## 1.0 INTRODUCTION

A mitigation plan addresses natural disasters that could affect a local community, whether it is flooding, tornadoes, high winds, winter storms, landslides or some other natural disaster. A mitigation plan is an administrative document that is issued to establish activities that should reduce or, when possible, eliminate long-term risk to human-life and property. The plan will also provide a community with a "comprehensive guide" for future mitigation efforts as they relate to the hazards that affect their county. By developing a mitigation plan, a community can identify their areas of risk, assess the magnitude of the risk and develop strategies and priorities to identify projects for reducing risk.

The Butler County Emergency Management Executive Board supported developing this Butler County Natural Hazard Mitigation Plan (referred to hereafter as "Mitigation Plan") with funds received from Ohio Emergency Management Agency (OEMA) and the Federal Emergency Management Agency (FEMA).

The hazards that Butler County is considered most susceptible to are as follows:

- Severe Storms (Summer and Winter)
- Flooding
- Tornadoes
- Droughts
- Earthquakes

As part of the Disaster Mitigation Act of 2000 (DMA2K, 42 USC 5165), communities that desire to remain eligible for Federal and State mitigation funds must have an approved mitigation plan in place.

According to the DMA2K, incorporated jurisdictions within a county must participate, as well as, representatives from the unincorporated areas. Townships are not required to participate because the county commissioners can represent them on mitigation projects. However, if a township would like to take an active part by submitting a hazard mitigation project, then their participation in the planning effort is crucial. Local participation is imperative to the successful implementation of these mitigation plans.

If a community chooses not to participate in the mitigation planning effort, then the community will become ineligible for any future federal or state mitigation money. This mitigation money usually comes in the form of a grant such as the Hazard Mitigation Grant Program (HMGP), Flood Mitigation Assistance (FMA) or the Pre-Disaster Mitigation Grant (PDM), which is to be used to implement mitigation strategies and activities. Examples of eligible activities that could be supported by mitigation dollars include: relocation, acquisitions, elevation, dry-flood proofing, wet-flood proofing, lightning prediction systems, interoperable siren systems, stream restorations or any other activity potentially funded with mitigation dollars.

The Mitigation Overhead and Development Committee was started to create, implement, and liaise with the Mitigation Core Group Committee.

Members of the Mitigation Overhead and Development Committee are as follows:

Butler County Emergency Management Agency
Butler County Geographical Information Services (GIS)
Butler County Engineer's Office

The primary mitigation planning process that was followed during the development of this plan is as follows:

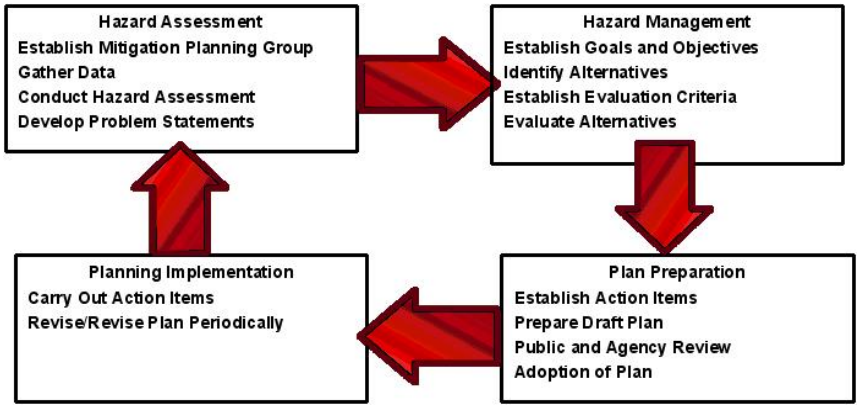


Figure 1.1

In addition to the aforementioned process, the Mitigation Overhead and Development Committee and the designated leaders of the group made sure that every community participating in this planning effort was aware of their responsibilities, as well as, how they could represent their community the best.

Some suggestions that were incorporated into the initial invitation to participate in the natural hazard mitigation planning effort included:

- Participate in the Mitigation Core Group Committee planning meetings representing your communities interests
- Supply any historic information (background) on natural disasters for your community to the Mitigation Planning Core Group Committee
- Review and comment on the Draft Mitigation Plan
- Review and select mitigation activities developed by the Mitigation Overhead and Development Committee for your community to implement
- Be an advocate for final adoption of the Mitigation Plan by your community

## 1.1 Planning Approach

In an effort to continue to meet the mission of protecting lives, property, economic viability and quality of life for the people of Butler County, the Emergency Management Executive Board desired to create the Mitigation Plan for their community and its residents.

The approach undertaken in the creation of the Mitigation Plan for the County can be described as both comprehensive and collaborative. The comprehensive approach includes following the interim final rule guidelines enacted under the DMA2K and the FEMA suggested guidelines for the creation of a mitigation plan. The collaborative portion of creating the Mitigation Plan included working with the different agencies within Butler County as well as coordination with all participating jurisdictions.

## 1.2 Participating Communities

Butler County has 25 jurisdictions, all of whom participated in this mitigation plan. The Butler County EMA developed a comprehensive survey for each of these jurisdictions to complete and return with mitigation planning information specific to their community. Appendix D contains the list of participants from each community, as well as, who of those participants are continuing participants from the 2003 plan or new participants. Also, letters were sent to communities along with the initial concept of how the groups would interact. See Appendix D for an example of the letter that was sent.

## 2.0 COUNTY INFORMATION

As required by DMA2K, a community profile must be developed for the county and any jurisdictions participating in this effort. Because of the multiple jurisdictions involved in this plan, this section presents a demographical and historical description of the county as a whole.

### 2.1 County Profile

Butler County is located in the southwestern portion of the State of Ohio. It lies north of Hamilton County, south of Preble County, southwest of Montgomery County, west of Warren County, and just east of the Indiana state line. The county covers a 467.27 square mile area with a population estimated at 363,184 as of 2009.

Figure 2.1

***Butler County***

The county has 6 cities, 13 townships, and 6 villages. The majority of the population resides in the seven cities located within the county. The highest populated area is the county seat, Hamilton, followed by Middletown, Fairfield, Oxford, Monroe, and Trenton. While 2,500 residents within the City of Sharonville reside in Butler County, the majority of Sharonville is located in Hamilton County, making the Hamilton County Emergency Management Agency their primary planning entity. The highest populated village in the county is New Miami, while West Chester accounts for the highest populated township.

### 2.2 County History

Butler County was established by the State of Ohio on March 24, 1803. The county was named in honor of Richard Butler, who was killed in St. Clair's defeat in 1791. The county was originally part of Hamilton County at its inception. Butler County has enjoyed a wide array of industry and business since its beginning. The cities of Hamilton and Middletown attracted industries which manufactured hundreds of products including paper, steel, machine tools, safes, and bicycles. By 1910 due to large growth of industry, the City of Hamilton's population was a robust 40,000 strong while the county as a whole was just over 70,000. The county population continued to grow steadily until 1960 when the population jumped from just over 150,000 to nearly 200,000 and has continued to rise to its current population.

## 2.3 County Jurisdictions

The jurisdictions represented in the Mitigation Core Group Committee include:

1. City of Hamilton
2. City of Fairfield
3. City of Middletown
4. City of Monroe
5. City of Trenton
6. City of Oxford
7. Fairfield Township
8. Hanover Township
9. Lemon Township
10. Liberty Township
11, Madison Township
12. Milford Township
13. Morgan Township
14. Oxford Township
15. Reily Township
16. Ross Township
17. St. Clair Township
18. Wayne Township
19. West Chester Township
20. Village of College Corner
21. Village of Jacksonburg
22. Village of Millville
23. Village of New Miami
24. Village of Seven Mile
25. Village of Somerville

## 2.4 Census Data and Projections

### State Population Projection

The State of Ohio's population in 2000 was 11,353,140 and it is projected to climb to 12,317,613 by 2030, an increase of 8.5%. However, it appears that the rate at which Ohio's population is growing is diminishing. Several factors may be contributing to this decline. The birth to death ratio is much smaller than in faster growing states, with Ohio expected to have 4.4 million births and 3.6 million deaths. Net migration is a factor as well. Ohio may gain approximately 247,000 people through in-migration but may lose about 758,000 people through out-migration.
The projected percentage of population change by county in Ohio from 1990 to 2030 is reflected on the map in this section. Counties surrounding a major metropolitan area – Cincinnati, Columbus, and Cleveland – generally will experience higher growth rates. Counties in the north central and eastern region of the state are projected to experience a decline.

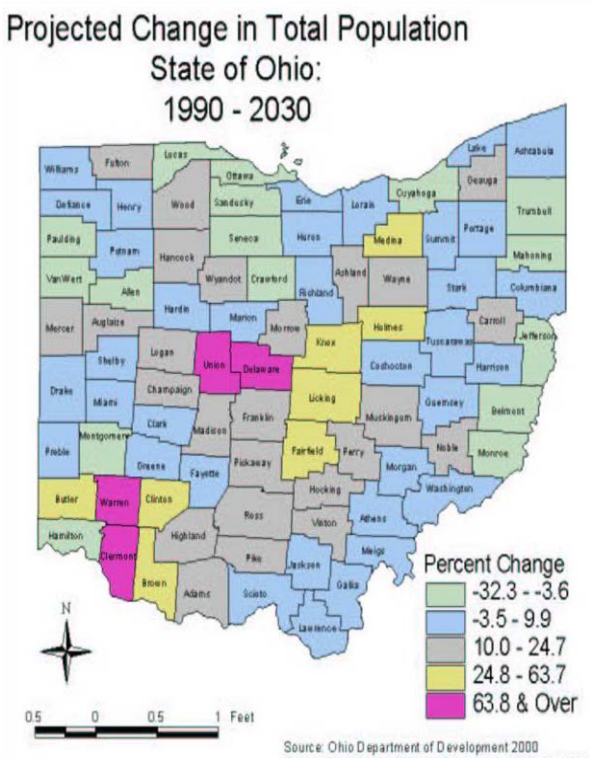


Figure 2.2

### County Population Projection

While the county's population at the 2000 census was 332,807, current estimates show that the population will most likely grow to above 363,000 by 2010. The exact information on the growth of population within the county will not be known until the 2010 census data is released in mid-2011. Residency in rural and urban parts of the county is nearly even with an estimated approximate of 60% living in the urban areas and 40% living in the rural. While current data is still being collected on exact numbers, history and future projections show that Butler County is an area that continually grows

from decade to decade. The Ohio Department of Development assumes that Butler County will grow between 24.8% and 63.7% between the years 1990 and 2030 (See Figure 2.2). Historic population data dating back to 1900 is listed in Figure 2.3.

**Butler County Historic Population Data**

| | |
|---|---|
| **2009 (estimate)** | 363,184 |
| **2005 (estimate)** | 349,966 |
| **2000** | 332,807 |
| **1990** | 291,479 |
| **1980** | 258,787 |
| **1970** | 226,207 |
| **1960** | 199,076 |
| **1950** | 147,203 |
| **1940** | 120,249 |
| **1930** | 114,084 |
| **1920** | 87,025 |
| **1910** | 70,271 |
| **1900** | 56,870 |

Figure 2.3

## 2.5 County Topography

According to the Butler County Soil and Water Conservation District, there are 14 different watersheds that influence drainage within the county. Of those 14 watersheds the Great Miami River, Indian Creek, and Four Mile Creek have the largest areas within the county.

Figure 2.4 shows rivers and streams in Butler County as they relate to jurisdictions.

