for implementing mitigation actions?
- For each mitigation action that has not been completed, what are the obstacles to implementation? What are potential solutions for overcoming these obstacles?
- Is each completed mitigation action effective in reducing risk? What action is required to further reduce the risk addressed by the completed action?
- What mitigation actions should be added to the plan and proposed for implementation?
- Should any proposed mitigation actions be deleted from the plan? What is the rationale for deleting previously proposed actions from the plan?
- Based upon the evaluation, should the plan be updated as soon as possible or should the plan be updated as scheduled 5 years after it was adopted?

The Lawrence County EMA Director will document the results of the annual evaluation meeting and submit the findings to each incorporated jurisdiction and townships in the county for review within 2 weeks. If the Mitigation Core Group determined that the plan should be updated as soon as possible, the Lawrence County EMA Director will take action to initiate the plan update.

## ***Updating the Plan***

This plan must be updated within 5 years and again adopted by the county and participating jurisdictions in order to maintain compliance with the regulations stated in 44 CFR Part 201.6 and ensure eligibility for applying for and receiving certain Federal mitigation grant funds.

Monitoring and evaluation will identify necessary modifications to the plan including changes in mitigation strategies and actions that should be incorporated in the next update. The update will have more current information about previous occurrences of hazards and improved information about wind speed for high wind events will be sought.

The Lawrence County EMA Director will initiate the process of updating the plan no more than 3 years after the plan was adopted, or immediately upon a determination by the Mitigation Core Group that the plan should be updated sooner. This will allow approximately 1 year for securing funding and/or staff for updating the plan and 1 year for conducting research and writing the updated plan.

## **Continued Public Involvement**

The Lawrence County EMA Director will provide printed copies of the plan to key Lawrence County offices including the public library in the county so that the public has access to printed copies of the plan. A copy of the adopted plan will be posted on the county web site for 5 years so that the public has electronic access to the plan. The Web site will include contact information for anyone to provide comment so that residents, business owners, and others who read the plan will be able to provide a comment about the plan or about the mitigation strategies. The Lawrence County EMA will maintain these comments and will provide them to the Mitigation Core Group for consideration at the annual plan evaluation meetings.

The Lawrence County EMA Director will post notices of annual mitigation plan evaluation meetings using the usual methods for posting meeting announcements in the county to invite the public to participate. In addition to posting announcements on the county web site, at least one newspaper press release will be published at the onset of the process of updating the plan inviting public participation.

The Lawrence County EMA Director will document the number of people who participate in the annual meetings and the results of the meeting for inclusion in the plan when it is next updated. In this way, the public will have an opportunity to become involved in the planning process and to influence mitigation planning decisions.

The Lawrence County EMA Director will provide a written report and/or make a presentation to the Lawrence County Commissioners to advise them of the status of the plan and of proposed mitigation actions. In this way, the public will have another opportunity to become aware of local mitigation efforts.

## List of Sources

- American Association of States Climatologists. (<http://www.stateclimate.org/>)
- Draft State of Ohio Enhanced Mitigation Plan, Ohio Emergency Management Agency
- FEMA. Community Rating System (CRS) Communities and their Classes (<http://www.fema.gov/library/viewRecord.do?id=3629>)
- FEMA. 2010a. Community Status Book Report. (<http://www.fema.gov/cis/OH.pdf>)
- FEMA. Disaster Search Results. (<http://www.fema.gov/femaNews/disasterSearch.do>)
- National Inventory of Dams. (<http://geo.usace.army.mil/pgis/f?p=397:1:0::NO>)
- National Oceanic and Atmospheric Administration (NOAA). Enhanced Fujita Scale for Tornado Damage. (<http://www.spc.noaa.gov/faq/tornado/ef-scale.html>)
- National Performance of Dams Program. (<http://ce-npdp-serv2.stanford.edu/npdphome/damdir.htm>)
- Natural Resources Conservation Service. 2010. (<http://www.nrcs.usda.gov/>)
- National Weather Service. (<http://www.erh.noaa.gov>)
- NOAA. Snowfall – Average Total in Inches. (<http://lwf.ncdc.noaa.gov/oa/climate/online/ccd/snowfall.html>)
- NOAA. Ohio, Climate Division 9, Palmer Drought Severity Index (PDSI) (<http://www.ncdc.noaa.gov/temp-and-precip/time-series/index.php?parameter=pdsi&month=4&year=2011&filter=6&state=33&div=9>)
- Ohio Department of Development (ODOD). Current Projects – Overview, (<http://development.columbus.gov/planning/currentprojects.aspx>)
- Ohio Development Services Agency. Lawrence County Profile (<http://development.ohio.gov/files/research/C1045.pdf>)
- Ohio EMA. State of Ohio: Hazard Identification and Risk Analysis (HIRA) ([http://ema.ohio.gov/Documents/OhioMitigationPlan/2011/Appendix%20I\\_Ohio%20HIRA.pdf](http://ema.ohio.gov/Documents/OhioMitigationPlan/2011/Appendix%20I_Ohio%20HIRA.pdf))
- Ohio EMA. Drought Annex ([http://ema.ohio.gov/Documents/Ohio\\_EOP/drought\\_annex.pdf](http://ema.ohio.gov/Documents/Ohio_EOP/drought_annex.pdf))
- Ohio DOA. Plant Health Division - Emerald Ash Borer (<http://www.agri.ohio.gov/eab/>)
- Ohio Department of Natural Resources (ODNR). Earthquakes in Ohio (<http://www.dnr.state.oh.us/Portals/10/pdf/EL/el09.pdf>)

- Richter, C. F., Elementary Seismology. ([http://www.uwiseismic.com/Downloads/Eq\\_mercalli\\_scale.pdf](http://www.uwiseismic.com/Downloads/Eq_mercalli_scale.pdf))
- State of Ohio Disaster History. Presidential Disaster Declarations (1964 - 2011). ([http://ema.ohio.gov/Documents/OhioMitigationPlan/2011/Appendix%20A\\_State%20of%20Ohio%20Disaster%20History%20Chart.pdf](http://ema.ohio.gov/Documents/OhioMitigationPlan/2011/Appendix%20A_State%20of%20Ohio%20Disaster%20History%20Chart.pdf))
- U.S. Census. 2010. (<http://2010.census.gov/2010census/popmap/>)
- U.S. Census. Population Census Count by County, City, Village and Township, March 2011. (<http://www.development.ohio.gov/research/documents/ALLSUBCOUNTY2010.pdf>)
- U.S. Census. State & County QuickFacts (<http://quickfacts.census.gov/qfd/states/39/39049.html>)
- U.S. Department of Agriculture (USDA). National Agricultural Statistical Service. ([http://www.nass.usda.gov/Statistics\\_by\\_State/Ohio/index.asp](http://www.nass.usda.gov/Statistics_by_State/Ohio/index.asp))
- U.S. Department of the Interior, U.S. Geological Survey. U.S. State Information on Drought, last updated May 25, 2010. (<http://waterwatch.usgs.gov/?m=dryw>)
- USGS Ohio Seismic Hazard Map (<http://earthquake.usgs.gov/earthquakes/states/ohio/hazards.php>)
- USGS Ohio Earthquake History (<http://www.usgs.gov/>)

## List of Acronyms

CDBG	Community Development Block Grant
CRS	Community Rating System
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	Geographic Information System
HUD	Housing and Urban Development
MORPC	Mid-Ohio Regional Planning Commission
NCDC	National Climate Data Center
NFIP	National Flood Insurance Rate Program
NOAA	National Oceanic and Atmospheric Administration
ODNR	Ohio Department of Natural Resources
OEMA	Ohio Emergency Management Agency
OSU	Ohio State University
USDA	United States Department of Agriculture
USGS	United States Geological Survey

### **Appendix I Sample Plan Adoption Resolutions**

The Lawrence County Commissioners as well as the incorporated areas of the Village of Athalia, Village of Chesapeake, Village of Coal Grove, Village of Hanging Rock, City of Ironton, Village of Proctorville and Village of South Point will be passing a Resolution of Support for the Lawrence County countywide Mitigation Plan after contingent approval from the State of Ohio EMA as well as FEMA.

An example of the Resolution of Adoption that will be presented to the Commissioners as well as the participating incorporated jurisdictions is provided on the following pages.



RESOLUTION NO. \_\_\_\_\_

ADOPTION OF THE LAWRENCE COUNTY COUNTYWIDE NATURAL HAZARDS MITIGATION PLAN

WHEREAS, on \_\_\_\_\_, the Lawrence County Commissioners passed Resolution No. adopting the LAWRENCE COUNTY COUNTYWIDE NATURAL HAZARDS MITIGATION PLAN (the Mitigation Plan) pursuant to \_\_\_\_\_ which established goals to minimize and reduce stormwater damages to existing structures and land use in order to maximize the protection of public health, safety, and welfare, and identify and develop revenue sources to complete the goals and objectives; and

WHEREAS, the mission of the Lawrence County Countywide Natural Hazards Mitigation Plan Core Group is: “To develop a working document that fulfills the mandates of the Federal Disaster Mitigation Act of 2000, and satisfies the requirements of FEMA and the Ohio EMA, as well as meets the needs of all of Lawrence County. Further, by researching and planning for future natural hazards and implementing appropriate mitigation techniques, all of Lawrence County can save lives and protect property, reduce the cost of disasters and provide for a rapid and efficient recovery by coordinating response efforts, and increasing the educational awareness of natural hazard events and their effects on the people, property, and resources of all Lawrence County.”; and

WHEREAS, on \_\_\_\_\_, 2013, the Lawrence County Emergency Management Agency Director approved the development of a Mitigation Plan on behalf of the Lawrence County Board of County Commissioners; and

WHEREAS, a Mitigation Plan for Lawrence County will be required beginning in January 1<sup>st</sup>, 2013 to receive any state or federal mitigation funding such as flood prone property improvement or buyout funds; and

WHEREAS, the County of Lawrence County is subject to flooding, tornadoes, winter storms, and other natural hazards that can damage property, close businesses, disrupt traffic, and present a public health and safety hazard; and

WHEREAS the Mitigation Planning Core Group, comprised of representatives from the County, municipalities and stakeholder organizations, has prepared a recommended Mitigation Plan that reviews the options to protect people and reduce damage from these natural hazards; and

WHEREAS, the recommended Mitigation Plan has been widely circulated for review by the County’s residents and federal, state and regional agencies and has been supported by those reviewers.

NOW, THEREFORE BE IT RESOLVED by the Lawrence County Commissioners that:

1. LAWRENCE COUNTY COUNTYWIDE NATURAL HAZARDS MITIGATION PLAN is hereby adopted as an official plan of Lawrence County.

2. The Mitigation Planning Core Group is hereby established as a permanent advisory body. It shall be composed of representatives from the existing Mitigation Planning Core Group, as recommended by the Lawrence County Emergency Management and Homeland Security Office. This includes those municipalities that pass a resolution to adopt for the Mitigation Plan.
3. The Core Group shall meet as often as necessary to prepare or review mitigation activities and progress toward implementing the Mitigation Plan. It shall meet at least once each year to review the status of ongoing projects.
4. The schedule of Core Group meetings shall be posted in appropriate places. All meetings of the Core Group shall be open to the public.
5. By November 30 each year, the Core Group shall prepare an annual evaluation report on the Mitigation Plan for the County Board of Commissioners and the municipalities.

