

# **BUTLER COUNTY**

## **NATURAL HAZARD MITIGATION PLAN**

Prepared For:

Butler County

Missouri

Prepared By:

Ozark Foothills Regional Planning Commission

3019 Fair Street

Poplar Bluff, MO 63901

2017

## **1 INTRODUCTION AND PLANNING PROCESS**

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## **1 INTRODUCTION AND PLANNING PROCESS**

### **1.1 Purpose**

Mitigation is the effort to reduce loss of life and property by lessening the impact of disasters. In order for mitigation to be effective, action needs to be taken now, prior to the next disaster, to reduce human and financial consequences.

Following the severe weather including tornadoes and flooding disaster that was declared in the spring of 2002 (DR-1412), the Missouri State Emergency Management Agency (SEMA) received flood buyout project proposals from 23 communities across the state. Fortunately they were able to help some of these communities with federal mitigation grant funding provided through the Federal Emergency Management Agency (FEMA). After November 1, 2004, communities like these are still eligible for federal disaster public assistance and individual assistance, but are not eligible for mitigation assistance unless they have an approved mitigation plan on file. For nearly 1,000 communities and 114 counties in Missouri, mitigation plans are required. All jurisdictions that participate in the development of the hazard mitigation plan and adopt the completed plan area eligible to receive federal mitigation grant funding. Any jurisdictions that do not participate in the development or adoption of the plan are ineligible for this mitigation funding.

The requirement for an adopted hazard mitigation plan for eligibility for federal hazard mitigation grant funding is set forth in the following legislation:

The Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act or DMA). The regulations established the requirements for local hazard mitigation plans are in the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288).

## 1.2 Background and Scope

This plan is an update to the Butler County Hazard Mitigation Plan that was approved in August 2012. The plans are required to be updated every five years to remain in compliance, valid and to ensure the plan is addressing current trends and needs of the participating jurisdictions.

The Butler County Hazard Mitigation Plan that was approved in 2012 and this update were both prepared by the Ozark Foothills Regional Planning Commission (OFRPC). The OFRPC, a member of the Missouri Association of Councils of Government MACOG) was created in 1967. The commission serves the five county region of Butler, Carter, Reynolds, Ripley and Wayne Counties, as well as all municipalities within those five counties.

Information in this plan should be used as a guide for the coordination of mitigation activities and decisions regarding local land use planning in the future. The actions included in this plan are not final solutions, but rather short-term efforts that will ultimately have long-term strategic impacts when implemented.

In the 2012 Butler County Plan the following jurisdictions participated and adopted the plan:

- Butler County
- City of Poplar Bluff
- City of Qulin
- City of Fisk
- City of Neelyville
- Poplar Bluff R-I School District
- Twin Rivers R-X School District
- Neelyville R-IV School District
- Three Rivers Community College

## 1.3 Plan Organization

This plan updated is organized into five chapters and an appendix. Following is a list of the chapters and their respective title. Set forth the outline of the plan.

- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 5: Plan Implementation and Maintenance
- Appendices

## 1.4 Planning Process

**44 CFR Requirement 201.6(c)(1): [The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.**

As mentioned above, the OFRPC was contracted to facilitate the update of the multi-jurisdictional, local hazard mitigation plan. The roles and responsibilities of the OFRPC are listed below:

- Assist in establishing a Mitigation Planning Committee (MPC) as defined by the Disaster Mitigation Act (DMA),
- Find out if the MPC established for the previously approved plan was a standing committee that met in the interim, and set forth any changes in the MPC membership and procedures since adoption of the previous plan,
- Assess whether there was adherence to the process set forth in the previously approved plan for maintenance (example, did the MPC meet regularly as specified in the previously approved plan), and explain how adherence occurred, and/or why it did not occur,
- Ensure the updated plan meets the DMA requirements as established by federal regulations and follows the most current planning guidance of the Federal Emergency Management Agency (FEMA),
- Facilitate the entire plan development process,
- Identify the data that MPC participants could provide and conduct the research and documentation necessary to augment that data,
- Assist in soliciting public input,
- Produce the draft and final plan update in a FEMA-approvable document, and Coordinate the Missouri State Emergency Management Agency (SEMA) and (FEMA) plan reviews.