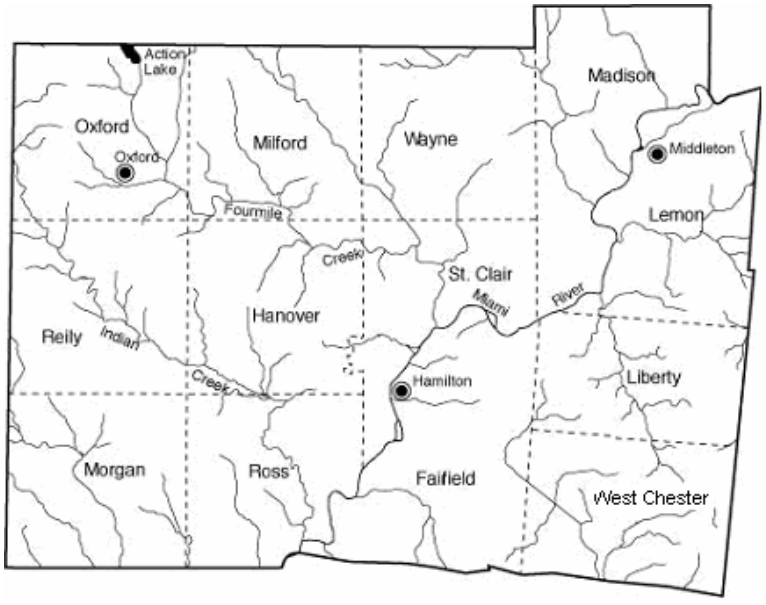


Figure 2.4

## 2.6 Land Use

The Butler County Department of Development Land Use Plan was reviewed and used to provide technical information during the update process of this Mitigation Plan. After analyzing data provided by the Butler County Department of Development, it is apparent that the majority of the land in the county is primarily used for agricultural purposes. Residential use is the next leading category with 30% of the county's land utilized in this fashion. Figure 2.5 shows the breakdown of the county's current land use.

| Land Use | 2010 Acres | % |
|---|---|---|
| Agriculture | 167,688 | 56.1 |
| Residential | 92,022 | 30.8 |
| Industrial | 6,166 | 2.1 |
| Commercial | 9,029 | 3 |
| Public | 22,983 | 7.7 |
| Railroad | 992 | .3 |
| **TOTALS** | **298,880** | **100** |

Figure 2.5

According to the current land use plan, 5 goals are in place to guide land development in the county. They are as follows:

1. To promote the orderly and efficient layout and appropriate use of land in Butler County to promote the health, safety, and welfare of all residents and to leave future generations a desirable place to work, study, and reside.

2. To provide the Board of County Commissioners, county planning commission, zoning commission and township trustees with policy guidelines in order to assist them in their weekly, monthly, and annual decision making concerning land use, zoning, public facilities and services, and development review matters.

3. To create a framework to provide current and future residents in Butler County the opportunity to create a shared vision for their community.

4, To establish the framework for implementing the recommendations of this plan in a timely and meaningful manner.

5. To assist the continuing efforts of coordinating various planning agencies operating in the county and achieve the overall goals and objectives of this plan without being unduly disrupted by any single element of this plan of other planning efforts undertaken in Butler County.

These goals are envisioned to eventually lead to the development of more of the county's agricultural land into residential, industrial, commercial, and public purposes.

According to the Butler County Department of Development the proposed change in acreage shown in the below chart is to be achieved by 2020. The proposed future land use specificities are shown in Figure 2.6.

| Land Use | Future Acres | % |
|---|---|---|
| Agriculture | 155,950 | 52.2 |
| Residential | 99,336 | 33.2 |
| Industrial | 7,566 | 2.5 |
| Commercial | 11,743 | 3.9 |
| Public | 23,293 | 7.8 |
| Railroad | 992 | .3 |
| **TOTALS** | **298,880** | **100** |

Figure 2.6

## 2.6 Public Utilities

### 2.6.1 Water and Wastewater

The 6 cities within Butler County all have their own water and wastewater facilities. The Butler County Water and Sewer Department (BCWS) serves a growing population of more than 100,000 in West Chester, Lemon, Liberty, Fairfield, Hanover and Ross townships, as well as, the city of Monroe and the village of New Miami. The BCWS provides both drinking water and wastewater services. The remaining townships and villages not served by cities or the BCWS depend on wells and septic systems for water and wastewater issues. Butler County receives its water from the City of Hamilton's ground water supply and the Greater Cincinnati Water Works' (GCWW) ground and surface water. The BCWS also maintains several other connections with the GCWW, Warren County, Cities of Hamilton, Mason, and Monroe to ensure the delivery of water in case of an emergency.

### 2.6.2 Other Utilities

The county is served by Duke Energy, Butler County Rural Elective Cooperative, and Dayton Power and Light for its gas and electricity needs. The City of Hamilton also has its own gas and electric department serving its residents. Telephone services are provided to the county by Cincinnati Bell and Time Warner Cable and other private telephone companies.

# 3.0 MITIGATION PLANNING PROCESS

## 3.1 Mitigation Mission Statement

**"The mission of the Mitigation Core Group Committee for Butler County, Ohio 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 Butler County. By further researching and planning for future natural hazards as well as implementing appropriate mitigation techniques, Butler County lives and property can be saved, costs from disasters can be reduced, and a rapid and efficient recovery can occur."**

## 3.2 Notification of Jurisdictions and General Public

All jurisdictions of the County, as well as other agencies that work within the County, were notified of the mitigation planning process. The Butler County EMA Office created a master list of jurisdictions they felt necessary to participate in this planning effort. Individuals that will make up the Mitigation Planning Core Group Committee were notified of the mitigation planning process.

Prior to commencing this planning process, in addition to contacting the Mitigation Planning Core Group Committee, Butler County EMA notified the general public regarding this mitigation planning process. A press release was sent on September 3rd, 2010. Please see Appendix D for copies of this press release.

## 3.3 The Mitigation Overhead and Development Committee

### 3.3.1 Meeting 1 Information

January 15, 2010
A preliminary meeting was held to outline the objectives and strategies for creating the new Hazard Mitigation Plan.

### 3.3.2 Meeting 2 Information

June 16, 2010
The GIS department and Emergency Management Agency identified the critical maps that will be created for the Hazard Mitigation Plan. Specific layouts for the maps were determined as well.

### 3.3.3 Meeting 3 Information

August 24, 2010
A meeting was held with a representative from the Ohio Emergency Management Agency's Mitigation Branch to finalize all grant funding for the Hazard Mitigation Plan.

### 3.3.4 Meeting 4 Information

October 6, 2010
The GIS department provided a preliminary map format that was agreed upon by the committee. Floodplain maps were also provided by the GIS department for review and discussion by the committee. It was agreed upon that the GIS department would begin developing the maps to be used in the mitigation plan based off of their proposed format.

### 3.3.5 Meeting 5 Information

December 3, 2010
Officially finalized all maps created by GIS department.

## 3.4 The Mitigation Core Group Committee

The Mitigation Planning Core Group Committee is the original planning unit for this project. All Mitigation Planning Core Group Committee members are involved for the entire planning process. The purpose of the committee is to provide information to the various entities of Butler County that have a stake, either directly or indirectly, in Mitigation Planning such as neighboring communities/counties, local businesses & industry, non-profit organizations, and any colleges or universities. They provide feedback, input, and review as the process of the Mitigation Plan development is completed, leading to a better quality and more inclusive scope of the Mitigation Plan that everyone can acknowledge and adopt, truly implementing a countywide plan.

Obtaining support from the whole community required a comprehensive approach to preparing the Mitigation Plan. Identifying those persons, community leaders and government agencies with the knowledge and authority to help the community organize a plan was key to the planning effort. Establishing a group of leaders was necessary to give this task validity. Please see Appendix D for a complete list of participants.

## 3.5 Mitigation Core Group Committee Meetings

There were 2 Mitigation Planning Core Group Committee meetings.

### 3.5.1 Meeting 1 Information

November 10, 2010
The Core Group Committee met and reviewed the most current draft of the Hazard Mitigation Plan. They were made aware of the upcoming public meetings that were going to take place within their jurisdictions in the following weeks. An electronic copy of the Mitigation Plan was sent to all administrators who requested one for closer review and edit.

### 3.5.2 Meeting 2 Information

January 13, 2011
The Core Group Committee met and was updated on the previous 2 months of planning, including information on public input from open houses that were held. They were also given the opportunity to again review mitigation goals and actions outlined in the Hazard Mitigation Plan and make suggestions to the plan they saw fit.

## 3.6 Public Open Houses

A total of 5 public open houses were held during the creation of the Hazard Mitigation Plan. 1 was held to review the old plan and 4 were held to review the newly created plan.

### 3.6.1 Old Plan Review Open House Information

September 9, 2010
The open house was held in the Government Services Center located at 315 High St. Hamilton, Ohio 45011. Please see Appendix D for a press release about this meeting.

### 3.6.2 City of Fairfield Open House

December 14, 2010
The open house was held at Fairfield's Fire Station #32 located at 6540 Dixie Highway Fairfield, Ohio 45014. Please see Appendix D for a press release about this meeting.

### 3.6.3 City of Hamilton Open House

December 16, 2010
The open house was held in the Government Services Center located at 315 High St. Hamilton, Ohio 45011. Please see Appendix D for a press release about this meeting.

### 3.6.4 West Chester Township Open House

December 28, 2010
The open house was held in West Chester's Township Hall located at 9113 Cincinnati-Dayton Road West Chester, Ohio 45069. Please see Appendix D for a press release about this meeting.

### 3.6.5 City of Middletown Open House

December 29, 2010
The open house was held in Middletown's City Building located at One Donham Plaza Middletown, Ohio 45042. Please see Appendix D for a press release about this meeting.

## 3.7 Plan Finalization

Upon incorporation of all comments into the Hazard Mitigation Plan, the plan will be prepared and submitted to the State of Ohio Emergency Management Agency and Federal Emergency Management Agency for review.

Each incorporated jurisdiction, as well as any township choosing to adopt this Hazard Mitigation Plan as a separate entity from the County, will also receive a digital copy of the plan.

# 4.0 HAZARD PROFILE

Butler County has experienced many natural disasters in the past one-hundred years. These disasters have ranged from tornadoes and blizzards, to flooding and droughts. The purpose of this document is to identify the number and frequency of disasters in Butler County to better prepare and deal with them when they do occur. The following sections describe the process of determining upon which hazards to focus, general background information on each hazard as well as hazard events that have occurred in Butler County.

## 4.1 Initial Hazard Assessment

In order to properly evaluate the natural hazards to which Butler County may be susceptible, a three-step process was utilized. This three-step process was completed in order to "narrowdown" the hazards for which Butler County should prepare, and potentially mitigate, in the future. The three steps are described in the following paragraphs.

Step 1 - FEMA's database was researched to determine which hazards FEMA had documented as possible natural hazards, including future threats, for the State of Ohio. Several hazards that are listed on FEMA's website include flooding, severe storms, tornadoes and winter storms.

Step 2 – The National Climate Data Center (NCDC) was researched and historic hazard information was reviewed all the way down to the county level. The NCDC website presented each type of hazard and the historic information associated with it for each county, offering several hazard search parameters. These parameters included: droughts, dust storm, flooding, fog, hail, hurricanes, lightning, tornadoes, wild/forest fires, ocean/lake surf, precipitation, snow and ice, temperature extremes and thunderstorms and high winds.

Because NCDC information did not address earthquakes, dams and dam safety, other sources were contacted for this data. The information pertaining to earthquake susceptibility was attained from United States Geographical Survey (USGS) data. The information pertaining to landslides, dams and dam safety was obtained from ODNR.

Step 3 - The State of Ohio Hazard Mitigation Plan Update in 2008 was referenced as well as its Hazard Analysis and Risk Assessment which documents both natural and non-natural (technological) hazard event information.

## 4.2 Risk Assessment and Ranking

The research compiled during the initial hazard assessment was provided to the Mitigation Overhead and Development Committee for their review and assessment. The committee evaluated all the hazards being considered and ranked them based on the number of historic events and cumulative damage that has occurred. The following list shows the committee's ranking of hazards with number one being the hazard of the most concern:

1. Summer Storms
2. Floods (Flash/100-year)/Dams
3. Winter Storms/Ice Storms (Sub-Hazard – Energy Emergencies)
4. Tornadoes
5. Droughts (Excessive Heat/Excessive Cold) (*Sub-Hazard – Energy Emergencies)*
6. Earthquakes

## 4.3 Severe Storms – High/Strong/Thunderstorm Winds, Lightning, Hail

Hazards that fit into the severe weather category include thunderstorms, high winds, lightning and hail. One of the biggest problems associated with severe weather is the lack of public education and awareness. Severe storms can do damage, but are often the precursor for much more severe weather to follow. One example is the direct association of tornadoes with thunderstorms.