The report will cover the following points:

- a. A review of the original plan.
  - b. A review of any natural disasters that occurred during the previous calendar year.
  - c. A review of the action items in the original plan, including how much was accomplished during the previous year.
  - d. A discussion of why any action items were not completed or why implementation is behind schedule.
  - e. Recommendations for new projects or revised action items. Such recommendations shall be subject to approval by the County Board of Commissioners and the affected municipality's governing boards as amendments to the adopted plan.
6. The director of each County office identified as "responsible agency" for the Mitigation Plan's action items shall ensure that the action item is implemented by the listed deadline subject to fiscal and staff time constraints.

Passed by the Lawrence County Board of Commissioners on \_\_\_\_\_.

Vote:

Yes \_\_\_\_

No \_\_\_\_



# Appendix II

## Core Group Invite and Meeting Minutes



### Lawrence County EMA

Emergency Management Agency

515 Park Avenue Ironton, OH 45638

EMA: Tel. 740-533-4375 Fax 740-533-4390

September 20, 2012

From the desk of:

Mr. Michael Boster, Director  
Lawrence County Emergency Management Agency  
515 Park Avenue  
Ironton, OH 45638

Dear Core Group Member:

Lawrence County has been awarded a planning grant from the Federal Emergency Management Agency (FEMA) under the Hazard Mitigation Grant Program (HMGP) to update the Lawrence County Natural Hazards Mitigation Plan to remain compliant with the Disaster Mitigation Act of 2000.

As you are aware, Lawrence County and all seven (7) of its incorporated jurisdictions have a FEMA approved Natural Hazards Mitigation Plan. Those incorporated jurisdictions include: Athalia, Chesapeake, Coal Grove, Hanging Rock, Ironton, Proctorville and South Point.

Although townships are not required to attend we encourage their participation in this effort as well.

This effort requires us to evaluate the existing Natural Hazards Mitigation Plan, to update the Action Plan for each participating community and to help those communities who participate to achieve and sustain future economic and community development, growth, and change that incorporate their local values and concerns for resiliency to natural disasters. Although natural weather-related occurrences will continue, this planning process will help local communities lessen their impact.

We request your participation in this process and hope that you can attend our first meeting scheduled for Thursday, October 11<sup>th</sup> at 4:00 pm at the Lawrence County Emergency Operations Center located at 515 Park Avenue in Ironton. The meeting room is at the rear of the county's 911 Dispatch Center Building, directly behind the Lawrence County Sheriff's Office. We will provide light refreshments.

If you have any questions about this process please feel free to give me a call.

Sincerely,

Michael Boster, Director  
Lawrence County

cc: Kari Mackenbach, URS Corporation

# Core Group Meeting Minutes- Oct. 11<sup>th</sup> 2012

**URS**

277 W. Nationwide Blvd.  
Columbus, OH 43215  
Telephone: (614) 464-4500  
Facsimile: (614) 464-0588  
*Architectural & Engineering Services*

## MEETING MINUTES

**LOCATION:** Lawrence County  
Lawrence County Emergency  
Operations Center

**BY:** Kari Mackenbach

**ATTENDEES:** **Lawrence Co. EMA-** Mike Boster  
**Law. Co. Engineer-** Paul Rubadue  
**Law. Co. 911-** Lonnie Best  
**Law. Soil and Water-** Peggy Reynolds  
**Law. Co. Auditor-** Matthew Vance  
**Village of Chesapeake-** Dick Gilpin  
**City of Ironton-** Thomas Runyon  
**Village of Hanging Rock-** Jarrod  
Robinson, Tim Dickens  
**Village of Proctorville-** Mark Root  
**Chesapeake-Union Twp. Vol. Fire  
Dept.-** Ed Webb  
**Commercial Property Resource  
Realty-** Keith McGuire  
**Ironton Law. Co. Community  
Action-** Cindy Anderson  
**Ohio U. Southern Campus-** Adam  
Riehl  
**Eastham & Associates-** Lester  
Tinkham  
**URS-** Kari Mackenbach, Bill Porteus

**MEETING DATE:** Oct. 11, 2012 @ 4:00 p.m.

**ISSUE DATE:** Oct. 23, 2012

**PROJECT:** Lawrence County NHMP

**JOB NO.:** URS: 14578121

**RE:** Core Group Meeting

**COPIES:** Attendees (see above), Central Files,

This report will confirm those items discussed and/or reached. Unless information to the contrary is received within five (5) working days, the writer will assume all participants agree with the contents of this memorandum.

The meeting was held at the Lawrence Co. Emergency Operations Center at 515 Park Avenue Ironton, OH 45638 and began at 4 p.m.

Items discussed were as follows:

### DISCUSSION ITEMS:

- **Introductions**
- **Mitigation Overview**
  - Natural Hazards Mitigation Plan (NHMP)

- Current Trends in Mitigation Planning
- FEMA Fundable Projects
- **Plan Overview**
  - Update process
  - Core Group Roles
    - Review and develop new goals
    - Review and approve the draft plan
    - Create Action Items representative of plan goals
  - Examination of existing mitigation action items
- **Discussion**
  - Information on historical disasters since 2003
  - Plan Goals
  - Action Items
- **Next steps**
  - Update status on past projects
  - Prioritization of Action Items as part of Cost Benefit Review
- **Establish Meetings and Important Dates**

### MEETING MINUTES

Specific items of importance discussed at the meeting were as follows:

- 1) Introductions
  - a) All members of the Core Group were introduced by name, position and group / agency represented
  - b) Two planners from the contracted firm, URS, were present and explained their role in the plan development process
- 2) Mitigations Overview
  - a) The Natural Hazards Mitigation Plan is a collaborative document wherein counties identify natural hazards, potential risk for disasters, and possible mitigation actions to be better prepared for when natural disasters occur. An approved plan enables a county and other municipal jurisdictions to apply for available federal mitigation funding.
  - b) The Plan establishes mitigation projects that can be pre and post disaster funded.
  - c) The Plan will be reviewed based of the guidelines of the Plan Review Guide of 2011.
  - d) The State has launched a new program called State Hazard Analysis, Resource and Planning Portal (Ohio SHARPP) to capture mitigation efforts and documents statewide.
  - e) FEMA fundable projects were briefly discussed.
  - f) Larger more comprehensive projects are more likely to be funded than smaller projects.
- 3) Plan Overview
  - a) The first task of the planning process is Data Collection and Updating any new Materials and information
  - b) The Core Group will help with additional materials and information for the plan.
    - i) Review and develop new goals
    - ii) Review and approve the draft plan
    - iii) Create Action Items representative of goals
  - c) Examination of existing action items

- (1) Core Group will receive the Action Items in an excel format and are asked to evaluate the existing action items. If a Core Group Member knows the status of an existing Action Item (i.e. Implemented, On-going or Never Happened) they are to denote this on the spreadsheet.
  - (2) More Action Items need to be created that align with fundable projects and address "larger picture" mitigation goals.
- d) 2007 Plan update was revised with minimal data and material updating.
- 4) Discussion
- a) Previous Goals were re-evaluated to produce functioning Goals that enhance new Action Items. These draft Goals will be sent to each Core Group member for consideration, revisions and eventual acceptance.
  - b) The Core Group needs to develop new Action Items, which will be emailed from the Core Group, assimilated into a document to be prioritized in the next Core Group meeting.
  - c) Available information includes flood damage to public infrastructure (e.g. roadways, culverts, bridges, etc.) and homes and businesses.
  - d) Record keeping of dollars lost in hazard / disaster clean up may be beneficial.
  - e) The Workforce Development Resource Center manages a federal cleanup program after a Federal Disaster Declaration. Information from that program would be beneficial.
  - f) There are 18 dams in the county and most do not have an Emergency Action Plans (EAP) in place. There are also no regulations for downstream development below these dams.
  - g) Invasive Vegetative Species are a problem in the county. There is already an organization established that looks at this issue.
- 5) Next Steps
- a) Update status on past projects
  - b) Prioritization of Action Items as part of the Cost Benefit Review
- 6) Establish Important Dates
- a) Next Meeting will be held at the Lawrence County EOC, 515 Park Avenue Ironton, OH 45638 on Nov. 15, 2012 at 4:00 p.m.
  - b) Core Group Members were asked to respond via email with new Action Items by Oct. 26<sup>th</sup>.

**END OF MINUTES**

# Core Group Meeting Minutes- Nov. 15<sup>th</sup> 2012

**URS**

277 W. Nationwide Blvd.  
Columbus, OH 43215  
Telephone: (614) 464-4500  
Facsimile: (614) 464-0588  
*Architectural & Engineering Services*

## MEETING MINUTES

**LOCATION:** Lawrence County  
Lawrence County Emergency  
Operations Center

**MEETING DATE:** Nov. 15, 2012 @ 4:00 p.m.

**ISSUE DATE:** Nov. 29, 2012

**BY:** Bill Porteus

**PROJECT:** Lawrence County NHMP

**ATTENDEES:** **Lawrence Co. EMA-** Mike Boster  
**Law. Co. Engineer-** Doug Cade, Paul Rubadue  
**Law. Co. Auditor-** Matthew Vance  
**Village of Chesapeake-** Dick Gilpin  
**City of Ironton-** Thomas Runyon  
**Chesapeake-Union Twp. Vol. Fire Dept.-** Ed Webb  
**Eastham & Associates-** Lester Tinkham  
**Law. Co. SWCD-** Carrie Yaniko  
**URS-** Bill Porteus

**JOB NO.:** URS: 14578121

**RE:** Core Group Meeting

**COPIES:** Attendees (see above), Central Files,

This report will confirm those items discussed and/or reached. Unless information to the contrary is received within five (5) working days, the writer will assume all participants agree with the contents of this memorandum.

The meeting was held at the Lawrence Co. Emergency Operations Center at 515 Park Avenue Ironton, OH 45638 and began at 4 p.m.