**Table 1.2** lists the member of the MPC and the entities they represent, along with their titles.

**Table 1.2 Jurisdictional Representatives County A Mitigation Planning Committee**

Name	Title	Department	Jurisdiction/Agency /Organization
Robbie Myers	Butler County Emergency Manager	Emergency Mgmt	Butler County
Robert Hudson	County Health Dept. Director	Health Dept	Butler County
Dennis Avery	City Planner	City of Poplar Bluff	Prospect Newspaper
Melissa Birchfield	City Clerk	City of Qulin	City of Qulin
Tammy Christian	City Clerk	City of Fisk	City of Fisk

Sharon Sargent	City Clerk	City of Neelyville	City of Neelyville
Scott Dill	Superintendent	Education	Poplar Bluff R-I School District
Jeremy Siebert	Superintendent	Education	Twin Rivers RX School District
Chuck Stratten	Director of Public Safety	Education	Three Rivers Community College
Steve Halter	Chamber of Commerce Director	Economic Development	Poplar Bluff Area Chamber of Commerce
Karen Crook	Executive Director	Nonprofit	Butler County Caring Communities
Ralph Stucker	Fire Chief	Public Safety	Poplar Bluff Fire Department
Bob Fredwell	Fire Chief	Public Safety	Butler County Fire Department

### 1.4.1 Multi-Jurisdictional Participation

**44 CFR Requirement §201.6(a)(3): Multi-jurisdictional plans may be accepted, as appropriate, as long as each jurisdiction has participated in the process and has officially adopted the plan.**

The Ozark Foothills Regional Planning Commission (OFRPC), on behalf of Butler County, invited all cities, school districts, area colleges, and private nonprofit entities in the County to participate in this update of the Butler County Multi-Jurisdictional Hazard Mitigation Plan. DMA 2000 requires that jurisdictions represented by a multi-jurisdictional plan participate in the planning process and formally adopt the plan. Each participating jurisdiction was required to meet plan participation requirements as defined by the MPC at the beginning of the planning process. Minimum participation requirements are defined as follows:

- Designation of a representative from each participating jurisdiction to serve on the MPC;
- Participation in a planning meetings, including centralized, planning area wide MPC meetings, by either direct participation or authorized representative;
- Each participating jurisdiction must provide to the MPC sufficient information to support plan development by completion and return of Data Collection Questionnaires and validating/correcting critical facility inventories;
- Provide progress reports on mitigation actions from the previously approved plan and identify additional mitigation actions for the plan;
- Eliminate from further consideration those actions from the previously approved plan that were not implemented because they were impractical, inappropriate, not cost-effective, or were otherwise not feasible;
- Review and comment on plan drafts;

- Actively solicit input from the public, local officials, and other interested parties about the planning process and provide an opportunity for them to comment on the plan;
- Provide documentation to show time donated to the planning effort; and
- All participants should formally adopt the mitigation plan prior to submittal to SEMA and FEMA for final approval. Note that an “approvable pending adoption” designation can be given without submittal of adoption documents. However, submittal of all adoption documentation with the final plan is the preferred methodology.

The following jurisdictions did not participate in the update of the Butler County. No MPC represented was named by the jurisdiction, no one representing the jurisdictions attended planning meetings and Data Collection Questionnaires were not completed and returned. All jurisdictions were notified of all meetings and for jurisdictions that did not attend the initial meeting to receive Data Collection Questionnaires, those questionnaires were emailed.

- Neelyville R-IV School District

**Table 1.3** lists the representation of each participating jurisdiction at the planning meetings, the provision of responses to the Data Collection Questionnaire, the active critical facility validation, the update/development of mitigation actions, and the documentation of donated time. Reference sign-in sheets and other documentation located in an appendix.

**Table 1.3 Jurisdictional Participation in Planning Process**

Jurisdiction	Kick-off Meeting	Meeting #2	Meeting #3	Meeting #4	Data Collection Questionnaire Response	Update/Develop Mitigation Actions
Butler County	x	X	X	X	X	X
City of Poplar Bluff	X	X	X	X	X	X
City of Quin	X				X	X
City of Fisk	X				X	X
City of Neelyville	X	X	X		X	X
Poplar Bluff R-I Schools	X	X	X		X	X
Twin Rivers R-X Schools	X	X	X	X	X	X
Neelyville R-IV Schools						
Three Rivers Community College	X	X	X		X	X

### 1.4.2 The Planning Steps

Data for this plan was created through a series of public meetings held within Butler County. The planning process for the Butler County Hazard Mitigation Plan began during the summer of 2017, with presentations to elected officials, community members, and other interested parties. These individuals were invited to attend planning meetings, with a special effort to invite participants representing various business and service interests throughout Butler County

communities. Participants were asked to identify critical infrastructure, ranking the likelihood of disaster occurrence, perform a susceptibility analysis based on these factors, and determine appropriate mitigation strategies for each individual disaster. This data was recorded and assimilated into this plan by OFRPC staff.