A severe thunderstorm watch is issued by the National Weather Service (NWS) when the weather conditions are such that damaging winds of 58 mph or more, or hail 3/4 of an inch in diameter or greater, are likely to develop. Citizens should locate a safe place in the home and tell family members to watch the sky and listen to the radio or television for more information.

A severe thunderstorm warning is issued when a severe thunderstorm has been sighted or indicated by weather radar. At this point, danger is imminent and citizens should move to a safe place, turn on a battery-operated radio or television, and wait for the "all clear" by the authorities. Severe storms are also associated with other hazards such as tornadoes and severe flooding. Since tornadoes and flash flooding are spawned by thunderstorms, people should review what action to take under a tornado warning or a flash flood warning when a "severe thunderstorm warning" is issued. When thunderstorms are forecasted to bring heavy rains (which can cause flash flooding), strong winds, hail, lightning and tornadoes, people should get inside a sturdy building and stay tuned to a battery-operated radio for weather information. People should also be aware that lightning and high winds are also major threats during thunderstorms.

### 4.3.1 High Winds/Strong Winds/Thunderstorm Winds

Straight-line winds are often responsible for most of the wind damage associated with a thunderstorm. These winds are often confused with tornadoes because of similar damage and wind speeds. However, the strong and gusty winds associated with straight-line winds blow roughly in a straight line unlike the rotating winds of a tornado.

### 4.3.2 Lightning

Lightning kills between 75 and 100 people a year. It is the second largest killer of natural hazard events, exceeded only by floods. Lightning strikes can happen anywhere and affect anyone. Only 10% of lightning strikes result in death, leaving the rest with various degrees of disability, most being central nervous system issues

### 4.3.3 Hail

Hail is a type of precipitation composed of balls or irregular lumps of ice. It occurs when super cooled water droplets (remaining in a liquid state despite being below the freezing point, 0 °C/32 °F) in a storm cloud collide with some solid object, such as a dust particle or an already forming hailstone.

Hail often forms in strong thunderstorms, often along a cold front, where the layer of air on top is much colder than that on the bottom. The smaller hailstones can bounce up and down between the warm and cold layers due to updrafts and gravity. The longer the stones bounce around, the larger they grow. These strong, severe, or even supercell thunderstorms can also produce hail in the summer months, even without a cold front.

Hailstones, while most commonly only a few millimeters in diameter, can sometimes grow to several inches or occasionally even bigger. Such large hailstones can do serious damage, notably to

automobiles, skylights, and glass-roofed structures. Pea or golf ball-size hailstones are not uncommon in severe storms. Rarely, massive hailstones have been known to cause concussions or to kill people by causing head trauma.

### 4.3.4 Frequency/Probability of Future Occurrence

Severe storms in Butler County quantitatively have the highest likelihood of occurring on a yearly basis. According to the NCDC, 262 storm events including thunder storms, lightning, strong winds, high winds, and hail were documented for Butler County since 1950. Severe storms in Butler County have caused the most cumulative property damage with estimated total losses of over $76 million over a 60 year period.

## 4.4 Floods (including Flash Floods)/Dams

Floods are a naturally recurring event for a river or stream, and are caused by weather phenomena and events that deliver more precipitation to a drainage basin that can be readily absorbed or stored within the basin. Flooding is a localized hazard that is a result of heavy or continuous rainfall exceeding the absorptive capacity of soil and the flow capacity of rivers and streams. Floods can be generally considered in two categories: flash floods, the product of heavy localized precipitation in a short time period over a given location; and riverine floods, caused by precipitation over a longer time period and over a given river basin.

Flash floods occur within a few minutes or hours of heavy amounts of rainfall, from a dam or levee failure, or from a sudden release of water held by an ice jam. Flash floods can destroy buildings and bridges, uproot trees, and scour out new drainage channels. Heavy rains that produce flash floods can also trigger mudslides. Most flash flooding is caused by slow-moving thunderstorms, repeated thunderstorms in a local area, or by heavy rains from hurricanes and tropical storms. Although flash flooding occurs often along mountain streams, it is also common in urban areas where much of the ground is covered by impervious surfaces. Roads and buildings generate greater amounts of runoff than typical forested land. Fixed drainage channels in urban areas may be unable to contain the runoff that is generated by relatively small, but intense, rainfall events.

Riverine flooding refers to periodic flooding of lands adjacent to non-tidal rivers and streams. It is a natural and inevitable occurrence. When stream flow exceeds the capacity of the normal watercourse, some of the above-normal stream flow spills over onto adjacent lands within the floodplain. Riverine flooding is a function of precipitation levels and water runoff volumes within the watershed of the stream or river. The recurrence interval of a flood is defined as the average time interval, in years, expected to take place between the occurrence of a flood of a particular magnitude and an equal or larger flood. Flood magnitude increases with increasing recurrence interval.

Flooding is an important issue for the residents and business owners of Butler County. Whether it was riverine flooding or flash flooding events that have occurred in the past, lives have been disrupted or lost and damage has been extensive.

### 4.4.1 Areas of Special Flood Hazard

Areas of special flood hazards are defined as land in a flood plain that is subjected to a 1% or greater chance of flooding in any given year. Areas of special flood hazard are designated by the Federal Emergency Management Agency (FEMA). Flood Insurance Rate Maps (FIRM) determine the Base Flood Elevation (BFE) for the areas. BFE is defined by the Butler County Flood Plain regulations as “the water surface of the base flood in relation to a specified datum, usually the National Geodetic

Vertical Datum of 1929 or the North American Vertical Datum of 1988 and usually expressed in Feet Mean Sea Level (MSL)."

Butler County has special flood hazard areas identified within the county. All unincorporated and incorporated areas in Butler County are in compliance with state floodplain management standards and participate in the National Flood Insurance Program (NFIP).

Map modernization within the county took place in 2005. The floodplain regulations related to the NFIP were reviewed and updated by the Butler County Department of Development between 2008 and 2010.

The following timeline shows the process of the floodplain update:

**August 18th 2008** – Scoping Meeting to review floodplain and development

**May 15th, 2009** – Preliminary maps created

**July 9th, 2009** – Open house held for public to view maps

**December 10th, 2009 – March 10th 2010** – Appeals period

**June 17th, 2010** – Letter of final determination was drafted

**November 15th, 2010** – Maps and regulations adopted by County Commissioners

**December 17th, 2010** – Maps and regulations effective

The Butler County Department of Development, per adopted regulations, monitors and enforces floodplain regulations for all areas of the county. This monitoring and enforcement is to ensure development does not occur in the floodplain in a way that will be a detriment to any citizen of Butler County.

### 4.4.2 Repetitive Loss Properties

In most counties there are areas that periodically suffer damages from floods. They are known as "repetitive loss properties". Repetitive loss properties are defined as properties with structures that have had two or more insurance claims within a 10 year period. The following is the repetitive loss property information as of 4/30/2011 for Butler County as provided by the State of Ohio EMA.

Butler County unincorporated
5 total buildings – 14 reported losses - $327,281.87 in damages

City of Fairfield
31 total buildings – 92 reported losses - $826,286.51 in damages

City of Hamilton
3 total buildings – 7 reported losses - $111,052.16 in damages

City of Middletown
1 total building – 3 reported losses - $25,998.87 in damages

Village of Somerville
2 total buildings – 2 reported losses - $23,825.87 in damages

Village of Millville
1 total building – 2 reported losses - $17,496.74 in damages

TOTAL
41 total buildings – 120 reported losses – $1,331,941.70 in damages

Information regarding mitigation strategies for Repetitive loss properties can be found in section 6.3 of this plan

### 4.4.3 Frequency/Probability of Future Occurrence

Past floods are indications of what can happen in the future, but mitigation plans are based on the risk of future flooding. Flood studies interpret historical records to determine the statistical potential that storms and floods of certain magnitude will recur. Such events are measured by their recurrence interval.

Recurrence interval, or frequency of occurrence, is defined as the average number of years between storms of a given intensity. Recurrence intervals commonly used in technical studies and design are 100 years and 500 years. Recurrence interval addresses how often a flood of a specific depth will be expected to occur. Structures located within areas considered at higher risk should be prioritized higher as it relates to mitigation.

According to the NCDC, Butler County has experienced 62 flood events since 1993. These floods have caused over $6 million in damage and 1 death.

### 4.4.4 Dams in Ohio

A dam is an artificial barrier usually constructed across a stream channel to impound water. Timber, rock, concrete, earth, steel or a combination of these materials may be used to build the dam. 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. Most dams in Ohio are small and are constructed by farmers and other private individuals for water supply, recreation, swimming and fishing. Numerous other, usually larger, dams are built by cities and industry to form reservoirs for water supply or liquefied waste storage. Ownership of dams is diverse and maintained by both public and private interests. The federal government owns and operates over 30 dams for flood control, recreation and water supply. The state of Ohio has more than 100 dams, primarily located instate park and wildlife areas for recreational purposes. Flood control and some water supply are provided by dams owned by watershed conservancy districts.

The oldest dams in Ohio were constructed over 150 years ago to create water supply reservoirs for a network of navigational canals. Buckeye Lake Dam, built in about 1825 as part of the canal system and located in Licking and Fairfield counties, is the oldest dam in the state. The highest dam in Ohio is located in Jefferson County and is 240 feet high.

### 4.4.5 History of Dam Safety in Ohio

Construction of dams in Ohio dates back to the early 1800 when reservoirs such as Buckeye Lake and Grand Lake St. Marys were built to supply water to the canal system, which provided a means of transportation for agricultural trade and commerce. Dam construction continued at a modest pace for about the next 100 years with relatively few dams built by private entities. In the early part of the nineteenth century, several large municipally-owned dams and reservoirs were built for public water supply. Severe floods also prompted the formation of conservancy districts which constructed dams for flood control.

Although the true forerunner of current dam safety laws in Ohio was enacted in 1963, legislation pertaining to the construction of dams was enacted as early as 1937. This early set of laws aimed to encourage construction of dams for the storage of water in response to recent drought periods in Ohio and the "dust bowl" days on the Great Plains. The regulatory agency responsible for the enforcement of

these early laws was the Division of Conservation and Natural Resources in the State Department of Agriculture.

Due to the availability of large earthmoving equipment after World War II, Ohio saw a significant increase in the number of dams built by individuals and private companies. Although the water storage and recreational capabilities provided by these dams were important benefits, concern about the adequacy of design and construction was prompted by the loss of life and property damage resulting from dam failures, which led to a greater interest in dam safety.

The ODNR's Division of Water has been involved in dam safety since 1963. During this year, the first Ohio law requiring construction permits for building new dams was enacted. In addition, following the failure of several dams in northeast Ohio during the severe flood of 1969, the General Assembly revised the law to include periodic inspections of existing structures. Inspections were required to help assure that the continued operation and use of a dam, dike or levee does not pose a hazard to life, health, or property. In 1972, the failure of Buffalo Creek Dam in West Virginia, which caused great loss of life and severe property damage, led to the enactment of the National Dam Safety Act. This law, administered by the Corp of Engineers, called for an inventory of dams in the United States and the inspection of those dams that could create the most hazards if they failed. The Corps contracted with the Division of Water to inventory roughly 4,500 non-federal dams in Ohio.

### 4.4.6 Classification of Dams in Ohio

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:

(a) Possible health hazard, including but not limited to, loss of a public water supply or wastewater treatment facility.

(b) Probable loss of high-value property, including but not limited to, flooding of residential, commercial, industrial, publicly owned, and/or valuable agricultural structures, structural damage to downstream Class I, II, or III dams, dikes or levees, or other dams, dikes or levees of high value.
(c) Damage to major roads, including but not limited to, interstate and state highways and roads which provide the only access to residential or other critical areas such as hospitals, nursing homes or correctional facilities as determined by the Chief of ODNR's Division of Water.

(d) Damage to railroads, or public utilities.