Items discussed were as follows:

### DISCUSSION ITEMS:

- **Accept New Plan Format**
- **Finalize Mitigation Goals**
- **Action Items**
  - **Add New Action Items**
  - **Prioritize Action Items**
- **Next Steps**
  - **Identify Completed or In Progress Actions**
  - **Conduct Public Meeting**
  - **Update Plan**
- **Establish Meetings and Important Dates**



### **MEETING MINUTES**

Specific items of importance discussed at the meeting were as follows:

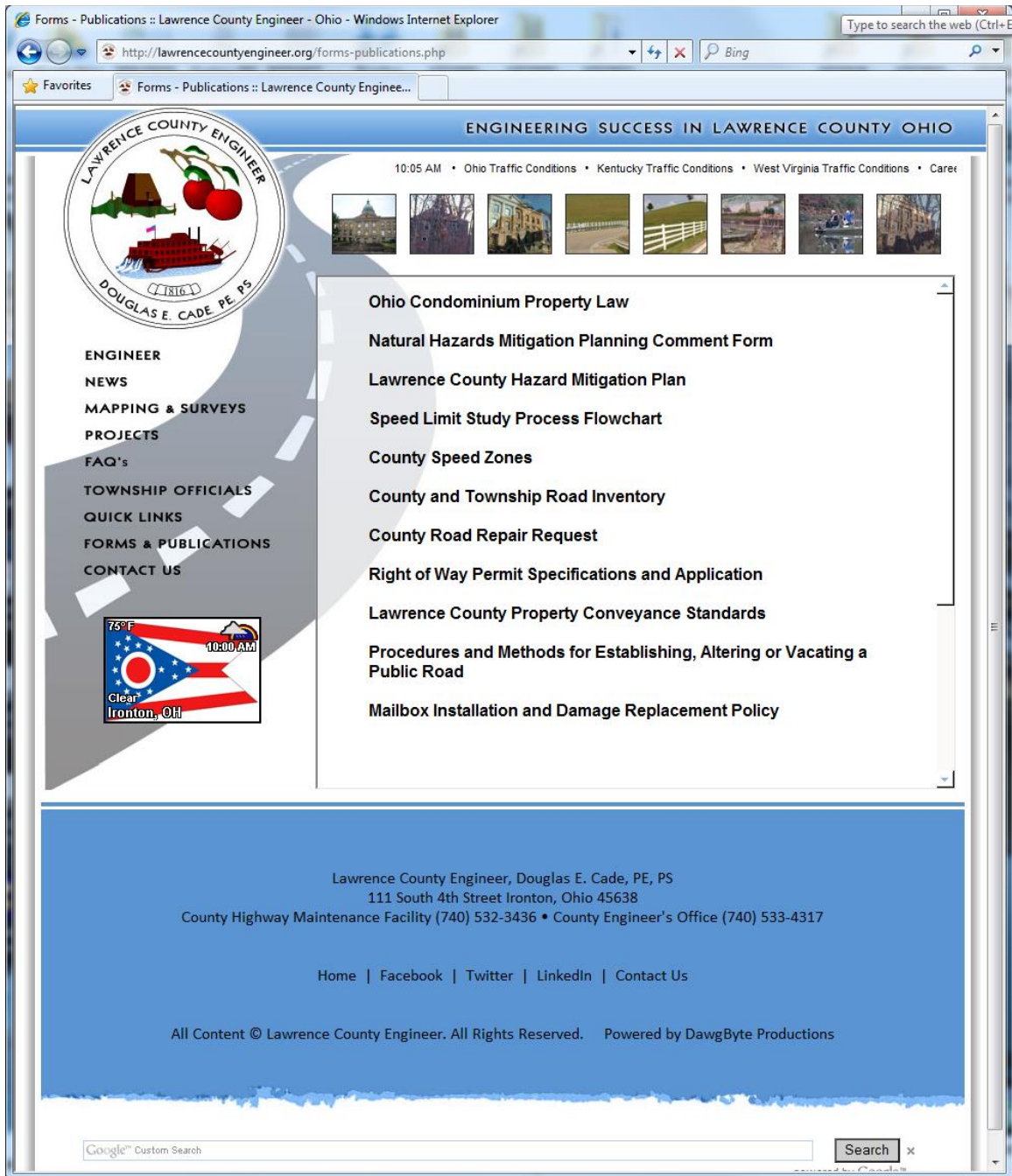
- 1) Accept New Plan Format
  - a) Reasons for changing to a new Plan format were discussed and the Core Group approved updating the Plan's format.
- 2) Finalize Mitigation Goals
  - a) The new hazard mitigation goals established at the last Core Group Meeting were approved.
- 3) Action Items
  - a) The mitigation of Repetitive Loss Structures within the County was added to the list of Action Items.
  - b) Action Items were prioritized based off a voting system. The voting system provided two benefits. The first is it provides a means to prioritize the Action items. For the second, it acts as a cost benefit review process that is conducted by the Core Group. The core Group was instructed to keep in mind the following things when voting: Historical Occurrence, Affected Area, Collateral Damage, Warning Time, Demographic Factor, Fiscal Effect, Duration, and Response Time.
  - c) Each member had 12 votes with a weighted value of 4 votes high, 4 votes medium, and 4 votes low. Each vote counted once but tie-breakers were settled based off of which Action Item received more higher weighted votes. The Core Group also decided that any Action Items with the same vote weighting would be prioritized based off of the prioritization of the hazard.
  - d) Jurisdictional representatives at this meeting accepted the Action Item prioritization for their jurisdiction. Jurisdictions not represented at this meeting will be asked if they will support the prioritization of the Action Items.
- 4) Next Steps
  - a) Identify Completed or In Progress Actions
  - b) A public meeting will be scheduled for the middle of December.
  - c) Update Plan and prepare a draft for the core Group to review by January.
- 5) Public Meeting is tentatively set for Dec. 19th, 2012 from 4pm to 6pm with the location at the library or the EMA Center.

**END OF MINUTES**

**Appendix III**  
**Letter to Reviewers**

# Appendix IV Public Involvement

A screen shot was taken of the Lawrence County Engineer's website to show that the public had access to the Plan and was able to make comments as it was being updated. Both the Plan and Comment Form were in PDF form to be viewed on screen or printed out.



# Press Release

## **Lawrence County EMA** **Emergency Management Agency**

515 Park Avenue Ironton, OH 45638

EMA: Tel. 740-533-4375 Fax 740-533-4390

---

December 10, 2012

### **NEWS RELEASE**

For Immediate Release

Subject: Lawrence County Emergency Management Agency (EMA) invites public comment on Hazard Mitigation Plan.

#### **Ironton, Ohio**

Lawrence County Emergency Management Agency is currently updating the Lawrence County, Ohio Hazard Mitigation Plan – 2003/2007 version, to remain compliant with the Disaster Mitigation Act of 2000, according to Michael Boster, Director of Lawrence County Emergency Management Agency. “This effort requires a review and evaluation of the existing plan, an update of the action plan for each participating community and the overall development of an updated plan for the county.” said Boster. “The process also helps the participating communities to achieve and sustain future economic and community development, growth, and changes that incorporate their local values and concerns for resiliency to natural disasters.” Although natural hazards and weather-related events will continue to happen, the planning process can help local communities lessen the impact of such events. “We cannot stop natural hazards from occurring, of course, but we can often identify steps that communities can take to reduce the impact or consequences of a particular hazard on the community.” he added.

- MORE -

Lawrence County EMA is inviting PUBLIC PARTICIPATION in the planning process by providing an opportunity to review the current approved plan and to submit written comments. The public can view the old plan online at the Lawrence County Engineer's website at <http://lawrencecountyengineer.org/forms-publications.php> under the "Forms and Publications" tab. A download of **Adobe Acrobat Reader** might first be required to view the documents. "I appreciate Doug Cade and the County Engineer's Office partnering with our agency to make the plan available for public comment." said Boster. "The Engineer, along with other key community leaders has been involved in the review process. Collaboration is always a very important part of the emergency management planning process"

COMMENTS: A printable PDF [Comment Form](#) is included on the *Lawrence County Ohio Emergency Management Agency* Facebook page. To comment, you may download, complete and FAX or E-mail the form to Lawrence County EMA.

You may also review a copy of the Natural Hazards Mitigation Plan 2003/2007 by appointment, or you may request a [Comment Form](#) in person at the Emergency Management Agency Office located at 515 Park Avenue, Ironton, OH 45638. Call, E-mail or fax the agency for an appointment or form.

PUBLIC MEETING: Lawrence County EMA will host a PUBLIC MEETING concerning Hazard Mitigation planning on Wednesday, December 19, 2012 from 4 -6 pm at the Lawrence County Emergency Operations Center located at 515 Park Avenue in Ironton at the rear of the county's 911 Dispatch Center Building, directly behind the Lawrence County Sheriff's Office.

To learn more, contact Lawrence County (Ohio) Emergency Management Agency at 740-533-4375 or by fax at 740-533-4390 or by E-mail at **LAWCOOHEMA@GMAIL.COM**

- END -

# Example Letter to Organizations



## Lawrence County EMA Emergency Management Agency

515 Park Avenue Ironton, OH 45638

EMA: Tel. 740-533-4375 Fax 740-533-4390

October 6, 2011

To: Wayne National Forest  
Tim Slone, Ironton District Ranger  
6518 State Route 93  
Pedro, OH 45659

From: Michael L. Boster, Director Lawrence County EMA  
Subject: Lawrence County (All-Natural Hazards) Hazard Mitigation Plan update process

The purpose of this letter is to notify you that the Lawrence County is actively updating the **Lawrence County, Ohio Hazard Mitigation Plan**.

In an effort to continue to meet the mission of protecting lives, property, economic interests and quality of life for the people of Lawrence County, the county is updating the current Hazard Mitigation Plan originally developed and adopted subsequent to November 2003. This is a required FEMA update to remain eligible for federal mitigation funds and programs.

The updated plan will incorporate past and current hazard event information, as well as risk assessments, identification and documentation of hazards, benefit cost analysis where required, and other aspects of potential future mitigation efforts in the county. Included will be information concerning flooding, tornadoes, winter storms, earthquakes, and other natural hazards that have or could affect the county.

Participants in the update process will include state, county, municipal and township governmental entities as well as emergency response, private agencies, organizations and individuals who are stakeholders in the process. By updating the plan collaboratively, the county can best identify all areas of risk, assess the magnitude of the risks and develop strategies and priorities for reducing the risks. The county, as well as all municipal jurisdictions will be participating in the update process.

This letter is our request for assistance from your agency, specifically:

Do you have any information on past natural hazard events (e.g. floods, tornadoes, winter storms, wind events, etc.) and possible solutions to the risk of these hazards?

Is your agency planning or implementing any natural hazard reduction projects / mitigation projects that we should be aware of?

Does your agency have any financial or technical assistance that would benefit us in our plan update process?

Do you have any suggestions on what types of activities we should be reviewing that would reduce damages from natural hazards in Lawrence County?

Would you be willing and able to meet with the planning committee to advise us on your agency's work and recommendations? ...or to participate in the entire update process?

We have scheduled our first plan update meeting as follows:

**Mitigation Plan Update: Planning Meeting**  
**Briggs Lawrence County Library: Main Branch**  
**321 South 4<sup>th</sup> Street, Ironton, OH**  
**Wednesday October 19, 2011**  
**10 a.m. to 12 noon**

Please contact the Lawrence County EMA as necessary to contribute to the process, or, with any questions, comments, concerns or requests for more information on this plan update effort.