Background and statistical data for this plan were collected from a variety of sources, including Data Collection Questionnaires, the United States Census Bureau, the United States Geological Society, the United States Corps of Engineers, the Missouri Department of Natural Resources, the Missouri Department of Conservation, the Center for Agricultural, Resources and Environmental Systems at the University of Missouri-Columbia, and the National Climatic Data Center. The Missouri State Hazard Mitigation Plan was last updated in 2013 and provided information regarding tornado, earthquake, and flood hazards affecting Butler County. The last flood insurance study for Butler County was conducted in 1980 and, at this time, there is no activity pertaining to DFIRM production for Butler County. Flood hazard data from the 2006 HAZUS-MH loss run for Butler County was incorporated into the plan providing updated information on vulnerable structures, shelter requirements, and loss estimates. Other sources of information that include Comprehensive Land Use Plans, Zoning Ordinances, Building Codes, Storm Water Regulations, and Subdivision Regulations were reviewed for applicability to the plan.

**Table 1.4** describes the 10-step planning process adapted from EMA's Community Rating System and Flood Mitigation Assistance Program. The 10-step process allowed the plan to meet the funding eligibility requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, Community Rating System, and the Flood Mitigation Assistance Program.

The sources for the plan update framework and development process used were FEMA's *Local Mitigation Planning Handbook (March 2013)*, *Local Mitigation Plan Review Guide (October 1, 2011)*, and *Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials (March 1, 2013)*. The planning "How To" guides developed prior to 2012 are no longer current.

**Table 1.4 County Mitigation Plan Update Process**

Community Rating System (CRS) Planning Steps (Activity 510)	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
Step 1. Organize	Task 1: Determine the Planning Area and Resources
	Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
Step 2. Involve the public	Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(1)
Step 3. Coordinate	Task 4: Review Community Capabilities 44 CFR 201.6(b)(2) & (3)
Step 4. Assess the hazard	Task 5: Conduct a Risk Assessment 44 CFR 201.6(c)(2)(i) 44 CFR 201.6(c)(2)(ii) & (iii)
Step 5. Assess the problem	
Step 6. Set goals	Task 6: Develop a Mitigation Strategy 44 CFR 201.6(c)(3)(i); 44 CFR 201.6(c)(3)(ii); and 44 CFR 201.6(c)(3)(iii)
Step 7. Review possible activities	
Step 8. Draft an action plan	
Step 9. Adopt the plan	Task 8: Review and Adopt the Plan
Step 10. Implement, evaluate, revise	Task 7: Keep the Plan Current
	Task 9: Create a Safe and Resilient Community 44 CFR 201.6(c)(4)

***Step 1: Organize the Planning Team (Handbook Tasks 1 & 2)***

During the informational meeting that was held on May 26, 2016 those in attendance were given an overview of hazard mitigation, the planning area was recognized as Butler County. During the scoping meeting, a tentative schedule should have been set, identification of possible MPC members should have been established, and general methodology should have been discussed. Table 1.5 provides a brief overview, with dates for the four meetings held in the process of updating the 2011 County Plan. The Data Collection Questionnaires were distributed to all jurisdictions represented at the first meeting and emailed to the jurisdictions not present at the informational meeting.

**Table 1.5 Schedule of MPC Meetings**

Meeting	Topic	Date
Informational Meeting	An overview of hazard mitigation was provided, jurisdictions were asked to name a representative to the MPC, future meeting dates and locations were selected, public input solicitation was discussed.	April 25, 2017

Kick-off Meeting	Identify and profile hazards, previous disaster declarations, data collection questionnaires were collected, other data sources discussed	May 16, 2017
Planning Meeting #2	2011 County Plan goals reviewed, Updated goals established	June 20, 2017
Planning Meeting #3	2011 county plan actions reviewed, updated goals established utilizing STAPLEE, plan for maintenance of plan established	July 18, 2017

**Step 2: Plan for Public Involvement (Handbook Task 3)**

**44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.**

The Kick off meeting was held on April 25, 2017 at the office of the Ozark Foothills Regional Planning Commission in Poplar Bluff, Missouri. Attendees discussed the best and most effective way to solicit for and collect public input. A survey was provided to the group and all agreed to share the survey with their respective contacts. The survey would be available for pick up and dropoff at the Ozark Foothills Regional Planning Commission. An online version of the survey was created using SurveyMonkey. The link to this online survey was shared electronically through emails, on Facebook sites, and on local websites. A copy of the survey and the results are included in Appendix A.