**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.

(a) Property losses, including but not limited to, rural buildings not otherwise listed as high-value property in paragraph (A) of this Rule and Class IV dams, dikes and levees not otherwise listed as high-value property in paragraph (A) of this Rule. At the request of the dam owner, the Chief of ODNR's

Division of Water may exempt dams from the criterion of this paragraph if the dam owner owns the potentially affected property.

(b) Local roads including but not limited to roads not otherwise listed as major roads in paragraph (A) of this rule.

**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. Dams which are twenty-five feet or less in height and have a storage volume of fifty acre-feet or less, may be placed in Class IV. No proposed dam shall be placed in Class IV unless the applicant has submitted the preliminary design report required by Rule 1501:21-5-02 of the Administrative Code. Class IV dams are exempt from the permit requirements of Section 1521.06 of the Revised Code pursuant to paragraph (A) of Rule 1501:21-19-01 of the Administrative Code. (www.dnr.ohio.gov/water/dsafety/whatdam.htm)

There are more than 50,000 dams identified in Ohio. A great majority of these dams are small and do not fall under the jurisdiction of Ohio's Dam Safety Laws. The number of dams, which fall under state law jurisdiction number as of April 2000 and their classifications are as follows:

Class I Dams - 499
Class II Dams - 539
Class III Dams - 704
Class IV Dams – 952

### 4.4.7 Dams in Butler County

Butler County has 51 total dams within its boundaries. The breakdown of classifications is below:

Class I: 8
Class II: 8
Class III: 14
Class IV: 21
Total: 51

In addition, Butler County has 3 abandoned dams, 7 unclassified dams, and 58 exempt 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.

These dams have been mapped along with Class I and Class II inundation areas. These maps can be seen in Appendix A.

### 4.4.8 Frequency/Probability of Future Occurrence

Butler County does not have a significant history of dam failure. The State of Ohio Dam Safety Program is in place to monitor and provide dam owners in Butler County pertinent information to support their dam's maintenance requirements. The Dam Safety Program regulates the construction, operation, and maintenance of Ohio's dams, dikes, and levees to protect life and property from damages due to failure. This regulation is accomplished through periodic inspection, new dam construction permits, and regulation of improvements, maintenance and operation of existing dams. The probability of future dam failure occurrences is quite low, however the likelihood of severe damage if a Class I or potentially a Class II Dam were to fail is determined on a case by case basis and

could be devastating to areas such as the City of Oxford, City of Hamilton, City of Fairfield, City of Middletown, and West Chester Township due to Class I or II dams located near or directly in the area.

## 4.5 Winter Storms

A winter storm encompasses several types of storm systems that develop during the late fall to early spring. It deposits any of the following types of precipitation: snow, freezing rain, or ice. Blizzards and ice storms are subcategories of winter storms. A winter storm watch indicates that severe winter weather may affect an area. A winter storm warning indicates that severe winter weather conditions are definitely on the way.

### 4.5.1 Blizzards

A blizzard warning signifies that large amounts of falling or blowing snow, and sustained winds of at least 35 mph, are expected for several hours. In order to be classified as a blizzard, as opposed to merely a winter storm, the weather must meet several conditions. The storm must decrease visibility to a quarter of a mile for three consecutive hours, include snow or ice as precipitation, and have wind speeds of at least 35 mph. A blizzard is also characterized by low temperatures.

### 4.5.2 Ice Storms

An ice storm is defined as a weather event containing liquid rain that falls upon cold objects creating 1/4 inch thick or more accumulation of ice buildup. This ice accumulation creates serious damage such as downed trees and power lines, leaving people without power and communication. It also makes for extremely treacherous road conditions. Occasionally, snow will fall after an ice storm has occurred. With the ice covered, it is nearly impossible to determine which travel areas to avoid. When traveling by car, this snow covered ice causes accidents and when walking it causes people to fall, possibly sustaining injuries.

### 4.5.3. Frequency/Probability of Future Occurrence

According to the NCDC, Butler County has had 50 winter storm occurrences since 1993. These storms have caused over $19 million in damage and 5 deaths. According to the Butler County Engineer, the annual amount of snow the county receives during the winter season is 24 inches. That number is far less than Northeast Ohio just 250 miles north that receives 80-100 inches per year.

## 4.6 Tornadoes

Tornadoes are produced from the energy released during a thunderstorm, but account for only a tiny fraction of the overall energy generated. What makes them particularly dangerous is that the energy is concentrated in a small area, perhaps only 100 yards across. Not all tornadoes are the same and science does not yet completely understand how a portion of a thunderstorm's energy becomes focused into something as small as a tornado.

Tornadoes occur mostly in the central plains of North America, east of the Rocky Mountains and west of the Appalachian Mountains. They occur primarily during the spring and summer – the tornado season comes early in the south and later in the north according to the seasonal changes in relation to latitude – usually during the late afternoon and early evening. They have been known to occur in every state in the United States and every continent on the earth, any day of the year, and at any hour.

The damaging strong winds generated from tornadoes can reach 300 mph in the most violent tornadoes, causing automobiles to become airborne, ripping ordinary homes to shreds, and turning broken glass and other debris into lethal missiles. The biggest threat to living creatures, including humans, during tornadoes is flying debris and being tossed about in the wind. Contrary to previous belief, it is not true that the pressure in a tornado contributes to damage by making buildings "explode."

According to the NWS, the development of Doppler radar has made it possible, under certain circumstances, to detect tornado winds with radar. However, spotters remain an important part of the system to detect tornadoes, because not all tornadoes occur in situations where the radar can "see" them. Citizen volunteers comprise what is called the SKYWARN (*www.skywarn.org*) network of storm spotters, who work with their local communities to watch out for approaching tornadoes to ensure that appropriate action is taken during tornado events. Spotter information is relayed to the NWS, who operates the Doppler radars and issues warnings, usually relayed to the public by radio and TV, for communities ahead of the storms. The NWS utilizes all the information they can obtain from weather maps, modern weather radars, storm spotters, monitoring power line breaks, as well as additional sources for issuing tornado warnings. Although the process by which tornadoes form is not completely understood, scientific research has revealed that tornadoes usually form under certain types of atmospheric conditions. Those conditions can be predicted, but it is not yet possible to predict in advance exactly when and where they will develop, how strong they will be, or precisely what path they will follow.

According to the NWS, there are some "surprises" every year, when tornadoes form in situations that do not look like the right conditions in advance, but these are becoming less frequent. Once a tornado is formed and has been detected, warnings can be issued based on the path of the storm producing the tornado, but even these cannot be perfectly precise regarding who will, or will not, be struck

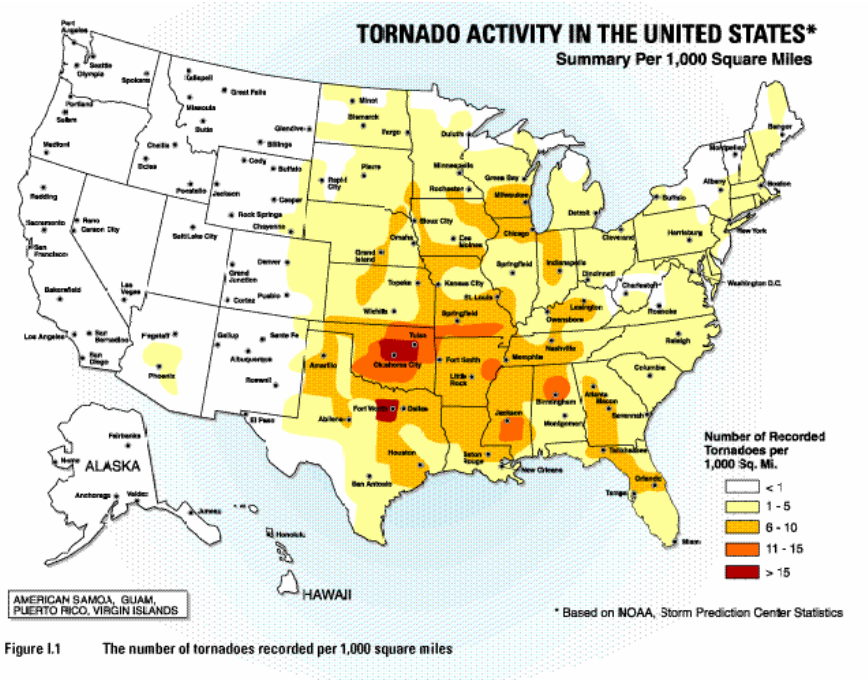


Figure 4.1

Although the number of tornadoes in Ohio does not rank high compared to other states in the United States, the State does average around 14 tornadoes a year. Ohio's peak tornado season runs from April through July, with most tornadoes occurring between 2 p.m. and 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 of the year and at any time of the day or night.

Tornadoes are considered the most violent atmospheric phenomenon on the face of the earth with their strength being measured by the Fujita Scale as described in Figure 4.2. This scale is the mechanism used to determine the potential type of tornado that may have affected a particular community. It is based on velocity of wind and the type of damage the tornado caused. Many F0 and F1 tornadoes have touched down in Ohio, but Ohio has also 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.

| SCALE | WIND SPEED | POSSIBLE DAMAGE |
|---|---|---|
| F0 | 40-72 mph | Light damage: Branches broken off trees; minor roof damage |
| F1 | 73-112 mph | Moderate damage: Trees snapped; mobile home pushed off foundations; roofs damaged |
| F2 | 133-157 mph | Considerable damage: Mobile homes demolished; trees uprooted; strong built homes unroofed |
| F3 | 158-206 mph | Severe damage: Trains overturned; cars lifted off the ground; strong built homes have outside walls blown away |
| F4 | 207-260 mph | Devastating damage: Houses leveled leaving piles of debris; cars thrown 300 yards or more in the air |
| F5 | 261-318 mph | Incredible damage: Strongly built homes completely blown away; automobile-sized missiles generated |

Figure 4.2

Butler County has experienced 15 tornadoes since 1950, according to NCDC, which have caused over $60 million in damage as well as killing 1 person and injuring 31more.

### 4.6.1 Frequency/Probability of Future Occurrence

Butler County has a significant history of tornado occurrences. According to the NCDC, there have been 15 tornadic events recorded in the county over the past 60 years. On average, 4 tornadoes occur in the county every 10 years. There have been 2 F4 tornadoes documented within the county and one 1 F3 in the past 60 years. The probability of future occurrences is quite high as well as the likelihood of severe damage based on significant population growth in the county.

## 4.7 Drought

A drought is a period of abnormally dry weather that persists long enough to produce a serious hydrologic imbalance (i.e., crop damage, water supply shortage, etc.) The severity of the drought depends upon the degree of moisture deficiency, the duration and the size of the affected area.

The worst drought in 50 years affected 35 states during the long, hot summer of 1988, when some areas had been suffering from lack of rainfall since 1984. Rainfall totals in 1988 throughout the mid-west, Northern Plains and the Rockies were 50% to 85% below normal. Crops and livestock died, and some areas became desert. Forest fires began over the Northwest that left 4,100,000 acres destroyed by autumn.

### 4.7.1 Droughts as a Precursor to Other Disasters

Rural counties are susceptible to wild land fires especially during drought conditions. When most people think of wild fires, the first thing that comes to mind is the devastating and disastrous western fires that are quite prevalent during the summer months.

With more people than ever living, working, traveling and recreating in the urban/urban interface, the odds of wild land fires are increasing. Causes of wild land fires include the careless burning of debris, household trash and cigarettes, lightning, equipment and vehicles, railroad accidents, electrical fires, and arson.

Fire fighters talk of the fire triangle in terms of the heat of combustion, fuel and oxygen all being necessary for fire to occur. Wild land fire fighters are concerned with the wild land fire triangle of fuel (grass, brush, forests, crops, etc.), terrain (open flat lands, steep slopes and everything conducive to wild land fire spread) and weather (hot, dry, windy conditions are typical wild land fire weather). During an average year in Ohio, an estimated 15,000 wildfires and natural fuel fires occur. Typically, a reported 1,000 wild land fires burn an average between 4,000 to 6,000 acres in Ohio each year.