Voice: 740-533-4375

Email: lawcoohema@gmail.com

Sincerely,

Michael L. Boster, Director  
Lawrence Emergency Management Agency

CC: FILE

# Example Letter to Jurisdictions



## **Lawrence County EMA** Emergency Management Agency

---

515 Park Avenue Ironton, OH 45638

EMA: Tel. 740-533-4375 Fax 740-533-4390

**September 30, 2011**

**Mayor Rich Blankenship  
City of Ironton  
Ironton, OH 45638**

**Subject:  
Mitigation Plan Update Planning Meeting  
Briggs Lawrence County Library: Main Branch  
321 South 4<sup>th</sup> Street, Ironton, OH  
Wednesday October 19, 2011  
10 a.m. to 12 noon  
Ironton, OH**

Mayor Rich Blankenship,

The Lawrence County Emergency Management Agency, in cooperation other government and private agencies, is launching an effort to **update** the Lawrence County Hazard Mitigation Plan. The original plan, which was submitted in 2003 and then subsequently approved by FEMA, is due to be updated by the end of March 2012. Lawrence County EMA intends to seek planning grant funds to support the planning efforts. If successful, the grant will require a 25% local match, which can be a combination of cash or in-kind match. Time spent in planning meetings, supplies and several other "soft match" items can be used toward the match.

We will begin the mitigation plan update process by establishing a "Core Mitigation Planning Group" comprised of stakeholders from local (county, municipal and township) government; state government; utility companies, private business interests (banks, realty, insurance companies); planning professionals; and others as needed. In order to be included in future FEMA mitigation grant programs and projects, Municipalities within the county must either participate in the county planning process, or they must develop and adopt their own plans. If they choose to participate in the county process, they must subsequently adopt the plan formally after FEMA approval.

The kickoff meeting for the core group will be conducted at the Ironton Branch of the Briggs Lawrence County Library located at 321 South 4<sup>th</sup> Street in Ironton on Wednesday October 19, 2011 beginning at 10 a.m. until 12 noon.



Background

Under the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288), as amended, State, Tribal, and local governments are required to develop and maintain current, a hazard mitigation plan as a condition for receiving certain types of emergency and non-emergency disaster assistance, including funding for the mitigation process.

The planning process promoted by the Federal Emergency Management Agency (FEMA) is as important as the resulting plan itself because it creates a framework for government to reduce the negative impacts from future disasters on lives, property, the environment and the economy. The planning process includes the following elements: Public involvement and organization of resources and data, conducting a risk assessment, developing a mitigation strategy to implement the plan (goals and objectives for each jurisdiction), and monitoring the progress / making future updates as needed.

Additionally, mitigation planning benefits the county by increasing public awareness for vulnerabilities, garnering support for specific actions to avoid future disasters, building collaboration with various stakeholders (leveraging valuable data and resources), building upon the understanding of risk reduction, and guiding proper development, prioritization and implementation of mitigation projects to avoid future damages from hazard events.

Sincerely,

---

Michael L. Boster, Director  
Lawrence Emergency Management Agency

CC: FILE

# Letter to Adjacent Counties



## Lawrence County EMA

Emergency Management Agency

515 Park Avenue Ironton, OH 45638

EMA: Tel. 740-533-4375 Fax 740-533-4390

September 21, 2012

To: Kim Carver, Director Scioto County EMA  
Robert Czechlewski, Director Jackson County EMA  
Sherry Daines, Director Gallia County EMA  
Dennis Bass, Director Greenup County OEM  
Brent Webster, Director Boyd County OEM  
Bill Willis, Director Wayne County OES  
Gordon Merry, Director Cabell County OES

From: Michael L. Boster, Director Lawrence County EMA  
Subject: Lawrence County Natural Hazards Mitigation Plan update process

The purpose of this letter is to notify you that the Lawrence County is actively updating the **Lawrence County, Ohio Natural Hazards Mitigation Plan**. This is a required notification to adjacent communities about these actions.

In an effort to continue to meet the mission of protecting lives, property, economic interests and quality of life for the people of Lawrence County, the county is updating the current Natural Hazards Mitigation Plan originally developed and adopted subsequent to November 2003. This is a required update to remain eligible for FEMA federal mitigation funds and programs.

The updated plan will incorporate past and current hazard event information, as well as risk assessments, identification and documentation of hazards, benefit cost analysis where required, and other aspects of potential future mitigation efforts in the county. Included will be information concerning flooding, tornadoes, winter storms, earthquakes, and other natural hazards that have or could affect the county.

Participants in the update process will include state, county, municipal and township governmental entities as well as emergency response, private agencies, organizations and individuals who are stakeholders in the process. By updating the plan collaboratively, the county can best identify all areas of risk, assess the magnitude of the risks and develop strategies and priorities for reducing the risks. The county, as well as all municipal jurisdictions will be participating in the update process. Through a grant, we have enlisted a contractor, URS Corporation, to facilitate the process and production of the updated plan.

Please contact the Lawrence County EMA as necessary to contribute to the process, or, with any questions, comments, concerns or requests for more information on this plan update effort.

Sincerely,

Michael L. Boster, Director  
Lawrence Emergency Management Agency

CC: Kari Mackenbach, URS Corporation  
File

## **Appendix V**

### **Multi-Hazard Maps and Dam Locator Map**

## Appendix VI NCDC Historical Events

### Flood History

43 Events were reported in Lawrence County between 01/01/1994 and 12/31/2011.

Mag - Magnitude, Dth - Deaths, Inj - Injuries, PrD - Property Damage, CrD - Crop Damage

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
Countywide	5/7/1994	06:00:00 PM	FLASH FLOOD	N/A	0	0	500	0
OHZ076 - 085>087	1/20/1996	12:00:00 PM	FLOOD	N/A	0	0	1700	0
COUNTYWIDE	4/1/1996	10:00:00 AM	FLASH FLOOD	N/A	0	0	10	0
COUNTYWIDE	5/15/1996	02:00:00 PM	FLASH FLOOD	N/A	0	0	10	0
BARTLES	5/24/1996	09:30:00 AM	FLASH FLOOD	N/A	0	0	10	0
PROCTORVILLE	6/8/1996	06:15:00 PM	FLASH FLOOD	N/A	0	0	10	0
EASTERN HALF	6/23/1996	12:00:00 AM	FLASH FLOOD	N/A	0	0	400	0
COUNTYWIDE	7/31/1996	02:30:00 AM	FLASH FLOOD	N/A	0	0	400	100
COUNTYWIDE	3/1/1997	06:30:00 AM	FLASH FLOOD	N/A	0	0	2000	0
COUNTYWIDE	3/2/1997	12:00:00 AM	FLASH FLOOD	N/A	0	0	1000	0
OHZ087	3/2/1997	07:00:00 PM	FLOOD	N/A	0	0	2000	0
COUNTYWIDE	3/3/1997	08:00:00 AM	FLASH FLOOD	N/A	0	0	10	0
COUNTYWIDE	3/4/1997	01:00:00 AM	FLASH FLOOD	N/A	0	0	5	0
KITTS HILL	6/2/1997	05:45:00 PM	FLASH FLOOD	N/A	0	0	20	0
COUNTYWIDE	1/7/1998	07:00:00 PM	FLASH FLOOD	N/A	0	0	10	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
COUNTYWIDE	6/14/1998	11:30:00 PM	FLASH FLOOD	N/A	0	0	10	0
COUNTYWIDE	2/18/2000	04:00:00 PM	FLASH FLOOD	N/A	0	0	400	0
OHZ075 - 085>087	2/19/2000	11:00:00 AM	FLOOD	N/A	1	0	50	0
IRONTON	7/10/2000	10:30:00 PM	FLASH FLOOD	N/A	0	0	2	0
BUCKHORN	5/17/2001	12:30:00 AM	FLASH FLOOD	N/A	0	0	25	0
NORTH PORTION	5/17/2001	10:30:00 PM	FLASH FLOOD	N/A	0	0	250	0
COUNTYWIDE	5/18/2001	06:00:00 PM	FLASH FLOOD	N/A	0	0	400	0
OHZ085>087	3/20/2002	02:00:00 AM	FLOOD	N/A	0	0	750	0
OHZ083>084 - 086>087	4/21/2002	07:00:00 PM	FLOOD	N/A	1	0	40	0
OHZ083>087	4/28/2002	03:30:00 AM	FLOOD	N/A	0	0	45	0
OHZ083 - 086>087	5/10/2003	11:00:00 AM	FLOOD	N/A	0	0	450	0
WATERLOO	6/16/2003	05:15:00 PM	FLASH FLOOD	N/A	0	0	15	0
SCOTTOWN	8/11/2003	03:15:00 PM	FLASH FLOOD	N/A	0	0	10	0
OHZ085>087	3/5/2004	09:00:00 PM	FLOOD	N/A	0	0	0	0
ARABIA	7/3/2004	02:15:00 PM	FLASH FLOOD	N/A	0	0	10	0
OHZ066>067 - 075>076 - 083>087	9/8/2004	12:00:00 PM	FLOOD	N/A	0	0	3530	0
OHZ066>067 - 075>076 - 084>087	9/17/2004	08:15:00 AM	FLOOD	N/A	0	0	25500	0
OHZ087	11/4/2004	08:20:00 AM	FLOOD	N/A	0	0	400	0
OHZ087	1/23/2006	03:15:00 AM	FLOOD	N/A	0	0	0	0
PLATFORM	4/4/2008	07:00:00 AM	FLOOD	N/A	0	0	0	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
WATERLOO	6/4/2008	14:00:00 PM	FLOOD	N/A	0	0	750	0
KELLEY MILLS	6/17/2009	12:01:00 AM	FLASH FLOOD	N/A	0	0	250	0
PINE GROVE	5/2/2010	03:00:00 PM	FLOOD	N/A	0	0	2000	0
HANGING ROCK	7/20/2010	08:25:00 PM	FLASH FLOOD	N/A	0	0	4000	0
MILLER	3/11/2011	03:00:00 AM	FLOOD	N/A	0	0	50	0
PINE GROVE	4/22/2011	09:20:00 PM	FLOOD	NA	0	0	100	0
BLACKFORK	5/10/2011	05:15:00 PM	FLASH FLOOD	NA	0	0	8000	0
PEDRO	11/22/2011	03:00:00 PM	FLOOD	NA	0	0	10	0
TOTALS:					2	0	55132	100