One hundred seventy-nine responses were received to the SurveyMonkey survey. Nine comments were received from survey respondents:

- Build the levees up where there is so much flooding. They keep failing and also fix the dam in Clearwater where it is failing. Also, something needs to be done to Hwy T where the road will not be washed out by the Wappapello dam again. This last flood was serious, too many homes and lives lost.
- Drought issues for farmers
- 1982's flood was called a "100-year flood". Since then, we have had 15 out of 29 Historical Crests on the Black River, not including April/May 2016's flooding. A plan needs to be in place, so that the Poplar Bluff area does not flood every time we get a big rain. North Poplar Bluff should not have to rely on a levee breach/break on the south of Poplar Bluff so that those homes do not get destroyed or flooded as much. This flooding has occurred after all of the progress over the years (4 lane of 67, new businesses, etc.), so Poplar Bluff needs some kind of plan in place for everyone, so that families will not be displaced.
- Low income families and housing are typically what is effected by the flooding. These families do

not typically own their housing and typically do not have renter's insurance or any other way to compensate for damages or lost items. Their protection from flooding and other natural disasters need to be the priority. Middle class and up typically have all insurances necessary to compensate for losses and damages. Thank you for your time and continued efforts to help the community!!

- Some of our flooding issues are being caused by levees not being maintained "supposedly because they are owned by the state" and not covered somehow by Butler County and therefore are not being maintained. I believe because of the constant flooding issues we have been having since 2008, we should look at raising the height of our levees and make sure they are maintained well.
- All electrical services underground
- Levee repairs throughout the county.
- We need to have the capability of having an interoperable water system (distribution lines) between all the county wide water systems in event of an emergency
- Better tornado tracking which would benefit advanced notification

These suggested actions were taken into consideration by the MPC. Several of the comments were addressed through the actions of this plan, including levee repairs and upgrades to public water systems. This survey was distributed recently following historic flooding of the area, leading to the majority of the comments directed towards flooding.

Below are the hazards the public voted as "Highly Likely" to occur, along with the percentage of votes received for "Highly Likely":

- Earthquakes – 20.11%
- Extreme Heat – 29.05%
- Tornadoes – 33.52%
- Flooding – 36.31%
- Levee Failure – 36.87%
- Thunderstorm events – 55.87%

A sample copy of the survey, along with survey results from SurveyMonkey is included in Appendix C.

### ***Step 3: Coordinate with Other Departments and Agencies and Incorporate Existing Information (Handbook Task 3)***

**44 CFR Requirement 201.6(b): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include: (2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia and other private and non-profit interests to be involved in the planning process. (3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