According to the NCDC, Butler County has not had any reported wild fires in the past 60 years. While chances of these occurring are minimal, the county still has nearly 130,000 acres of farmland that could be susceptible to fires.

### 4.7.2 Urban/Rural Fire Interface

The wildland-urban interface can be defined as the zone where structures and other human developments meet or intermingle with undeveloped lands.

Topography plays a major role in how fast a wildfire spreads. Steep slopes are the greatest topographical influence on fire behavior. As the steepness of a slope increases, fires spread more quickly. A fire will spread twice as fast on a 30% slope than it will on level ground. This fast speed is due to the fact that a fire starting at the bottom of a slope has a longer upslope run with more available fuel in its path.

Unlike most hazards, the threat of a drought tends to be dismissed because of the relatively long time a drought takes to have damaging effects.

Figure 4.3 shows the national risk to wild fires as of September 2010.

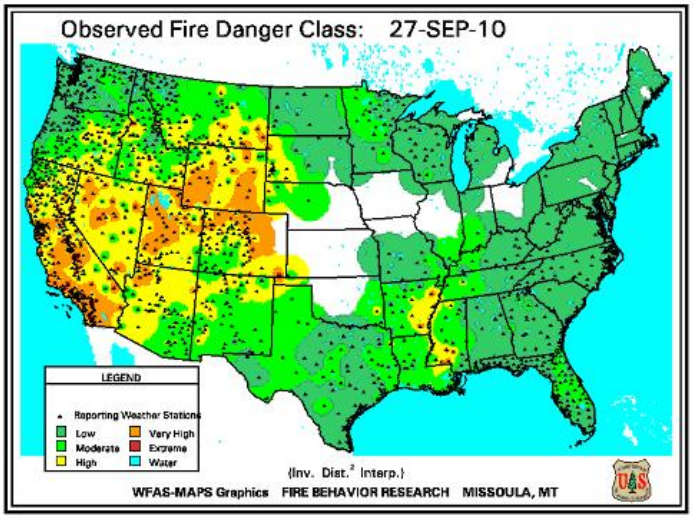


Figure 4.3

### 4.7.3 Frequency/Probability of Future Occurrence

According to the NCDC, Butler County has experienced 2 droughts of significance since 1999. The odds of future occurrences based on this information are very minimal.

## 4.8 Earthquakes

Major earthquakes are a low probability, high consequence event. It is because of the potential high consequences that geologists, emergency planners and other government officials have taken a greater interest in understanding the potential for earthquakes in some of the areas of the eastern United States and educating the population as to the risk in their areas. Although there have been great strides in increased earthquake awareness in the eastern United States, the low probability of such events makes it difficult to convince most people that they should be prepared.

It is 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 have been 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.

Although the New Madrid Line is in close proximity to the State of Ohio, there has not been an earthquake of any significance since 1875 caused by this fault line. An earthquake on June 18, 1975 caused damage in western Ohio, and affected a total area estimated at over 40,000 square miles. Walls were cracked and chimneys thrown down in Sidney and Urbana. The shock was felt sharply at Jeffersonville, Indiana. The affected area included parts of Illinois, Indiana, Kentucky and Missouri.

### 4.8.1 Monitoring of Earthquakes

The ODNR Division of Geological Survey has established a 25 station cooperative network of seismograph stations throughout the State, mostly at universities and colleges, in order to continuously record earthquake activity. The network, which went on line in January 1999, ended a five-year gap during which there was only one operating station in Ohio. The State was dependent on seismographs in Kentucky and Michigan to record Ohio earthquakes. Figure 4.4 shows their locations.


Figure 4.4

The 25 stations of the new seismograph network, which is called OhioSeis, are distributed across the State, but are concentrated in the most seismically active areas or in areas that provide optimal conditions for detecting and locating very small earthquakes that are below the threshold of human notice. These small micro earthquakes are important because they occur more frequently and help to identify the location of faults that may periodically produce larger, potentially damaging earthquakes. Each OhioSeis station is a cooperative effort. Seismometers, the instrument that detects Earth motions and other seismic components were purchased by the Division of Geological Survey with funds provided by FEMA through the OEMA, as part of the National Earthquake Hazards Reduction Program. The computers and Internet connection were purchased and provided by the cooperating institutions.

The Division of Geological Survey is coordinating the seismic network and has established the Ohio Earthquake Information Center at the Horace R. Collins Laboratory at Alum Creek State Park, north of Columbus in Delaware County. This facility functions as a repository and laboratory for rock core and well cuttings, but has a specially constructed room for earthquake recording. The seismograph system allows for very rapid location of the epicenter and calculation of the magnitude of any earthquake in the State. The earthquake records, or seismograms, from at least three seismograph stations are needed to determine earthquake locations (epicenters). These records can be downloaded from the internet at any station on the network, and location and magnitude can be determined. Small earthquakes were in many cases not even detected by distant, out-of-date seismograph stations.

The OhioSeis network provides a whole new dimension of understanding about the pulse of the Earth beneath Ohio. Although the new seismograph network will not predict earthquakes or provide an alert prior to an event, it will provide insight into earthquake risk in the State so that intelligent decisions about building and facility design and construction, insurance coverage and other planning decisions can be made by individuals, business and industry, and governmental agencies.

While Butler County has never had an epicenter directly within the county, earthquakes have been in very close proximity located in northern Hamilton County and southern Montgomery County which have had direct affects on Butler. The locations of past earthquakes' epicenters are shown in figure 4.4.

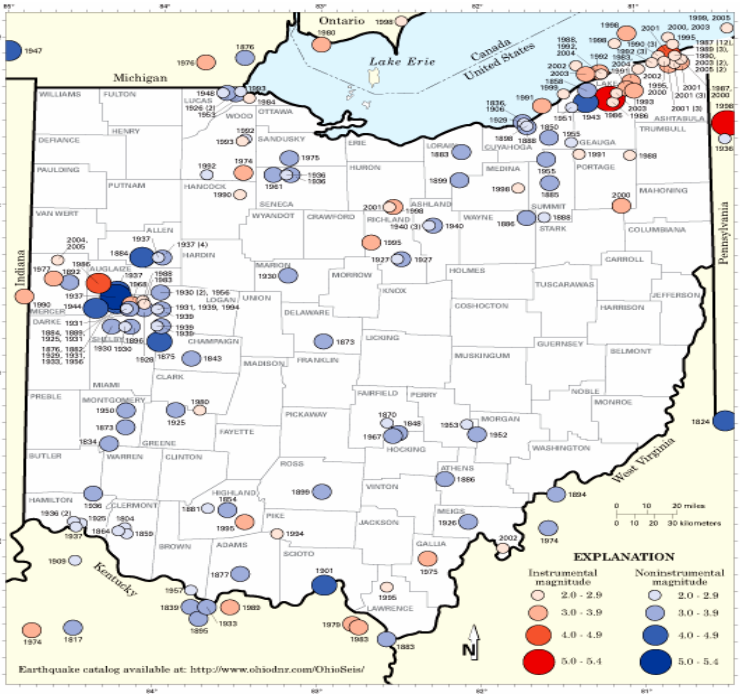


Figure 4.4

## 4.8.2 Frequency/Probability of Future Occurrence

Based on historical data the odds of an earthquake occurring in southwest Ohio and impacting Butler County are fairly high. 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 according to geologists. Butler County's close proximity to this fault line puts the county at risk for any major earthquakes. A map of the New Madrid fault is shown in Figure 4.5.

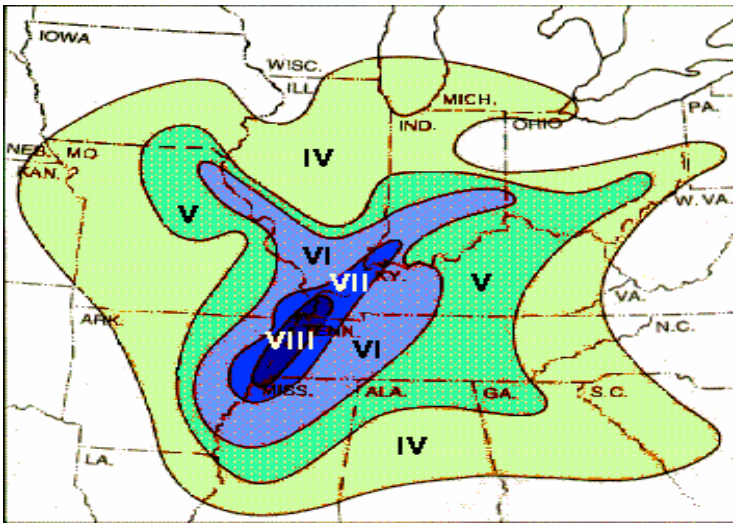


Figure 4.5

# 5.0 VULNERABILITY ASSSESSMENT

Butler County is susceptible to many different kinds of natural hazards as reviewed in the previous section of this plan. If a hazard event struck vacant land, there would not be much cause for concern. However, since Butler County has nearly 370,000 residents and thousands of homes, businesses and critical facilities, the potential for damage and injury is very high, especially in higher populous areas such as the major cities and the continuously growing townships.

This chapter reviews how vulnerable Butler County is to property damage and threats to public health and safety. This chapter also reviews how hazards may have an adverse impact on the economy. The potential for property damage is measured in dollars based on historical events of the past and damage incurred from those events.

A five-step process was followed to estimate the probability and cost to Butler County of the hazards reviewed in the Hazard Profile section (Section 4.0) of this report. This process was documented on a per hazard basis. The steps that were used are as follows:

Step 1: Inventory critical facilities and structures susceptible to property damage.
Step 2: Determine potential dollars lost based on various levels of damage on different categories of structures.
Step 3: Evaluate the impact on infrastructure and general population.
Step 4: Evaluate property damage, loss of life and economic losses.
Step 5: Determine and prioritize the probability, geographic extent and magnitude of the hazards

## 5.1 Vulnerability Data Collection

Prior to beginning an assessment of a community's vulnerability to hazards, local sources of information were researched including comprehensive plans, land use plans, land development regulations and flood regulations, to determine if the county previously addressed its vulnerability to any particular hazard. In most cases, local plans and regulations did not yet exist or were very minimal in addressing natural hazard situations and building parameters.

Therefore, other state and national sources were researched for detailed information. One of these resources was the National Climate Data Center (NCDC). The NCDC is the world's largest active library of weather data. The NCDC creates many climate publications and responds to data requests from all over the world. The NCDC supports a three-tier national climate services support program that includes partners such as the NCDC, Regional Climate Centers, and State Climatologists. The NCDC has long served as a national resource for climate information. The NCDC's data is used to address issues that span the breadth of this nation's interests. As climate knows no boundaries, the NCDC works closely with scientists and researchers world-wide to develop both national and global data sets that have been used by both government and the private sector to maximize the resources provided by our climate and minimize the risks of climate variability and weather extremes. The NCDC has a statutory mission to describe the climate of the United States and acts as the nation's scorekeeper regarding the trends and anomalies of weather and climate. The NCDC's climate data have been used in a variety of applications including agriculture, air quality, construction, education, energy, engineering, forestry, health, insurance, landscape design, livestock management, manufacturing, recreation and tourism, retailing, transportation, and water resources management among other areas. The NCDC's data and products fulfill needs ranging from building codes to power plant and space shuttle design.

Another source of hazard information that was explored was the Ohio Seismic Network as described in previous sections of this report. The Division of Geological Survey of the ODNR coordinates a 23-

station cooperative network of seismograph stations throughout the state in order to continuously record earthquake activity.

Because the state and national agencies are not always privy to the local knowledge, some information extracted from their libraries may not be comprehensive or complete. Therefore, the Mitigation Development and Overhead Committee used their experience and knowledge with verification from the local communities to prioritize the hazards determined to affect the county the most and assess them according to local concerns.