### Snow and Ice History

17 Snow and Ice events were reported in Lawrence County between 01/01/1993 and 04/30/2011.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
OHZALL	15-Feb-93	1800	HEAVY SNOW	N/A	1	0	5000	0
OHZ42>088	08-Feb-94	0500	ICE STORM	N/A	1	1568	50000	5000
OHZ067>069 - 075 - 076 - 079 - 081>088	11-Feb-94	0100	ICE STORM	N/A	0	26	5000	500
OHZ023 - 033 - 039>041 - 048>050 - 057>059 - 066>069 - 074>076 - 083>088	08-Mar-95	0600	HEAVY SNOW	N/A	0	0	50	0
OHZ066>067 - 075>076 - 083>087	06-Jan-96	06:00:00 PM	HEAVY SNOW	N/A	0	0	5	0
OHZ083>087	11-Jan-96	10:00:00 PM	HEAVY SNOW	N/A	0	0	0	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
OHZ086>087	02-Feb-96	12:00:00 PM	HEAVY SNOW	N/A	0	0	0	0
OHZ075 - 083>087	03-Feb-98	10:00:00 PM	WINTER STORM	N/A	0	0	250	0
OHZ066>067 - 075>076 - 083>087	12-Feb-99	10:00:00 AM	SNOW	N/A	0	0	0	0
OHZ066>067 - 075>076 - 083>087	20-Jan-00	12:00:00 AM	SNOW	N/A	0	0	0	0
OHZ083 - 086>087	29-Jan-00	06:00:00 PM	WINTER STORM	N/A	0	0	0	0
OHZ066>067 - 075>076 - 083>087	19-Jan-01	10:00:00 AM	SNOW	N/A	0	0	0	0
OHZ066>067 - 075>076 - 084>087	06-Jan-02	07:00:00 AM	SNOW	N/A	0	0	0	0
OHZ087	19-Jan-02	05:00:00 AM	HEAVY SNOW	N/A	0	0	0	0
OHZ066>067 - 075>076 - 083>087	04-Dec-02	07:00:00 PM	SNOW	N/A	0	0	0	0
OHZ083 - 085>087	16-Feb-03	02:00:00 AM	ICE STORM	N/A	0	0	6250	0
OHZ066>067 - 075>076 - 083>087	25-Jan-04	12:00:00 PM	WINTER STORM	N/A	0	0	0	0
TOTALS:					2	1594	66753	5500

### Thunderstorm and High Wind History

89 Thunderstorm and High Wind events were reported in Lawrence County between 01/01/1968 and 06/30/2011.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
LAWRENCE	05/26/68	1430	TSTM WIND	0	0	0	0	0
LAWRENCE	07/02/70	1640	TSTM WIND	0	0	0	0	0
LAWRENCE	06/12/73	1430	TSTM WIND	0	0	0	0	0
LAWRENCE	07/15/76	1740	TSTM WIND	0	0	0	0	0
LAWRENCE	07/09/80	2000	TSTM	0	0	0	0	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
			WIND					
LAWRENCE	07/12/80	1715	TSTM WIND	0	0	0	0	0
LAWRENCE	07/17/83	1530	TSTM WIND	0	0	0	0	0
LAWRENCE	07/23/83	1740	TSTM WIND	0	0	0	0	0
LAWRENCE	07/23/83	1740	TSTM WIND	0	0	0	0	0
LAWRENCE	08/09/83	1334	TSTM WIND	0	0	0	0	0
LAWRENCE	08/09/83	1425	TSTM WIND	0	0	0	0	0
LAWRENCE	04/27/87	1825	TSTM WIND	0	0	0	0	0
LAWRENCE	04/25/89	2200	TSTM WIND	0	0	0	0	0
LAWRENCE	08/05/89	1850	TSTM WIND	0	0	0	0	0
LAWRENCE	04/09/91	1510	TSTM WIND	0	0	0	0	0
LAWRENCE	04/09/91	1535	TSTM WIND	0	0	0	0	0
LAWRENCE	07/23/91	1705	TSTM WIND	0	0	0	0	0
LAWRENCE	07/23/91	1640	TSTM WIND	0	0	0	0	0
LAWRENCE	08/08/91	1730	TSTM WIND	0	0	0	0	0
LAWRENCE	07/10/92	2045	TSTM WIND	0	0	0	0	0
LAWRENCE	08/27/92	1210	TSTM WIND	0	0	0	0	0
Ironton	02/21/93	1745	TSTM WIND	0	0	0	50	0
Coal Grove	04/15/93	20:15	HIGH WINDS	0	0	2	50	0
Southern Half	05/18/93	15:30	HIGH WINDS	0	0	0	5	0
Wheelersburg	05/18/93	15:05	HIGH WINDS	0	0	0	5	0
Ohio Furnace	08/24/93	1640	TSTM WIND	0	0	0	50	0
South half	04/15/94	1305	TSTM	0	0	0	50	50



Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
			WIND					
Countywide	06/20/94	1930	TSTM WIND	0	0	0	5	0
Ironton	05/10/95	1815	TSTM WIND	0	0	0	10	0
Ironton	06/08/95	1645	TSTM WIND	0	0	0	20	0
Ironton	06/10/95	1315	TSTM WIND	0	0	0	45	0
Ironton	07/25/95	1545	TSTM WIND	0	0	0	2	0
Parts of West Central	11/11/95	10:15	HIGH WINDS	0	0	0	50	0
IRONTON	04/23/96	12:15:00 PM	TSTM WIND	0	0	0	5	0
CHESAPEAKE	04/23/96	12:25:00 PM	TSTM WIND	0	0	0	5	0
IRONTON	06/06/96	06:35:00 PM	TSTM WIND	0	0	0	200	0
PEDRO	07/02/97	08:26:00 PM	TSTM WIND	0	0	0	2	0
IRONTON	07/28/97	04:30:00 PM	TSTM WIND	0	0	0	3	0
PROCTORVILLE	08/17/97	03:48:00 PM	TSTM WIND	0	0	0	2	0
PROCTORVILLE	08/17/97	02:10:00 PM	TSTM WIND	0	0	0	20	0
COAL GROVE	02/17/98	01:33:00 PM	TSTM WIND	0	0	0	2	0
GETAWAY	06/10/98	01:30:00 AM	TSTM WIND	0	0	0	2	0
KITTS HILL	10/13/99	05:15:00 PM	TSTM WIND	0	0	0	5	0
COAL GROVE	04/20/00	08:30:00 PM	TSTM WIND	0	0	0	5	0
PLATFORM	08/09/00	06:35:00 PM	TSTM WIND	0	0	0	75	0
OHZ066>067 - 075>076 - 083>087	03/09/02	16:45	HIGH WINDS	0	0	0	75	0
IRONTON	11/10/02	08:33:00 PM	TSTM WIND	0	0	0	1	0
COAL GROVE	05/10/03	05:25:00 PM	TSTM WIND	50	0	0	10	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
IRONTON	05/10/03	05:45:00 PM	TSTM WIND	50	0	0	0	0
COUNTYWIDE	07/10/03	03:40:00 PM	TSTM WIND	50	0	0	75	0
VERNON	07/12/03	04:05:00 PM	TSTM WIND	50	0	0	0	0
COUNTYWIDE	05/27/04	08:25:00 PM	TSTM WIND	50	0	0	0	0
IRONTON	06/01/04	03:35:00 PM	TSTM WIND	50	0	0	0	0
SOUTH PT	06/01/04	03:45:00 PM	TSTM WIND	50	0	0	0	0
PEDRO	06/01/04	03:45:00 PM	TSTM WIND	50	0	0	0	0
COAL GROVE	06/14/05	04:52:00 PM	TSTM WIND	50	0	0	0	0
BURLINGTON	06/14/05	05:10:00 PM	TSTM WIND	50	0	0	0	0
SOUTH PT	06/22/06	08:40:00 PM	TSTM WIND	50	0	0	0	0
PROCTORVILLE	07/14/06	07:00:00 PM	TSTM WIND	50	0	0	0	0
SOUTH PT	06/13/07	21:21:00 PM	TSTM WIND	50	0	0	0	0
PROCTORVILLE	07/17/07	15:20:00 PM	TSTM WIND	55	0	0	250	0
CHESAPEAKE	07/27/07	15:52:00 PM	TSTM WIND	50	0	0	0	0
IRONTON	01/29/08	23:20:00 PM	TSTM WIND	50	0	0	0	0
PROCTORVILLE	06/04/08	14:40:00 PM	TSTM WIND	50	0	0	0	0
IRONTON	07/20/08	18:36:00 PM	TSTM WIND	50	0	0	0	0
PROCTORVILLE	07/20/08	18:55:00 PM	TSTM WIND	50	0	0	0	0
CHSPK LAWRENCE CO AR	07/20/08	18:50:00 PM	TSTM WIND	50	0	1	15	0
SOUTH PT	02/11/09	05:15:00 PM	TSTM WIND	55	0	0	2	0
IRONTON	07/11/09	04:35:00 PM	TSTM WIND	50	0	0	2	0
IRONTON	07/11/09	04:15:00 PM	TSTM WIND	50	0	0	3	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
IRONTON	07/11/09	04:30:00 PM	TSTM WIND	50	0	0	0	0
PROCTORVILLE	07/25/09	01:45:00 PM	TSTM WIND	50	0	0	0	0
KITTS HILL	06/15/10	09:11:00 PM	TSTM WIND	50	0	0	2	0
SOUTH PT	06/27/10	03:45:00 PM	TSTM WIND	50	0	0	20	0
LISMAN	08/05/10	11:40:00 AM	TSTM WIND	50	0	0	2	0
IRONTON	08/14/10	07:49:00 PM	TSTM WIND	50	0	0	2	0
LINNVILLE	03/23/11	04:15:00 PM	TSTM WIND	61	0	0	0	0
PROCTORVILLE	03/23/11	04:27:00 PM	TSTM WIND	50	0	0	10	0
PEDRO	04/23/11	04:10:00 PM	TSTM WIND	50	0	0	5	0
ELLISONVILLE	04/23/11	04:15:00 PM	TSTM WIND	50	0	0	75	0
PEDRO	04/23/11	04:05:00 PM	TSTM WIND	50	0	0	50	0
ATHALIA	04/23/11	04:38:00 PM	TSTM WIND	50	0	0	10	0
IRONTON	04/23/11	04:12:00 PM	TSTM WIND	50	0	0	1	0
KITTS HILL	04/23/11	04:20:00 PM	TSTM WIND	50	0	0	1	0
COAL GROVE	04/23/11	06:35:00 AM	TSTM WIND	50	0	0	5	0
LA GRANGE	05/23/11	08:29:00 PM	TSTM WIND	50	0	0	1	0
BURLINGTON	06/21/11	04:40:00 PM	TSTM WIND	50	0	0	7	0
NORTH KENOVA	06/21/11	04:38:00 PM	TSTM WIND	50	0	0	1	0
WATERLOO	06/23/11	02:45:00 PM	TSTM WIND	50	0	0	1	0
TOTALS:					0	3	1294	50

## Tornado History

4 Tornado events were reported in Lawrence County between 01/01/1950 and 04/30/2011.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
IRONTON	04/23/68	1530	Tornado	F5	7	93	0.03	0
LAWRENCE	06/02/80	1735	Tornado	F1	0	0	2500	0
LAWRENCE	07/12/80	1530	Tornado	F1	0	0	25	0
LAWRENCE	06/21/81	1520	Tornado	F0	0	0	25	0
LAWRENCE	08/09/00	07:26:00 PM	Tornado	F1	0	0	200	0
TOTALS:					7	93	2750	0