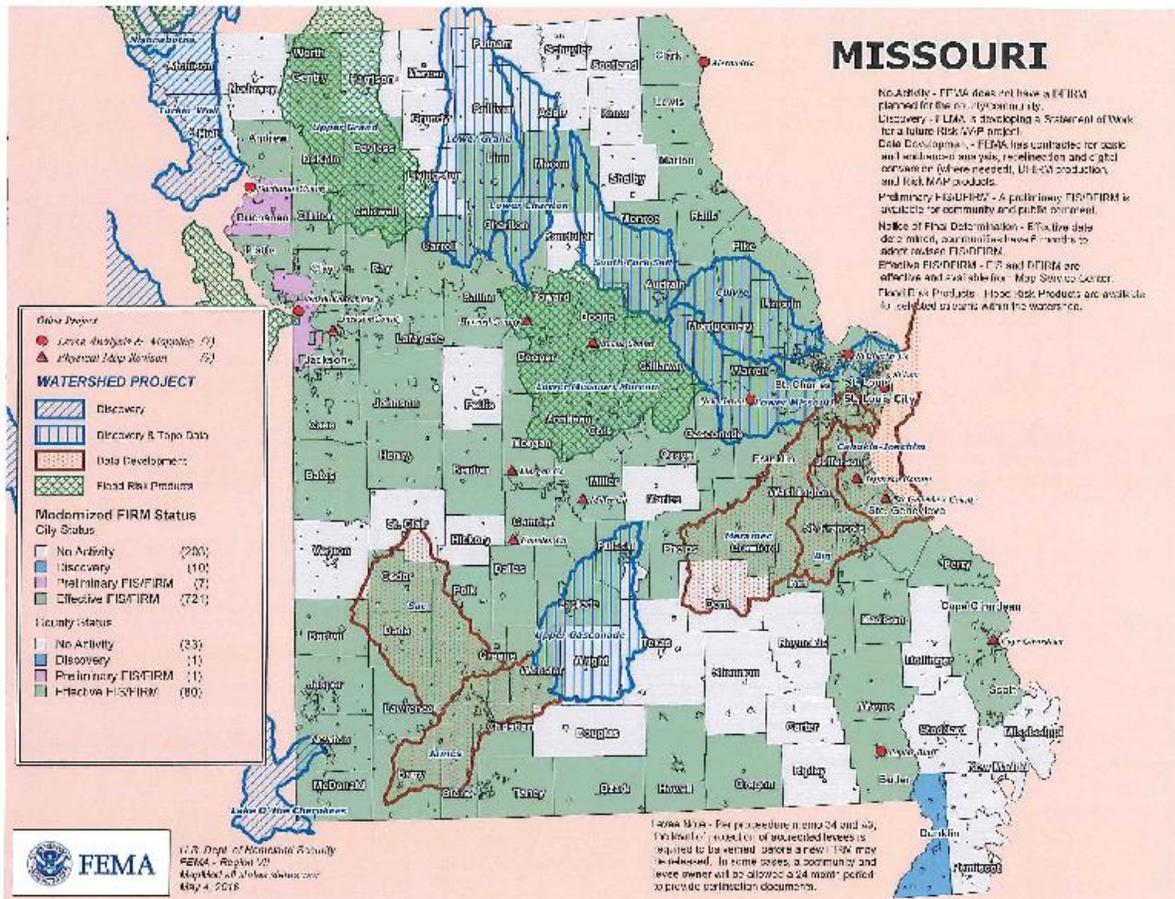
Invitations were sent to a variety of organizations in addition to participating jurisdictions. These organizations include the following:

- Southeast Missouri State University
- Three Rivers Community College
- Poplar Bluff Regional Medical Center
- United State Forest Service
- The Nature Conservancy
- Butler County Caring Communities
- All volunteer fire departments serving the County
- Butler County Public Water Supply District #1 and #2
- Missouri Department of Natural Resources
- Greater Poplar Bluff Area Chamber of Commerce
- Missouri Department of Natural Resources

### **Coordination with FEMA RiskMAP Project**

There are no RiskMAP projects currently underway in Butler County. A flood depth grid has been created for Butler County and is included in Appendix A of this plan. No other RiskMap projects are anticipated for the next few years. An update of RiskMap will be addressed in all future updates of the Butler County Hazard Mitigation Plan. The Missouri State RiskMAP is below as Figure 1.1.

Figure 1.1 Map of RiskMAP projects



**Integration of Other Data, Reports, Studies, and Plans**

The update process was presented to neighboring counties and other interested parties at two regular meetings of the Ozark Foothills Regional Planning Commission. The opportunity to review and comment on both the 2011 Plan and this update was provided. Many phone calls were made and emails exchanged to gather data from agencies that were not able to attend meetings or missed meetings at times. All participating jurisdictions and local agencies were eager to provide information when requested and often went above and beyond what was requested.

A variety of sources were used to gather technical data. Some of these resources included:

- 2013 Missouri State Hazard Mitigation Plan
- Data from university extensions from various states
- Flood Insurance Studies

- Flood Insurance Rate Maps
- Missouri Department of Natural Resources
- Missouri Department of Transportation
- National Inventory of Dams
- State fire reports
- Wildland/Urban Interface and Intermix areas from SILVIS Lab
- Local comprehensive plans
- USDA, Risk Management Agency, Crop Loss Statistics
- Local city, county and school district budgets

All sources are cited throughout the plan as they are used so as to give credit for data, tables, and maps included in this plan.

### ***Step 4: Assess the Hazard: Identify and Profile Hazards (Handbook Task 5)***

During the Kickoff meeting held on April 25, 2017 at the offices of the Ozark Foothills Regional Planning Commission, information was presented to the MPC that identified and profile the hazards to be included in the plan. As a part of this discussion previous disaster declarations were discussed with local input provided by members of events surrounding those declarations. The hazards included in the 2013 State Plan were also presented to the MPC, along with the hazards identified in the 2012 Butler County Plan.

Data Collection Questionnaires were collected or prior at this meeting to the jurisdictions. The questionnaires were discussed and the use of the data within the plan was also discussed with jurisdictions. In reviewing the questionnaires, it was explained that information and data from the jurisdictions existing plans would be incorporated into this plan and that each participating jurisdiction was required to incorporate the final updated hazard mitigation plan into future plans.