## 5.2 Critical Facilities

All the facilities deemed critical by this Mitigation Plan are listed in Figure 5.1.

| Facility Type | # |
|---|---|
| Government | 7 |
| Nursing Homes | 41 |
| Fire Stations | 49 |
| Police Stations | 14 |
| Hospitals | 6 |
| Airports | 3 |
| Red Cross Shelters | 14 |
| Oil and Gas Wells | 26 |
| Water Pump Stations | 74 |
| **TOTAL** | **234** |

Figure 5.1

## 5.3 Potential Dollars Lost

The second step of the vulnerability assessment was to calculate the impact of the given hazards in terms of property damage and loss of property use. Averages and typical situations were used for various categories of facilities. This approach did not predict which facilities will be hit by which hazard, but it instead provided a general estimate of the level of damage that would be expected based upon available data.

First, the value of the property being damaged was determined based on average value of a facility within that category. Typical values of the structures were determined using data received from the County's Auditor's Office.

Contents value was calculated as a percentage of the structure's value. Figure 5.2 shows the relative value of the typical contents to the typical structure type. These ratios were taken from FEMA guidance documents.

| Occupancy Class | Value (%) |
|---|---|
| Residential | 50% |
| Commercial | 100% |
| Industrial | 150% |
| Medical Facilities | 150% |
| Emergency Services | 150% |
| General Government | 100% |
| Schools/Libraries | 100% |
| Colleges/Universities | 150% |
| Religion/Nonprofit | 100% |
| Shelters | 100% |

Figure 5.2

Second, three levels of physical damage were evaluated for each category of structure. These levels have a percentage of damage associated with each. The dollars lost for each level, however, may be underestimated since there may be downtime associated with closing a business for an extended period of time.

- **Minor damage:** Many structures exposed to a storm or other hazard will suffer only minor to moderate damage. For example, a strong windstorm may just damage the roof and windows of some structures. For this calculation, 5% of the structure's value was used. Because the structure stays substantially intact, no contents losses were considered.

- **Moderate damage:** This category represents more serious damage, such as a collapsed wall or floodwater over the first floor of a building. Moderate damage is calculated as 40% of the structure's value plus 40% of the content's value.

- **Major damage:** This category is used when a building is demolished or heavily damaged. An example of the former is a house leveled by a tornado. An example of the latter is floodwater more than 1.5 feet over the lowest floor (i.e., over the electrical outlets). The average dollar figure for this category is 75% of the structure's value and 75% of the contents' value.

Figure 5.3 shows the calculated dollar losses for each level of damage per facility type. The type of facility as listed was limited to that information available from the County Auditor's Office.

| Property | Average Value | Minor Damage | Moderate Damage | Major Damage |
|---|---|---|---|---|
| Residential | $118,292 | $5,915 | $70,975 | $133,079 |
| Commercial | $301,945 | $15,097 | $241,556 | $452,918 |
| Industrial | $719,722 | $35,986 | $719,722 | $1,349,479 |
| Agricultural | $254,651 | $12,733 | $203,720 | $218,913 |
| Public Utilities | $25,237 | $1,262 | $25,237 | $47,320 |

Figure 5.3

## 5.4 Prioritization Rankings

The information contained in each hazard profile was used to prioritize each hazard. A total priority score was assigned to each hazard type based on a combination of the natural hazard's probability of future occurrence, anticipated geographic extent and anticipated magnitude. These numbers were added together to calculate the final priority score. The number rankings were based upon a method supplied by the Ohio Department of Natural Resources (ODNR)

### 5.4.1 Probability of Occurrence

5: The historical records indicate the natural hazard has occurred ten or more times over a one-year period.

4: The historical records indicate the natural hazard has occurred at least ten times over a ten-year period.

3: The historical records indicate the natural hazard has occurred more than one but less than ten times over a ten-year period

2: The historical records indicate the natural hazard has occurred on average one time over a ten-year period

1: The historical records indicate the natural hazard has occurred less than one time over a ten-year period

### 5.4.2 Anticipated Geographic Extent

5: The future occurrence of the natural hazard may affect multiple sites in six or more townships, or approximately one-half the entire county.

4: The future occurrence of the natural hazard may affect multiple sites in at least one but less than six townships

3: The future occurrence of the natural hazard may affect individual sites in at least one but less than six townships

2: The future occurrence of the natural hazard may affect multiple sites in one township; however additional townships would not be affected

1: The future occurrence of the natural hazard may affect an individual site in only one township

### 5.4.3 Anticipated Magnitude

5: The occurrence of the natural hazard has in the past resulted in deaths and/or injuries and extensive property damage in the millions of dollars and at least one record from the past that resulted in the declaration of a Federal Disaster. The affected community would need outside assistance to recover from this event. There is a large potential for critical facilities to be affected that could exaggerate the impacts of the event through the community.

4: The occurrence of the natural hazard has not in the past, but could in the future result in the deaths and/or injuries and has in the past resulted in extensive property damage in the

millions of dollars. The affected community would need outside assistance to recover from this event. There is large potential for critical facilities to be affected that could exaggerate the impacts of the event throughout the community.

3: The future occurrence of the natural hazard could result in deaths and/or injuries, but extensive property damage to only specific areas within the community would be expected. There is a small potential for critical facilities to be affected. The occurrence likely would require local multi-agency and multi-jurisdictional assistance for recovery.

2: The future occurrence of the natural hazard would not result in deaths and/or injuries, and property damage would be localized and limited. There is a small potential for critical facilities to be affected. The occurrence would be treated as a local emergency and likely would not require multi-agency and multi-jurisdictional assistance for recovery.

1: The occurrence of the natural hazard in the future would not result in deaths and/or injuries, and property damage would be minimal or unlikely. There is no potential for critical facilities to be affected. The occurrence would be treated as a local emergency and would not require multi-agency and multi-jurisdictional assistance for recovery.

## 5.5 Vulnerability Assessment by Hazard

### 5.5.1 Severe Storms

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

#### 5.5.1.1Infrastructure Impacts

Since severe storms are random in nature, the impact on the County's infrastructure is not limited to a certain area as with river flooding. Homes and businesses all throughout the County are susceptible to high winds, lightning and hail. Shingles are blown from rooftops and hail may dent siding or break windows. Lightning strikes may be more damaging to structures that are not grounded with lightning rods. Trees may become uprooted and limbs detached and blown into structures. Winds also cause severe damage to mobile home parks and campgrounds if units are not properly secured to permanent structures.

Utilities and municipal plants may also be damaged during severe storms. Debris, such as tree limbs, blown into utility lines may cause downed power lines. Wastewater plants may also be adversely affected with blown limbs and debris clogging the tanks and filters.

#### 5.5.1.2 Population Impacts

Because severe storms are random in nature, the entire County population is susceptible and should be prepared. The populations located in mobile home parks and camp grounds should take particular care to seek adequate shelter with approaching severe weather.

#### 5.5.1.3 Property Damage

According to the NCDC, there have been 262 severe storm events in Butler County since 1950. The total property lost within the county due to severe storms accumulates to $46.29 million. The majority of this damage came during the 2008 Hurricane Ike windstorm that which caused $41.7 million in damage, easily the most significant event in Butler County in the past 60 years.

#### 5.5.1.4 Loss of Life

Since 1950, there have been 3 recorded deaths and 27 recorded injuries due to severe storms, wind, lightning and hail. Because the number of severe storms affecting Butler County is large, the potential for death and injury is high. As the population of the County continues to grow, as forecasted by the 2010 Census, there is more potential for loss of life and/or injury. One of the biggest problems associated with severe storms is the lack of public education and awareness. Citizens are not aware of the warnings and dangers associated with severe weather.

#### 5.5.1.5 Economic Loss

The economic losses a community suffers during a severe storm event can be high. In communities with hazard trees, these trees have the potential to destroy homes and businesses if uprooted. Fallen branches may also cause severe damage. Residents and business owners then turn their efforts from work and running a business to clean up efforts.

Federal assistance to Butler County residents in the aftermath of a severe storm has only occurred once in the past 10 years, on August 27, 2001. However, even if a disaster declaration is issued to the County, federal money may not cover the entire amount of damage. Therefore, the county and local governments must find the additional money needed to complete the clean up and restoration process.

#### 5.5.1.6 Prioritization Ranking

Severe Storms within Butler County received the following priority rankings:

| | |
|---|---|
| Probability of Occurrence: | 5 |
| Anticipated Geographic Extent: | 3 |
| Anticipated Magnitude: | 5 |
| | |
| Total Priority Score: | **13** |

### 5.5.2 Flooding

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 storm water 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. The 100-year floodplain is the land area having a 1 in 100 chance of flooding in any given year, but the statistics can be misleading. In reality, the 100-year storm or flood could occur two, three, or several years in a row (unlikely but possible), because the 100-year flood is a statistical probability and not a predictable recurrence. Statistically, the 100-year flood has a 25% chance of occurring during the typical 30-year lifespan of a home mortgage.

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 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 clog their free-flow area.

#### 5.5.2.1 Infrastructure Impact

There are approximately 4,350 total structures considered to be at-risk. These at-risk structures are located within the 100-year floodplain and are therefore susceptible to damage during a flood.

#### 5.5.2.2 Population Impact

Based on the NCDC data published from 1993 through June 2010 time period, Butler County's citizens have had to endure multiple flooding situations, including flash floods and river floods. Flash floods affect a specific area over a short period of time and a smaller population than river floods. On occasion, a life may be lost because of water rising very quickly in this short time.

Unlike flash flooding, the 100-year river flood has a less likelihood of occurring but will impact a larger population. The streams and rivers within the floodplain will flood their 100-year floodplains on and average of once every 100 years. The populations occupying at-risk structures located in the floodplain shown on the Multi-hazard Map will be affected by this flood.

#### 5.5.2.3 Property Damage

Based on information retrieved from the NCDC, river flooding in Butler County has accounted for $6.17 million in damages from 1993 through 2010. The most significant event occurred in 2001 where flooding accounted for $1.5 million in damages throughout the county. On average, according to the data gathered from the NCDC, in the past 17 years the county suffered $363,470 in damage per year from flooding.

#### 5.5.2.4 Loss of Life

The NCDC has only 1 record of death occurring due to flooding within the county. This event took place in 1996, when an 18$^{th}$ month old child drowned in a flooded stream. While this is the only death recorded since 1993, the potential for death and injury is ever present, especially in flash flood events. During flash floods, water rises very quickly and may catch citizens by surprise. Homeowner's may not be prepared for the rising waters and the need to seek safety quickly. Motorists often think that they can drive through ponded water and risk getting stuck in the flooded area. Due to the frequency of flash flooding in Butler County, the risk to human life is high but can be reduced by educating the County's residents.

#### 5.5.2.5 Economic Loss

The economic losses a community suffers during a flood event can be high. Productivity decreases as residents miss work to tend to the damage incurred at their homes. Some inventory within a business itself may be lost if the owner was not prepared and the facility not flood proofed prior to a flood event. Small businesses may suffer so much damage that they are unable to reopen. Contractors and clean up companies may reap the benefits of the damage but not enough to offset the overall losses to the economy.

The County's infrastructure will also suffer damage to be repaired. Some roads and bridges may wash out. In some areas of the County, especially near Canyon Lake, residential developments sustain substantial erosion.

Federal assistance to Butler County residents in the aftermath of a severe storm has only occurred once in the past 10 years, on August 27, 2001 due to flooding from a severe storm. However, even if a disaster declaration is issued to the County, federal money may not cover the entire amount of damage.

Therefore, the county and local governments must find the additional money needed to complete the clean up and restoration process.

#### 5.5.2.6 Prioritization Rankings

Flooding within Butler County received the following priority rankings:

| | |
|---|---|
| Probability of Occurrence: | 5 |
| Anticipated Geographic Extent: | 3 |
| Anticipated Magnitude: | 5 |
| | |
| Total Priority Score: | **13** |

### 5.5.3 Winter Storms/Ice Storms

While Butler County does not necessarily receive a high amount of snow during the winter months, it is still susceptible to strong winter storms, ice storms, and extremely cold temperatures.

#### 5.5.3.1 Infrastructure Impact

Because the area is not known for the extreme winter storms that are mostly associated to the northern Ohio region, structures in the county may not be built to withstand an intense snow fall/ice storm if they do occur.