## Hail Storm History

69 Hail events were reported in Lawrence County between 01/01/1950 and 04/30/2011.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
Lawrence	6/20/1975	2:50:00 PM	Hail	1.75	0	0	0	0
Lawrence	8/13/1976	3:30:00 PM	Hail	1.75	0	0	0	0
Lawrence	6/2/1980	8:30:00 PM	Hail	2	0	0	0	0
Lawrence	6/9/1982	9:20:00 PM	Hail	1.75	0	0	0	0
Lawrence	7/17/1983	4:45:00 PM	Hail	1	0	0	0	0
Lawrence	7/17/1983	4:30:00 PM	Hail	1	0	0	0	0
Lawrence	7/10/1985	12:30:00 PM	Hail	0.75	0	0	0	0
Lawrence	6/27/1989	7:10:00 PM	Hail	1	0	0	0	0
Lawrence	4/9/1991	4:35:00 PM	Hail	0.75	0	0	0	0
Coal Grove	5/12/1993	1:15:00 PM	Hail	0.75	0	0	0.5	0
Lawrence	4/15/1994	12:00:00 AM	Hail	1	0	0	0	0
Pedro	6/21/1994	5:40:00 PM	Hail	1	0	0	0	0
LECTA	6/9/1996	04:30:00 PM	Hail	0.75	0	0	0	0
AID	6/2/1997	06:05:00	Hail	0.75	0	0	0	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
		PM						
WILLOW WOOD	1/8/1998	10:05:00 PM	Hail	1	0	0	0	0
SOUTH PT	1/8/1998	10:00:00 PM	Hail	1	0	0	5	0
PEDRO	5/24/1998	04:48:00 PM	Hail	1.5	0	0	40	0
IRONTON	5/24/1998	05:38:00 PM	Hail	1	0	0	50	0
IRONTON	6/16/1998	12:35:00 PM	Hail	1.75	0	0	250	0
IRONTON	6/16/1998	12:55:00 PM	Hail	0.88	0	0	25	0
WATERLOO	6/16/1998	01:00:00 PM	Hail	1	0	0	0	0
WATERLOO	7/2/1998	03:40:00 PM	Hail	1	0	0	0	0
ARABIA	7/2/1998	04:05:00 PM	Hail	1.75	0	0	10	0
PEDRO	7/28/2000	01:00:00 PM	Hail	1	0	0	0	0
IRONTON	11/10/2002	10:05:00 PM	Hail	0.75	0	0	0	0
COAL GROVE	11/10/2002	09:50:00 PM	Hail	0.75	0	0	0	0
WILLOW WOOD	11/10/2002	10:00:00 PM	Hail	0.75	0	0	0	0
CHESAPEAKE	5/1/2003	03:19:00 PM	Hail	1.75	0	0	5	0
IRONTON	7/12/2003	04:44:00 PM	Hail	0.75	0	0	0	0
CHESAPEAKE	5/31/2004	01:30:00 AM	Hail	0.75	0	0	0	0
SOUTH PT	6/14/2004	04:12:00 PM	Hail	1	0	0	0	0
WATERLOO	5/14/2005	02:40:00 PM	Hail	1	0	0	0	0
IRONTON	12/28/2005	03:55:00 PM	Hail	0.88	0	0	0	0
SOUTH PT	7/4/2006	04:58:00 PM	Hail	1	0	0	0	0
SCOTTOWN	3/14/2007	17:55:00 PM	Hail	1	0	0	0	0
IRONTON	6/19/2007	17:10:00 PM	Hail	0.88	0	0	0	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
IRONTON	7/24/2007	18:15:00 PM	Hail	0.88	0	0	0	0
SOUTH PT	7/27/2007	16:07:00 PM	Hail	0.88	0	0	0	0
IRONTON	8/16/2007	18:10:00 PM	Hail	0.75	0	0	0	0
SOUTH PT	8/16/2007	18:20:00 PM	Hail	0.88	0	0	0	0
PROCTORVILLE	8/16/2007	18:30:00 PM	Hail	0.88	0	0	0	0
IRONTON	5/11/2008	09:57:00 AM	Hail	0.75	0	0	0	0
PROCTORVILLE	6/1/2008	14:24:00 PM	Hail	0.75	0	0	0	0
PROCTORVILLE	6/1/2008	14:24:00 PM	Hail	0.88	0	0	0	0
WATERLOO	6/4/2008	13:00:00 PM	Hail	0.75	0	0	0	0
CHESAPEAKE	6/22/2008	12:00:00 PM	Hail	1.25	0	0	0	0
CHESAPEAKE	6/22/2008	11:51:00 AM	Hail	0.75	0	0	0	0
PROCTORVILLE	6/22/2008	12:00:00 PM	Hail	1	0	0	0	0
IRONTON	6/22/2008	11:25:00 AM	Hail	0.75	0	0	0	0
SOUTH PT	6/22/2008	11:32:00 AM	Hail	0.75	0	0	0	0
CHESAPEAKE	5/30/2009	10:35:00 PM	Hail	0.01	0	0	0	0
CHESAPEAKE	5/30/2009	08:36:00 PM	Hail	0.01	0	0	0	0
ANDIS	6/2/2009	05:05:00 PM	Hail	0.01	0	0	0	0
SHERRITTS	6/2/2009	02:05:00 PM	Hail	0.01	0	0	0	0
SOUTH PT	5/14/2010	04:18:00 PM	Hail	0.01	0	0	0	0
IRONTON	5/14/2010	03:32:00 PM	Hail	0.01	0	0	0	0
IRONTON	3/21/2011	06:20:00 PM	Hail	0.01	0	0	0	0
IRONTON	3/21/2011	06:00:00 PM	Hail	0.01	0	0	0	0
PROCTORVILLE	3/23/2011	10:50:00	Hail	0.01	0	0	0	0

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
		PM						
PEDRO	4/23/2011	04:05:00 PM	Hail	0.01	0	0	0	0
SOUTH PT	5/10/2011	04:32:00 PM	Hail	0.01	0	0	10	0
SOUTH PT	5/10/2011	04:30:00 PM	Hail	0.01	0	0	10	0
SOUTH PT	5/10/2011	04:35:00 PM	Hail	0.02	0	0	10	0
SOUTH PT	5/10/2011	05:32:00 PM	Hail	0.01	0	0	2	0
IRONTON	6/7/2011	02:50:00 PM	Hail	0.01	0	0	0	0
IRONTON	6/7/2011	03:00:00 PM	Hail	0.01	0	0	0	0
CHESAPEAKE	6/21/2011	04:38:00 PM	Hail	0.01	0	0	0	0
OHZ066 - 067 - 075 - 076 - 083 - 085 - 086 - 087	9/14/2011	08:30:00 PM	Hail	0.01	0	0	0	0
TOTALS:					0	0	417K	0

## Drought History

13 Drought events were reported in Lawrence County between 01/01/1994 and 04/30/2011.

Location or County	Date	Time	Type	Mag	Dth	Inj	PrD (x1000)	CrD (x1000)
OHZ083>087	5/1/1999	12:00 AM	Drought	N/A	0	0	0	0
OHZ075>076 083>087	6/1/1999	12:00 AM	Drought	N/A	0	0	0	0
OHZ066>067 075>076 - 083 - 085>087	7/1/1999	12:00 AM	Drought	N/A	0	0	0	0
OHZ066>067 075>076 - 083>087	8/1/1999	12:00 AM	Drought	N/A	0	0	0	0
OHZ066>067 075>076 - 083>087	9/1/1999	12:00 AM	Drought	N/A	0	0	0	0
OHZ066>067 075>076 - 083>087	10/1/1999	12:00 AM	Drought	N/A	0	0	0	0
OHZ066>067 075>076 - 083>087	9/1/2002	12:00 AM	Drought	N/A	0	0	0	0
OHZ086 - 087	6/8/2007	12:00 AM	Drought	N/A	0	0	0	0
OHZ086 - 087	7/1/2007	12:00 AM	Drought	N/A	0	0	0	0
OHZ086 - 087	8/1/2007	12:00 AM	Drought	N/A	0	0	0	0
OHZ083>087	9/1/2007	12:00 AM	Drought	N/A	0	0	0	0
OHZ083>087	10/1/2007	12:00 AM	Drought	N/A	0	0	0	0
OHZ083>087	11/1/2007	12:00 AM	Drought	N/A	0	0	0	0
TOTALS:					0	0	0	0

This historical weather data for Lawrence County was collected from the national Climatic Data Center. The National Climatic Data Center is the world's largest active archive of weather data. The NCDC is part of the Department of Commerce, National oceanic and Atmospheric Administration (NOAA) and the National Environmental Satellite, Data and Information Services (NESDIS)



## Appendix VII Critical Facilities

Facility	Address	City	Zip
Sunset Nursing Home	813 1/2 Marion Pike	Coal Grove	45638
Heartland of Riverview	7743 County Road 1	South Point	45680
Bryant Health Center	5th & Clinton Street	Ironton	45638
River's Bend Health Care, LLC	335 Township Road 1026	South Point	45680
Jo-Lin Health Center	1050 & Clinton Street	Ironton	45638
Sheriff's Office / Jail	115 S. 5th Street	Ironton	45638
Lawrence County 911	515 Park Avenue	Ironton	45638
Lawrence County EMS Headquarters	515 Park Avenue	Ironton	45638
Lawrence County EMA	515 Park Avenue	Ironton	45638
County Courthouse/Commissioners and most county elected officials	One Veteran's Square	Ironton	45638
Lawrence County Court House /Chesapeake (Municipal Court and Probation Office)	10916 County Road 1	Chesapeake	45619
City of Ironton - Mayor - City Center	301 South Third Street	Ironton	45638
Village of Athalia, Offices	14407 State Route 7	Proctorville	45669
Village of Chesapeake, Offices	211 Third Avenue	Chesapeake	45619
Village of Coal Grove, Offices	513 Carlton-Davidson Lane	Coal Grove	45638
Village of Hanging Rock, Offices	100 Scioto Avenue	Hanging Rock	45638
Village of Proctorville, Offices	305 State Street	Proctorville	45669
Village of South Point, Offices	408 Second Street West	South Point	45680
Lawrence County Health Dept. and Ironton City Health Dept.	2122 South 8th Street	Ironton	45638
Chesapeake Police	211 3rd Avenue	Chesapeake	45619
Coal Grove Police	513 Carlton-Davidson Lane	Coal Grove	45638
Hanging Rock Police	100 Scioto Avenue	Hanging Rock	45638
Ironton Police	301 South Third Street	Ironton	45638
Proctorville Police	305 State Street	Proctorville	45669
South Point Police	408 Second Street West	South Point	45680
Ohio Highway Patrol	1336 County Road 60	South Point	45680
Aid Township Fire Dept.	14112 State Route 141	Willow Wood	45696
Burlington-Fayette Township Fire Dept.	7681 County Road 1	South Point	45680
Chesapeake Village/Union Township Fire Dept.	400 Winters Road	Chesapeake	45619
Coal Grove Village Fire Dept.	513 Carlton-Davidson Lane	Coal Grove	45638
Decatur Township Fire Dept.	15697 State Route 93	Pedro	45659
Elizabeth Township Fire Dept. Station #1	127 Township Road 113	Pedro	45659
Elizabeth Township Fire Dept. Station #2	Intersection St. Rt. 650 & County Road 26	Pedro	45659
Fayette Township Fire Dept. #2	51 Township Road 93 North	Chesapeake	45619