#### 5.5.3.2 Population Impact

Because winter storms are countywide, the entire County population is susceptible and should be prepared. Motorists should be aware of declared snow emergencies and seek safety before becoming stranded. Motorists should also be educated on the presence of black ice on roadways and bridges. The sensitive populations will be the most susceptible to the deep snows and extreme temperatures and should prepare for such events prior to the winter months.

#### 5.5.3.3 Property Damage

According to the NCDC, there have been 50 winter storm events in Butler County since 1993. These storms have caused $19.27 million in property damage in the past 17 years. There has not been any crop damage in the county due to winter storms according to NCDC.

#### 5.5.3.4 Loss of Life

Since 1993, there have been 5 deaths and 34 reported injuries in Butler County due to winter storms. Because the number and severity of winter storms is not great in the county, deaths and injuries are not potentially high. However, due to continued population growth as well as the county's lack of experience dealing with major winter storms the impact of an extreme winter storm, one of which the county has never dealt with previously, could be significant.

#### 5.5.3.5 Economic Loss

The economic losses the county will endure during a normal winter storm are low. While some residents and businesses may be unable to partake in normal daily activities, the majority of the county should be able to function without any significant problems. However, if an unusually strong winter storm occurs within the area, the county may see significant school and business closings until the storm becomes manageable.

Federal assistance to Butler County residents in the aftermath of a winter storm is not likely. In the past 60 years Butler County has only received 1 federal disaster declaration from FEMA, which occurred on January 11th, 2005 after a strong winter storm impacted the region.

#### 5.5.3.6 Prioritization Ranking

Winter Storms/Ice Storms within Butler County received the following priority ranking:

| | |
|---|---|
| Probability of occurrence: | 4 |
| Anticipated Geographic Extent: | 4 |
| Anticipated Magnitude: | 5 |
| | |
| Total Priority Score: | **13** |

### 5.5.4 Tornadoes

As seen in the hazard profile and as determined by the Mitigation Development and Overhead Committee, Butler County has a high risk for tornadoes.

#### 5.5.4.1 Infrastructure Impact

Because tornadoes are random in nature, no one area of the County is more susceptible to infrastructure damage than another area. Since the occurrence of tornadoes is fairly high within Butler County, the effect on the infrastructure can be great due to the density within the area. Trees may become uprooted, limbs detached and blown into structures and structures may be completely destroyed.

#### 5.5.4.2 Population Impact

While Butler County is rapidly growing and will be nearing 400,000 residents within the next two decades, some of the western parts of the county have a limited population and low density. Therefore, if a tornado impacts the western part of Butler County the devastation may be relatively low, however if a tornado impacts the central or eastern part of the county where population and density are very high there could be widespread destruction and devastation of infrastructure. Tornadoes destruction may typically be covered by some homeowner's insurance which will cover the expenses of rehabilitation; however some homes and businesses may need extensive public assistance if it's made available.

#### 5.5.4.3 Property Damage

According to the NCDC, there have been 15 reported tornadoes in Butler County since 1950 with magnitudes ranging from F0 to F4. These tornadoes have caused property losses of $60.8 million. The last recorded tornado was in 2008 in Oxford, Ohio at the Miami University Airport. This tornado only received F0 ranking and caused $30,000 in damage. The two previous tornadoes recorded in Butler County were F4's and occurred in 1990 causing over $5 million in damage. The variety of tornado sizes Butler County has endured over the past 60 years along with the amount of past property damage created by these tornadoes plus the additional and continued growth of the county over the foreseeable decades makes tornadoes impacts high within the area.

#### 5.5.4.4 Loss of Life

There has been 1 recorded death and 31 injuries related to tornadic events in Butler County since 1950. The death occurred during a F2 tornado in 1990, while the injuries have been during tornadic events spread out through the decades. While 15 tornadoes in the past 60 years gives a low probability of a

tornadic event in the county, the continued growth of the county's population and increased density of infrastructure will increase the potential for loss of life and/or injury.

One of the biggest problems associated with tornadoes is the lack of public education and awareness, especially since tornadoes do not happen frequently. Citizens are not aware of the warnings and dangers associated with severe weather and tornadoes and thus may not be prepared.

#### 5.5.4.5 Economic Loss

If a tornado of F4 or F3 proportions, which have been recorded in the area before, impacted Butler County the devastation to the local economy could be great. Infrastructure could possibly be destroyed along with businesses, both small and large. There have been two federal disaster declarations in Butler County due to tornadoes, one in 1974 and one in 2001. Unless, there is a major tornado within the county that causes widespread devastation, a federal disaster declaration is unlikely.

#### 5.5.4.6 Prioritization Rankings

Tornadoes within Butler County received the following priority rankings:

| | |
|---|---|
| Probability of Occurrence: | 2 |
| Anticipated Geographic Extent: | 4 |
| Anticipated Magnitude: | 5 |
| | |
| Total Priority Score: | **11** |

### 5.5.5 Drought

As seen in the hazard profile and as determined by the Mitigation Development and Overhead Committee, Butler County has a low risk of incurring damage from droughts and extreme heat. Due to the non-site specific nature of this hazard, the best way to deal with preparing for future events is to consider historical occurrences.

#### 5.5.5.1 Infrastructure Impact

Because droughts are a non-site specific hazard, the effects of a drought should be evaluated countywide. There are no documented critical facilities that are considered at-risk as it relates to droughts.

By itself, a drought does not damage developed property. However, over a long period of time, certain soils can expand and contract resulting in some structural damage to buildings. A small percentage of buildings in areas with such soils suffer minor damage during their "useful lives." Therefore, the overall impact on the County's infrastructure will be very low.

#### 5.5.5.5 Population Impact

Since droughts are non-site specific, the entire County population could be affected by the hot, dry conditions. The overall impact that droughts have on the Butler County population is very low based on the number of events recorded by the National Climatic Data Center. However, the County's residents, especially the sensitive populations, should still be aware of the dangers of extreme heat, such as heat exhaustion and heat stroke.

#### 5.5.5.6 Property Damage

According to the NCDC, there have been only 2 droughts in Butler County since 1999. Neither of these events caused any property damage or crop damage to the county. Due to this lack of drought occurrences within the county, there is a low impact relative to property damage.

#### 5.5.5.7 Loss of Life

There were not any reported deaths or injuries during the 2 droughts in 1999. While drought occurrences are low within the county, it is important to educate the public about the problems with extreme heat and/or drought in case one does occur which could have potential significant health related issues for all residents.

#### 5.5.5.8 Economic Losses

Due to the infrequency of drought events in Butler County, the overall impact on the economy is low. However, when droughts do occur, the economic losses would be countywide hitting the farming community the hardest. It is very unlikely that a Presidential Disaster Declaration would occur, therefore the all mitigation costs would be funded locally.

#### 5.5.5.9 Prioritization Rankings

Drought within Butler County received the following priority rankings:

| | |
|---|---|
| Probability of Occurrence: | 2 |
| Anticipated Geographic Extent: | 3 |
| Anticipated Magnitude: | 3 |
| | |
| Total Priority Score: | **8** |

### 5.5.6 Earthquakes

As seen in the hazard profile and as determined by the Mitigation Development and Overhead Committee, Butler County does have a fairly high chance of being impacted by an earthquake in the future due to its close proximity to the New Madrid fault line. However, there have not been any previous epicenter locations within Butler County from the early 1800s through today. Therefore, the county is more susceptible to earthquake's impacting which have epicenters located outside of Butler County limits.

#### 5.5.6.1 Infrastructure Impacts

While earthquake events in the county are very limited, if one of significance does occur the impacts on the county's infrastructure could be great due to the increasing population growth and therefore density of the area. Facilities deemed 'critical' previously in this plan could potentially be damaged or completely destroyed.

#### 5.5.6.2 Population Impact

The increasing population growth and density within the county could potentially be significantly impacted by an earthquake. While the western portion of Butler County is mostly agricultural areas creating low population density, the central and eastern portion of the county has significant density making this area's population more susceptible to earthquakes.

#### 5.5.6.3 Property Damage

The level of damage expected from an earthquake in Butler County is low to moderate. According to previous historical data, it would be expected to be on the order of a 3.0 to 5.0 magnitude as registered on the Richter scale. A quake of this magnitude would be felt by all people. It would cause breakage of dishes, windows, plasters and possibly chimneys. Damage to buildings will vary depending on the quality of construction.

#### 5.5.6.4 Loss of Life

The level of an expected earthquake is not considered to be life threatening. Some minor injuries may result from falling objects. Because the likelihood of an earthquake occurring is very low, the potential for death or injury is minimal.

#### 5.5.6.5 Economic Losses

Based on the slight property damage expected from a 3.0 to 5.0 magnitude earthquake, the impact on the local economy and local government expenditures is considered to be low. Businesses may need to repair cracks in the walls but should not have to close due to severe infrastructure damage.

#### 5.5.6.6 Prioritization Rakings

Earthquakes within Butler County received the following priority rankings:

| | |
|---|---|
| Probability of Occurrence: | 3 |
| Anticipated Geographic Extent: | 4 |
| Anticipated Magnitude: | 3 |
| Total Priority Score: | **10** |

## 6.0 GOALS AND ACTION ITEMS

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 all of Butler County's jurisdictions. Mitigation goals reflect community priorities and should be consistent with other plans for the county and municipalities. Mitigation goals and actions items were prioritized by hazard using the risk assessment and ranking compiled in section 4.0 of this plan.

While previous goals and mitigation action items existed in the 2003 Mitigation Plan, the Overhead and Development Committee believed that new and more strategic goals were needed in this 2011 update and therefore past 2003 goals were deleted and new ones created. A cost-benefit review was used to maximize the benefits of each action. The pros and cons of each action are reflected in the benefits and costs.

The goals and action items developed are shown in the following charts, along with bulleted problem statements, start/end dates for projects, agencies involved, resources needed, and the current status of the projects.

# 6.1 All Hazards

- Current emergency notification mechanisms may not reach all citizens at risk
- It is presently unknown if there are a sufficient number of emergency shelters in Butler County for all citizens
- Existing emergency shelters in Butler County are inadequately publicized and/or located to respond to significant disasters

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1. Reduce health and safety risk to the Butler County community in the event of a significant disaster | 1. Investigate feasibility of new emergency notification options that will improve notification through local television/radio/telephone/facebook/twitter | June 2011-Dec 2011 | Emergency Management County IT BRICS | ALL | Existing Budget | NEW |
| | 2.Establish a countywide list of emergency shelters | June 1st –June 30th 2011 | Emergency Management Red Cross | ALL | Existing Budget | NEW |
| | 3. Asses capabilities of emergency shelters throughout Butler County to make sure they are adequate to meet potential demands | June 1st – June 30th 2011 | Emergency Management Red Cross | ALL | Existing Budget | NEW |
| | 4. Apply for grant funding to purchase/develop new emergency notification mechanisms | June 2011- June 2016 | Emergency Management County IT BRICS | ALL | Grants | NEW |
| 2.Ensure Public Funds are used in most efficient and effective manner | 1. Seek and secure grants for mitigation activities | June 2011- June 2016 | Emergency Management | ALL | Existing Budget | NEW |

# 6.2 Severe Storms

- Above ground utilities are exposed to damage and could cause widespread outages
- Citizens are not aware of all the dangers of lighting and how to minimize the risks
- Citizens do not utilize weather radios in an efficient manner
- Utility outages cause damage to electronics, perishable food items and put vulnerable and disabled populations at risk
- Communications could be disrupted for an extended period of time