Facility	Address	City	Zip
Hamilton Township Fire Dept. #1	1671 County Road 1-A	Hanging Rock	45638
Hamilton Township Fire Dept. #2	Hanging Rock Village Hall	Hanging Rock	45638
Ironton Fire Dept.	526 South Fourth Street	Ironton	45638
Lawrence Township Fire Dept. #1	7485 State Route 141	Kitts Hill	45645
Lawrence Township Fire Dept. #2	5216 County Road 6	Kitts Hill	45645
Perry Township Fire Dept. #1	4633 State Route 243	Ironton	45638
Perry Township Fire Dept. #2	649 County Road 1	South Point	45680
Proctorville Community Fire Dept.	410 State Street	Proctorville	45669
Rome Volunteer Fire Department #1	9666 State Route 7	Proctorville	45669
Rome Volunteer Fire Department #2	15981 State Route 7	Proctorville	45669
South Point Village Fire Dept.	104 Eisenhower Street	South Point	45680
Upper Township Fire Dept.	3402 State Route 141	Ironton	45638
Windsor Township Fire Dept.	8064 County Road 2	Chesapeake	45619
EMS Station 1	2324 South 8th Street	Ironton	45638
EMS Station 2	205 Sixth Street	South Point	45680
EMS Station 3	11024 County Road 1	Chesapeake	45619
EMS Station 4	267 Township Road 1060	Proctorville	45669
EMS Station 5	14112 State Route 141	Willow Wood	45696
Lawrence County Alternative school	4676 State Route 93	Ironton	45638
Chesapeake High	10181 County Road 1	Chesapeake	45619
Chesapeake Middle	10335 County Road 1	Chesapeake	45619
Chesapeake Elementary	11359 County Road 1	Chesapeake	45619
Dawson Bryant Elementary	4503 State Route 243	Ironton	45638
Dawson Bryant Middle	#1 Hornet Lane	Coal Grove	45638
Dawson Bryant High	#1 Hornet Lane	Coal Grove	45638
Fairland High	812 County Road 411	Proctorville	45669
Fairland Middle	7875 County Road 107	Proctorville	45669
Fairland West Elementary	110 Township Rd. 1125	Proctorville	45669
Fairland East Elementary	10732 State Route 7	Proctorville	45669
Ironton High School	1701 South 7th Street	Ironton	45638
Ironton Elementary	302 Delaware Street	Ironton	45638
Ironton Middle School	302 Delaware Street	Ironton	45638
Ironton St. Joseph High School	912 South 6th Street	Ironton	45638
Ironton-Catholic Schools Elementary	315 South 6th Street	Ironton	45638
Rock Hill High	2415 County Road 26	Ironton	45638
Rock Hill Middle	2171 County Road 26	Ironton	45638
Rock Hill Child Development Center	2325 B County Road 26	Ironton	45638
Rock Hill Elementary	2676 County Road 26	Ironton	45638
Ohio University Early Childhood / Head Start Center	300 Main Street	Hanging Rock	45638
South Point High	983 County Road 60	South Point	45680
South Point Middle	983 County Road 60	South Point	45680
South Point Elementary	201 Park Avenue	South Point	45680
Burlington Elementary	8781 County Road 1	South Point	45680
Symmes Valley High	14788 State Route 141	Willow Wood	45696
Symmes Valley Multi-Level Elementary / Middle	14680 State Route 141	Willow Wood	45696
Collins Career Center	11627 State Route 243	Chesapeake	45619

Facility	Address	City	Zip
St. Joseph High	Sixth and Quincy Streets	Ironton	45638
St. Lawrence Elementary	305 North 7th Street	Ironton	45638
Andis Alternative School	2204 State Route 217	Ironton	45638
Open Door School / Tri-State Industries	606 Carlton Davidson Lane	Coal Grove	45638
Open Door School	421 Lorain Street	Ironton	45638
Lawrence County Early Childhood Center / Head Start	1749 County Road 1	South Point	45680
Ohio University Southern	1804 Liberty Avenue	Ironton	45638
Ohio University - Proctorville Center	111 Private Drive 516	Proctorville	45669
Extremely Hazardous Substances Facilities			
American Electric Power (Ohio Power)	1901 County Road 1A	Ironton	45638
Americas Styrenics, LLC	925 County Road 1 A	Ironton	45638
AT&T Ironton 532 Central Office	821 Park Avenue	Ironton	45638
AT&T 643 Central Office	19046 State Route 141	Ironton	45638
AT&T South Point 377 Central Office	428 4th Street West	South Point	45680
Dow Chemical Co. Hanging Rock Plant	925 County Road 1A	Hanging Rock	45638
Duke Energy North America, LLC	1395 County Road 1-A	Ironton	45638
Frontier Communications - Chesapeake Central Office	419 3rd Avenue Rear	Chesapeake	45619
Frontier Communications - Proctorville Central Office	88 Township Road 1061	Proctorville	45669
Hecla Water Association	15 Pvt. Road 13170, State Route 7	Proctorville	45638
Ironton Wastewater Treatment Plant	810 North 4th Street	Ironton	45638
Ironton Water Filtration Plant	400 South Front Street	Ironton	45683
Liebert Corporation	3040 South 9th Street	Ironton	45638
McGinnis Inc.	502 Second St. Extension	South Point	45680
Ohio River Docks	510 Riverside Drive	Coal Grove	45638
Proctorville Water Company	Rear 109 Walnut Street	Proctorville	45669
Sam's Club Store 8152	221 County Road 410	South Point	45680
Village of South Point Water / Wastewater Plant	408 2nd Street West	South Point	45680
St. Mary's Medical Center, Ironton Campus	1408 Campbell Drive	Ironton	45638
Air Evac Lifeteam – 114	1818 Woodland Drive	Ironton	45638

**Appendix VIII**  
**Landslide and Subsidence Data**

**Appendix IX**  
**2003 Action Item Status**

# **Appendix X**

## **Action Item Prioritization**

Natural Hazard	Action Item	Jurisdiction
8 All	Seek funding for additional EMA personnel to assist current staff with needed disaster planning and prevention activities and programs.	Countywide 44
6 All	Buildings are not properly constructed to resist the forces and elements that can be encountered during a natural disaster event. This is due to a lack of a local building code and inspection system. Investigate developing building codes and inspection system in jurisdictions without building codes and educate the public regarding regulations designed to protect themselves from hazards.	Countywide 22
6 All	Adopt a resolution requiring all government agencies in the County to provide a list of typed equipment and assets along with qualifications and certifications of employees and personnel that can be used by our County Emergency Management office during major events. This information should be uploaded and managed by the NIMS Incident Resource Inventory System (IRIS).	Countywide 42
7 All	Develop a county GIS map showing areas and specific sites vulnerable to natural hazards and make available to the public.	Countywide 6
6 Tornadoes/ Winter & Severe Storms	Trees are often destroyed in high winds and ice storms, taking down power and communication lines. Encourage maintenance of trees in right-of-way areas.	Countywide 4
2 Flooding/ Wildfires/ Landslides	There is no tornado sirens throughout the County. Seek funding to complete a tornado warning siren program for all populated areas within the county. Make warning system capable of addressing other hazards within other hazard prone areas.	Countywide 11
4 All	Mobile homes are more prone to high wind damage. Propane tanks can become airborne during a tornado or float away during flooding events, causing an additional explosion hazard. Adopt & enforce anchoring criteria for mobile homes, propane tanks and any other objects that can become hazardous during natural hazard events. Seek funding for anchoring of existing mobile homes.	Countywide 1
2 Flooding/ Landslides	Logging often increases the risk of landslides and flooding. Coordinate with NRCS to improve logging practices including Best Management Practices in construction of haul roads, drainage facilities and silt/sediment controls.	Countywide 1
5 All	Prepare a list of available emergency shelters including city and county facilities, churches, schools, Salvation Army, others, etc.	Countywide 21
5 All	Communication systems often fail during disaster events. Develop back-up plans in the EOP for cases of communication failure.	Countywide 5
3 All	The public is not aware of the risks from natural hazards. Educate public about severe weather risks and damage prevention.	Countywide 21
3 All	Develop a program for presentations in high schools, to Civic organizations (e.g. Rotary and Kiwanis clubs) & Chambers of Commerce, etc. to acquaint the public with county emergencies, responses, programs, shelters, etc. using personal appearances, and/or video presentations.	Countywide 1
5 All	Publish a Disaster Preparation hand-out brochure or flier for distribution thru county court house offices, restaurants, banks etc.	Countywide 4
3 All	Promote periodic public workshops either by Lawrence County alone or with other counties, held in such venues as OUSEC to call public attention to the EMA programs and concerns and to seek public input.	Countywide 3
3 All	The public is not always aware of imminent dangerous weather situations. Educate the public on the benefits of weather radios and what to do in cases of imposing danger.	Countywide 2
6 All	Establish a NOAA Weather Radio program for all schools, libraries, government buildings, large industries, nursing homes, festivals, fairgrounds, etc.	Countywide 14

Natural Hazard	Action Item	Jurisdiction
	Reevaluate floodwall work with USACE. The floodwall pump stations control systems are failing and replacement parts are not available. Seek emergency funding to replace floodwall pump station control system.	Countywide 2
Flooding	Critical facilities should have an extra level of protection. Require new/improved critical facilities to be elevated/flood protected to the 500-year flood level.	Countywide
Flooding	Combined sanitary sewers often fill with flood waters, which then back up into structures. Seek funding for back-flow preventers in areas of combined sanitary sewers.	Countywide
Flooding	There is a lack of available equipment and contractors to handle snow removal. Develop a list of equipment resources and contractors.	Countywide 1
Winter Storms	Evaluate where tornado shelters are needed throughout the county and seek funding to construct the shelters.	Countywide 11
Tornadoes	Utility lines are often damaged during earthquakes, increasing risks to people and structures. Identify areas where additional utility cut-offs are needed to isolate utility systems.	Countywide 1
Earthquakes	Additional fire break lines are needed. Identify areas where fire break lines are needed.	Countywide
Drought/Wildfire	Address the problem of arson within the county by increasing enforcement and prosecution and provide a no way to report suspected arsonists.	Countywide
Drought/Wildfire	Provide public notification of regulated Fire Burning Seasons and drought conditions to prevent ignition of wildfires either from unsupervised brush burning or failed camp fire extinguishment. Also to help regulate fire hazards created by disposal of debris.	Countywide 1
Drought/Wildfires	Landslides and subsidence can destroy utilities. Identify areas where additional utility cut-offs are needed to isolate systems in high-risk zones.	Countywide
Landslide/ Subsidence	There is a lack of or conflicting information of where the high hazard areas are. Identify landslide, mined areas and problem soil areas.	Countywide 2
Landslide/ Subsidence	Additional investigation and mapping is needed to determine where old mines are. Seek funding for mapping and subsurface investigations.	Countywide 11
Landslide/ Subsidence	People are not always around media to alert them to severe weather. Develop an audible alert system.	Countywide 2
Severe Storms	There is a lack of maintenance of the dams. Coordinate with ODNR Division of Water regarding lack of maintenance and inspection of dams.	Countywide 3
Dam Failure	There are dams that have been constructed without review or state oversight. Identify dams throughout county to determine if they fall under state regulation.	Countywide
Dam Failure	Seek funding to create an SAP for each small dam on private property using Standards of the International Committee of Dam Safety (ICDS), developed in compliance with GAC requirements and including an update of the design floods and the downstream hazards. Findings to be provided to ODNR and to dam owners.	Countywide 11

2

1

5

3

0

1

2

3

4

5

4

3

0

4

3

6

7

6

2

4

2

5

5

3

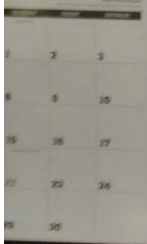
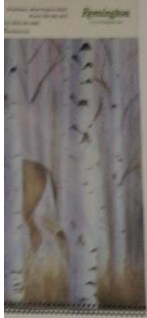
3

5

3

3

6







Eraser Pad  
Tableaux à feuilles mobiles  
Block de Hojas Reapichonables

Super Sticky  
Super Callout  
Super Adhesives

12 1/2" (31.8 cm) x 18" (45.7 cm)  
24 g/100 g (0.85 oz/2.83 oz)  
Cont. 1 block of 20 pages



~~1.~~ Mitigate Rep. Loss Structures within Law Co.



6 4

**Appendix XI**  
**Updated Action Item Strategy**

Item #	Natural Hazard	Action Item	Timeframe	Funding	Responsible Agency
1	All	Seek funding for additional EMA personnel to assist current staff with needed disaster planning and prevention activities and programs.	6/1/14 - 1/1/17	HMGP, PDM, Existing Budget	EMA
2	All	Develop a county GIS map showing areas and specific sites vulnerable to natural hazards and make available to the public.	9/1/14 - 12/1/15	HMGP, PDM, Existing Budget	Chesapeake Mayor, EMA
3	All	Adopt a resolution requiring all government agencies in the County to provide a list of typed equipment and assets along with qualifications and certifications of employees and personnel that can be used by our County Emergency Management office during major events. This information should be uploaded and managed by the NIMS Incident Resource Inventory System (IRIS).	6/1/14 - 9/1/15	Existing Budget	Hanging Rock Mayor, Core Group, EMA
4	All	Buildings are not properly constructed to resist the forces and elements that can be encountered during a natural disaster event. This is due to a lack of a local building code and inspection system. Investigate developing building codes and inspection system in jurisdictions without building codes and educate the public regarding regulations designed to protect themselves from hazards.	1/1/15 - 1/1/17	Existing Budget	Coal Grove Mayor, EMA
5	All	Establish a NOAA Weather Radio program for all schools, libraries, government buildings, large industries, nursing homes, festivals, fairgrounds, etc.	9/1/14 - 9/1/16	FMA, Existing Budget	EMA
6	All	Communication systems often fail during disaster events. Develop back-up plans in the EOP for cases of communication failure.	6/1/14 - 9/1/16	Existing Budget	Ironton Mayor, Core Group
7	All	Prepare a list of available emergency shelters including city and county facilities, churches, schools, Salvation Army, others, etc.	6/1/14 - 9/1/15	Existing Budget	Athalia Mayor, South Point Mayor, EMA
8	All	Publish a Disaster Preparation hand-out brochure or flier for distribution thru county court house offices, restaurants, banks etc.	12/1/14 - 12/1/15	Existing Budget	Proctorville Mayor, Athalia Mayor, EMA

Item #	Natural Hazard	Action Item	Timeframe	Funding	Responsible Agency
9	All	Mobile homes are more prone to high wind damage. Propane tanks can become airborne during a tornado or float away during flooding events, causing an additional explosion hazard. Adopt & enforce anchoring criteria for mobile homes, propane tanks and any other objects that can become hazardous during natural hazard events. Seek funding for anchoring of existing mobile homes.	9/1/14 - 12/1/16	Existing Budget	Core Group, EMA
10	All	The public is not aware of the risks from natural hazards. Educate public about severe weather risks and damage prevention.	1/1/15 - 6/1/16	Existing Budget	Proctorville Mayor, EMA
11	All	Develop a program for presentations in high schools, to Civic organizations (e.g. Rotary and Kiwanis clubs) & Chambers of Commerce, etc. to acquaint the public with county emergencies, responses, programs, shelters, etc. using personal appearances, and/or video presentations.	9/1/14 - 9/1/16	Existing Budget	Chesapeake Mayor, Core Group, EMA
12	All	Promote periodic public workshops either by Lawrence County alone or with other counties, held in such venues as OUSC to call public attention to the EMA programs and concerns and to seek public input.	1/1/15 - 1/1/17	Existing Budget	Core Group, EMA
13	All	The public is not always aware of imminent dangerous weather situations. Educate the public on the benefits of weather radios and what to do in cases of imposing danger.	1/1/15 - 6/1/16	Existing Budget	Hanging Rock Mayor, Core Group, EMA
14	Dam Failure	There are dams that have been constructed without review or state oversight. Identify dams throughout county to determine if they fall under state regulation.	6/1/14 - 9/1/16	Existing Budget	Core Group, EMA
15	Dam Failure	Seek funding to create an EAP for each small dam on private property using Standards of the International Committee of Dam Safety (ICODS), developed in compliance with OAC requirements and including an update of the design floods and the downstream hazards. Findings to be provided to ODNR and to dam owners.	1/1/15 - 6/1/16	HMGP, PDM, Existing Budget	South Point Mayor, EMA
16	Dam Failure	There is a lack of maintenance of the dams. Coordinate with ODNR Division of Water regarding lack of maintenance and inspection of dams.	1/1/15 - 1/1/17	HMGP, PDM, FMA	EMA, Lawrence County Engineer, ODNR, Soil & Water Conservation

Item #	Natural Hazard	Action Item	Timeframe	Funding	Responsible Agency
17	Drought/ Wildfires	Provide public notification of regulated Fire Burning Seasons and drought conditions to prevent ignition of wildfires either from unsupervised brush burning or failed camp fire extinguishment. Also to help regulate fire hazards created by disposal of debris.	12/1/14 - 12/1/15	Existing Budget	Ironton Mayor, Athalia Mayor, Core Group
18	Drought/ Wildfires	Address the problem of arson within the county by increasing enforcement and prosecution and provide a no way to report suspected arsonists.	6/1/15 - 9/1/16	Existing Budget	Hanging Rock Mayor, Core Group
19	Drought/ Wildfires	Additional fire break lines are needed. Identify areas where fire break lines are needed.	12/1/14 - 12/1/16	Existing Budget	Coal Grove Mayor, Core Group
20	Earthquakes	Utility lines are often damaged during earthquakes, increasing risks to people and structures. Identify areas where additional utility cut-offs are needed to isolate utility systems.	6/1/15 - 6/1/17	Existing Budget	EMA, Lawrence County Engineer and Utilities
21	Flooding	Mitigate all Repetitive Loss Structures with Lawrence County.	6/1/14 - 9/1/16	HMGP, PDM, FMA	Chesapeake Mayor, Core Group, EMA
22	Flooding	Reevaluate floodwall work with USACE. The floodwall pump stations control systems are failing and replacement parts are not available. Seek emergency funding to replace floodwall pump station control system.	6/1/14 - 6/1/16	HMGP, PDM, FMA	EMA
23	Flooding	Combined sanitary sewers often fill with flood waters, which then back up into structures. Seek funding for back-flow preventers in areas of combined sanitary sewers.	9/1/14 - 1/1/16	Ohio Dept. of Health, Ohio Dept. of Public Works	Core Group, EMA
24	Flooding	Critical facilities should have an extra level of protection. Require new/improved critical facilities to be elevated/flood protected to the 500-year flood level.	9/1/14 - 9/1/17	Existing Budget	EMA
25	Flooding/ Landslides	Logging often increases the risk of landslides and flooding. Coordinate with NRCS to improve logging practices including Best Management Practices in construction of haul roads, drainage facilities and silt/sediment controls.	6/1/15 - 9/1/17	Private Industries	Ironton Mayor, Core Group, EMA
26	Flooding/ Wildfires/ Landslides	There are no severe storm warning sirens throughout the county. Seek funding to complete a tornado warning siren program for all populated areas within the county. Make warning system capable of addressing other hazards within other hazard prone areas.	6/1/14 - 9/1/16	HMGP, PDM	South Point Mayor, EMA

Item #	Natural Hazard	Action Item	Timeframe	Funding	Responsible Agency
27	Landslide/ Subsidence	There is a lack of or conflicting information of where the high hazard areas are. Identify landslide, mined areas and problem soil areas.	6/1/14 - 6/1/17	Existing Budget	Coal Grove Mayor, EMA
28	Landslide/ Subsidence	Landslides and subsidence can destroy utilities. Identify areas where additional utility cut-offs are needed to isolate systems in high-risk zones.	1/1/15 - 6/1/1	Existing Budget	EMA, Lawrence County Engineer and Utilities
29	Landslide/ Subsidence	Additional investigation and mapping is needed to determine where old mines are. Seek funding for mapping and subsurface investigations.	6/1/15 - 9/1/17	HMGP, PDM, Existing Budget	Proctorville Mayor, Ironton Mayor, Core Group, EMA
30	Landslides/ Mine Subsidence	Conduct mitigation actions related to landslide and mine subsidence in affected areas throughout Lawrence County and its jurisdictions.	3/6/15 - 3/6/2020	PDM and Local Funds	Lawrence County, Incorporated Jurisdictions, County EMA, County Engineer, Ohio DOT
31	Severe Storms	People are not always around media to alert them to severe weather. Develop an audible alert system.	6/1/14 - 12/1/16	HMGP, PDM	Coal Grove Mayor, Athalia Mayor, Core Group, EMA
32	Tornadoes	Evaluate where tornado shelters are needed throughout the county and seek funding to construct the shelters.	6/1/14 - 6/1/16	HMGP, PDM, Existing Budget	EMA
33	Tornadoes/ Winter & Severe Storms	Trees are often destroyed in high winds and ice storms, taking down power and communication lines. Encourage maintenance of trees in right- of-way areas.	12/1/14 - 6/1/15	Existing Budget	EMA, Lawrence County Engineer and Utilities
34	Winter Storms	There is a lack of available equipment and contractors to handle snow removal. Develop a list of equipment resources and contractors.	9/1/14 - 9/1/16	HMGP, PDM	Ironton Mayor, Core Group