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1. Ensure public safety and reliable utility service during severe storms | 1. Place a high priority on tree trimming/maintenance throughout the county to protect power lines | June 2011-June 2016 | Emergency Management Butler County Engineer | ALL | Existing Budget | NEW |
| | 2. Seek funding for back-up generators for all critical facilities in the county | June 2011-Jan 2016 | Emergency Management | ALL | Mitigation Grants/County General Funds | NEW |
| | 3. Create general outreach/pamphlets on preparedness activities as it relates to severe storms | June 2011-Dec 2011 | Emergency Management | ALL | Existing Budget | NEW |
| | 4. Implement improved severe weather forecasting and warning systems | June 2011- Dec 2012 | Emergency Management | ALL (specifically Madison Twp, Wayne Twp, Morgan Twp, HanoverTwp) | Grants/County General Funds | NEW |
| 2. Reduce damage to public and private property during severe storm events | 1. Investigate developing stricter building codes that would better withstand strong winds associated with severe storms | June 2011- June 2016 | Emergency Management Butler County Building & Zoning | ALL | Existing Budget | NEW |
| | 2. Identify historic/architecturally significant buildings and critical infrastructure in county that may need structural upgrades to withstand events associated with severe storms | June 2011- June 2016 | Emergency Management Butler County Building & Zoning | City of Hamilton City of Fairfield City of Middletown | Grants/County General Funds | NEW |

# 6.3 Floods

- River and flash flooding in Butler County currently has the potential to cause significant property damage, interruption of business and government services, personal injury and loss of life

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1.Minimize losses caused by river and flash flooding to private and public property | 1. Develop accurate flood insurance maps for the county | June 1st- June 30th 2011 | Emergency Management<br>Butler County Building & Zoning | ALL (Townships, Cities, Villages) | Existing Budget | Ongoing 80% |
| | 2. Identify and inventory all structures that are subject to flood damage, including critical facilities and repetitive loss properties and prepare feasibility studies pertaining to potential future projects to alleviate issues | June 2011- Dec 2011 | Emergency Management<br>Butler County Building & Zoning | City of Fairfield<br>City of Hamilton<br>City of Middletown<br>Village of Somerville<br>Unincorporated Butler County areas | Existing Budget | NEW |
| | 3. Inform insurance agents and public of the National Flood Insurance Program and FEMA floodplain regulations | June 1st – June 30th 2011 | Emergency Management | ALL | Existing Budget | NEW |
| | 4. Develop a public education program for residents and business owners located in flood-prone areas regarding river set-backs, erosion, and other soil and flood related issues | June 2011- June 2012 | Emergency Management<br>Butler County Building & Zoning<br>Butler County Soil and Water Conservation District | ALL | Existing Budget | NEW |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 5. Develop a countywide plan for susceptible structures in floodplain by investigating feasibility of moving structures to safer locations | June 2011- June 2016 | Emergency Management Butler County Building & Zoning | ALL (Specifically City of Fairfield, St. Clair Township, Village of New Miami) | Mitigation Grants | NEW |
| | 6. Maintain full participation in the National Flood Insurance Program throughout Butler County | June 2011-June 2016 | Emergency Management Butler County Building & Zoning | ALL | Existing Budget | NEW |
| | 7. Develop a flood monitoring and notification program that can be used to warn residents and business owners in flood-prone areas | June 2011- June 2013 | Emergency Management | ALL | Existing Budget | NEW |
| 2. Minimize the danger and property damage associated with a potential Class 1 Dam failure in the county | 1. Work with ODNR to develop accurate inundation maps for all areas downstream of the Class 1 dams within the county | June 2011- June 2013 | Emergency Management ODNR | City of Oxford<br>Oxford Township<br>Hanover Township<br>Ross Township<br>City of Fairfield<br>City of Middletown<br>Madison Township<br>West Chester Township | Existing Budget | NEW |
| | 2. Work with ODNR and dam owners to develop emergency action plans for each Class 1 and Class II dam in the county | June 2011- June 2016 | Emergency Management ODNR | City of Oxford<br>Oxford Township<br>Hanover Township<br>Ross Township<br>City of Fairfield<br>City of Middletown<br>Madison Township<br>West Chester Township | Existing Budget | NEW |
| | 3. Develop a public education program for residents and business owners located within the inundation areas down stream of a Class 1 Dam | June 2011-June 2012 | Emergency Management | City of Oxford<br>Oxford Township<br>Hanover Township<br>Ross Township<br>City of Fairfield<br>City of Middletown<br>Madison Township<br>West Chester Township | Existing Budget | NEW |

# 6.4 Winter Storms

- Utilities exposed during winter storms may be damaged and lead to outages
- Many citizens may not have the means to dress adequately for winter conditions
- Transportation routes can become blocked and interrupt services
- Lack of understanding by the public of snow emergency levels

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1. Reduce vulnerability of county infrastructure during future winter storm events | 1. Develop an informational program to encourage local utility companies to bury future utility lines | June 2011-Dec 2012 | Emergency Management Butler County Building & Zoning | ALL | Existing Budget | NEW |
| | 2. Ensure that county engineer's office, city road departments, and township road departments have an adequate amount of snow removal vehicles and equipment | June 2011- Dec 2012 | Emergency Management County Engineer City Road Depts. Township Road Depts. | ALL | Existing Budget | NEW |
| | 3. Investigate developing stricter building codes that would better withstand winter storms | June 2011- June 2016 | Emergency Management Butler County Building & Zoning | ALL | Existing Budget | NEW |
| 2. Reduce vulnerability of the public during a future winter storm | 1. Provide the public with information about potential property damage from winter storms | June 2011-September 2011 | Emergency Management | ALL | Existing Budget | NEW |
| | 2. Develop an educational program for the public regarding "snow emergency levels" and other winter storm warnings | June 2011-September 2011 | Emergency Management | ALL | Existing Budget | NEW |
| | 3. Work with community groups to identify potential citizens that would be considered "at-risk" during winter storms | June 2011- Dec 2013 | Emergency Management | ALL | Existing Budget | NEW |
| | 4. Work with Red Cross to ensure that all shelters will be operational during winter storm events (potential power outages, heating issues) | June 2011-Dec 2011 | Emergency Management Red Cross | ALL | Existing Budget | NEW |

# 6.5 Tornadoes

- Public is inadequately trained on how to respond to a tornado warning or watch
- Shelters may be inadequately supplied to local emergencies
- Tornadoes paths are impossible to predict
- Warning sirens within the county are inadequate

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1. Reduce health and safety risk to Butler County community in the event of a tornado | 1. Continue to review and update existing warning siren coverage throughout the county | June 2011-June 2016 | Emergency Management | ALL | Grants/General Funds | NEW |
| | 2. Establish a tornado warning siren public education program throughout the county | June 2011- Dec 2011 | Emergency Management | ALL | Existing Budget | NEW |
| | 3. Develop a program to make weather radios more available to community residents | June 2011-Dec 2013 | Emergency Management | ALL | Grants | NEW |
| | 4.Establish an ongoing weather spotter training course | June 2011- Dec 2013 | Emergency Management | ALL | Existing Budget | NEW |
| | 5. Evaluate the need for tornado safe rooms and shelter rooms at schools and critical facilities throughout the county | June 2011- Dec 2013 | Emergency Management | ALL | Existing Budget | NEW |

# 6.6 Droughts

- Water supply could be depleted during extreme drought
- Livestock and agricultural losses can become high due to lack of water
- Deep wells may deplete water source and increase flow of contaminants into aquifers
- Rural areas dependant on private wells and cisterns are extremely vulnerable
- The risk of forest and field fires increase

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1. Reduce economic impact of drought on the county | 1. Establish a comprehensive list of areas, businesses, and people prone to drought so they would be assisted quickly during drought incidents | June 2011-Dec 2012 | Emergency Management<br>Ohio State University Branch-Butler Co.<br>Butler County Soil and Water District | ALL | Existing Budget | NEW |
| | 2. Establish MOU's with private contracts for water and ice distribution in case a prolonged drought occurs | June 2011- Dec 2012 | Emergency Management | ALL | Existing Budget | NEW |
| | 3. Seek out potential state and federal subsidy programs for crop losses due to drought | June 1st- June 30th 2011 | Emergency Management<br>Ohio State University Branch-Butler Co.<br>Butler County Soil and Water District | ALL (Specifically Western area of county where crop land is predominant) | Existing Budget | NEW |
| 2. Minimize potential fire losses due to drought conditions | 1. Develop public education campaign for awareness to the increased risk of wildfires during drought and dry conditions | June 2011- June 2012 | Emergency Management | ALL (Specifically Western area of county where crop land is predominant) | Existing Budget | NEW |
| | 2. Develop an inventory of possible alternative water sources (i.e. lakes, ponds) that can supplement firefighting efforts during dry and drought conditions | June 2011- Dec 2013 | Emergency Management | ALL | Existing Budget | NEW |

# 6.7 Earthquakes

- Residents are unaware of or apathetic to the threat of earthquakes in this region
- Existing buildings may not have been built using earthquake design standards
- Older, particularly brick structures in Butler County are more susceptible to damage
- Current state and local codes may not include adequate earthquake design standards

| GOALS | ACTION ITEMS | START/END DATES | AGENCY | TARGETED JURISDICTIONS | RESOURCES | STATUS |
|---|---|---|---|---|---|---|
| 1. Increase public awareness of earthquakes and associated risks to health, safety, and private property | 1. Update potential earthquake impact information regarding the county and disseminate it to the public | June 2011-Dec 2012 | Emergency Management | ALL | Existing Budget | NEW |
| 2. Improve first responder capabilities that will reduce fatalities in an earthquake event | 1. Continue training of the Butler County Tech Rescue Team for incidences dealing with structural collapse | June 2011-June 2016 | Emergency Management | ALL | Existing Budget | NEW |
| | 2. Continue to provide all necessary support and equipment to Butler County Tech Rescue Team | June 2011- June 2016 | Emergency Management | ALL | Grants/County General Funds | NEW |
| 3. Reduce damages to existing and future county critical infrastructure from earthquakes | 1. Identify all potential critical infrastructure that may be at risk for damages resulting from earthquake events | June 2011- June 2012 | Emergency Management | ALL (Specifically Eastern area of county where development is prominent) | Existing Budget | NEW |
| | 2. Identify funding sources for implementing earthquake risk reduction practices in the county on critical facilities | June 2011- Dec 2012 | Emergency Management | ALL | Existing Budget | NEW |

## 7.0 MITIGATION PLAN MAINTENANCE AND SCHEDULE

Once the Mitigation Plan is approved by the State of Ohio and FEMA by August 2011, a committee, initiated by the Butler County Emergency Management Agency and made up of representatives of all county jurisdictions, will be created to focus on implementing, monitoring, and evaluating the plan. Monitoring and evaluation of this plan involves the ongoing process of compiling information on the outcomes from the implementation of the mitigation action items.

At the initial meeting the committee will review the goals and action items to make sure that they are being successfully completed or are on track to be completed. The committee will assess if the county's vulnerability to hazards has decreased from the mitigation actions. Other issues that will be assessed by the committee are the redundancy of mitigation strategies, technical, legal or coordination problems associated with implementation, and any funding issues that may arise.

The committee will meet on a 6 month basis, or as needed.

The success of the Mitigation Plan will depend upon the efforts of this committee to become involved with other planning efforts in the community such as the development of future land-use plans, capital improvement plans, zoning ordinances, floodplain regulations, building codes, and subdivision regulations, etc. created by county jurisdictions. By becoming involved in these planning processes and plan's development, the goals and actions of this Mitigation Plan will be successfully embedded in everyday planning and development practice in Butler County and each hazard will be addressed and accounted for.

Communities will be able to use the plan for a variety of activities, including implementing specific mitigation projects, as well as, implementing changes in the daily operation of the local government. To ensure the success of an ongoing program, it is critical that the plan remains relevant to the County's growth and development. Thus, it is important for the County to conduct periodic evaluations and make revisions as needed, as well as, incorporate changes into other planning documents in the County.

The public will be involved on a continuous basis. Public involvement will be accomplished by establishing a website link (http://www.butlercountyohio.org/ema/) whereby the mitigation action items that are slated for development that current year will be highlighted. The public will be encouraged to participate in the continued development of the mitigation plan. There will also be a formalized press release developed for their annual review process.

## 8.0 RESOLUTION OF ADOPTION

The Butler County Commissioners, and the jurisdictions listed in Section 2.3 have passed a Resolution of Support and/or Ordinance for the Butler County Mitigation plan after contingent approval from the Ohio Emergency Management Agency as well as The Federal Emergency Management Agency.

Copies of the adopted ordinances and/or resolutions that jurisdictions pass are provided in a following appendix