In addition to the questionnaires, the MPC discussed other data sources available that could be used in the plan update. These additional data sources included internet searches, GIS analysis, local newspaper articles, local “historians”, and local officials from the jurisdictions. Included in Section 3 is a risk assessment, this assessment provides additional detail on conclusions drawn from the data collected and reviewed.

### ***Step 5: Assess the Problem: Identify Assets and Estimate Losses***

In an effort to identify local assets a variety of sources were used. The 2013 State Plan was reviewed along with US Census Data, GIS data, HAZUS data, and the Data Collection Questionnaires distributed to all jurisdictions. Once assets were identified, losses were estimated utilizing information in the 2013 State Plan as well as other available data such as dam inundation maps and prior loss history for events.

Section 2 of this plan provides information regarding each jurisdiction’s capabilities and area profiles. This section includes information on the participating jurisdictions’ regulatory, personnel, fiscal, and technical capabilities. This information was collected through a review of local ordinances, staff members, and annual budgets.

Section 3 of this plan includes a discussion of vulnerabilities for each hazard in the plan. These vulnerability estimates were taken from the 2013 State Plan, as the best and most recent data available.

### ***Step 6: Set Goals (Handbook Task 6)***

During the second planning meeting held on May 16, 2017 at the Poplar Bluff R-I School District Administration Offices, the MPC reviewed the goals from the previous plan. The 2012 County plan included six goals that many of the members of the MPC felt were repetitive and too specific. The four goals included in the 2013 State Plan were provided for reference and the MPC felt that the best course of action would be to use the state goals for the county plan.

The 2012 Butler County plan included the following six goals:

1. Reduce loss of life and property
2. Increase public education and awareness
3. Improve warning systems and timing
4. Eliminate hazard prone areas
5. Promote strategies to protect against damages
6. Decrease negative impacts on business and industry

The goals for the updated plan are as follows:

1. Implement mitigation actions that improve the protection of human life, health, and safety from the adverse effects of disasters.
2. Implement mitigation actions that improve the continuity of government and essential services from the adverse effects of disasters.
3. Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
4. Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.

### ***Step 7: Review Possible Mitigation Actions and Activities***

The third planning meeting occurred on June 20, 2017 at the offices of the Ozark Foothills Regional Planning Commission in Poplar Bluff, Missouri. At this meeting MPC members reviewed the mitigation strategies from the 2012 County plan and proposed new and different strategies. For participation, each jurisdiction was responsible for a minimum of one action being brought to this meeting. Members were asked to consider actions that substantially addressed long-term risks that were identified in the risk assessment in Section 3 of the updated plan.

The FEMA publication *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)* that was used as a reference in the development of action projects. Participants were encouraged to focus on long-term mitigation solutions and that consideration

was given to the potential cost of each project in relation to the anticipated future cost savings. The MPC used a modified STAPLEE method to prioritize actions that are included in this update.

***Step 8: Draft an Action Plan***

At the third planning meeting, MPC members used the Modified STAPLEE method to prioritize mitigation actions. Once all actions were scored, actions were prioritized based on the STAPLEE scores, with projects with lower scores not being included in the plan, or given lower priority.

***Step 9: Adopt the Plan (Handbook Task 8)***

The Butler County Hazard Mitigation Plan was adopted by the Butler County Commission on November 3, 2017. Adoption by the all other jurisdictions will closely follow the adoption by the county. Copies of all Adoption Resolutions are included in Appendix C Adoption Resolutions of this plan.

***Step 10: Implement, Evaluate, and Revise the Plan (Handbook Tasks 7 & 9)***

At the third planning meeting on July 18, 2017, the MPC developed and agreed upon an overall strategy for plan implementation and for monitoring and maintaining the plan over time. Section 5 provides additional information on plan maintenance and monitoring over the five years following plan approval.

## 2 PLANNING AREA PROFILE AND CAPABILITIES

### 2 PLANNING AREA PROFILE AND CAPABILITIES

#### 2.1 *Butler County, Missouri Planning Area Profile*

- 2.1.2 *Geography, Geology and Topography*
- 2.1.3 *Climate*
- 2.1.4 *Population/Demographics*
- 2.1.5 *History*
- 2.1.6 *Occupations*
- 2.1.7 *Agriculture*
- 2.1.8 *FEMA Hazard Mitigation Assistance Grants in Planning Area*

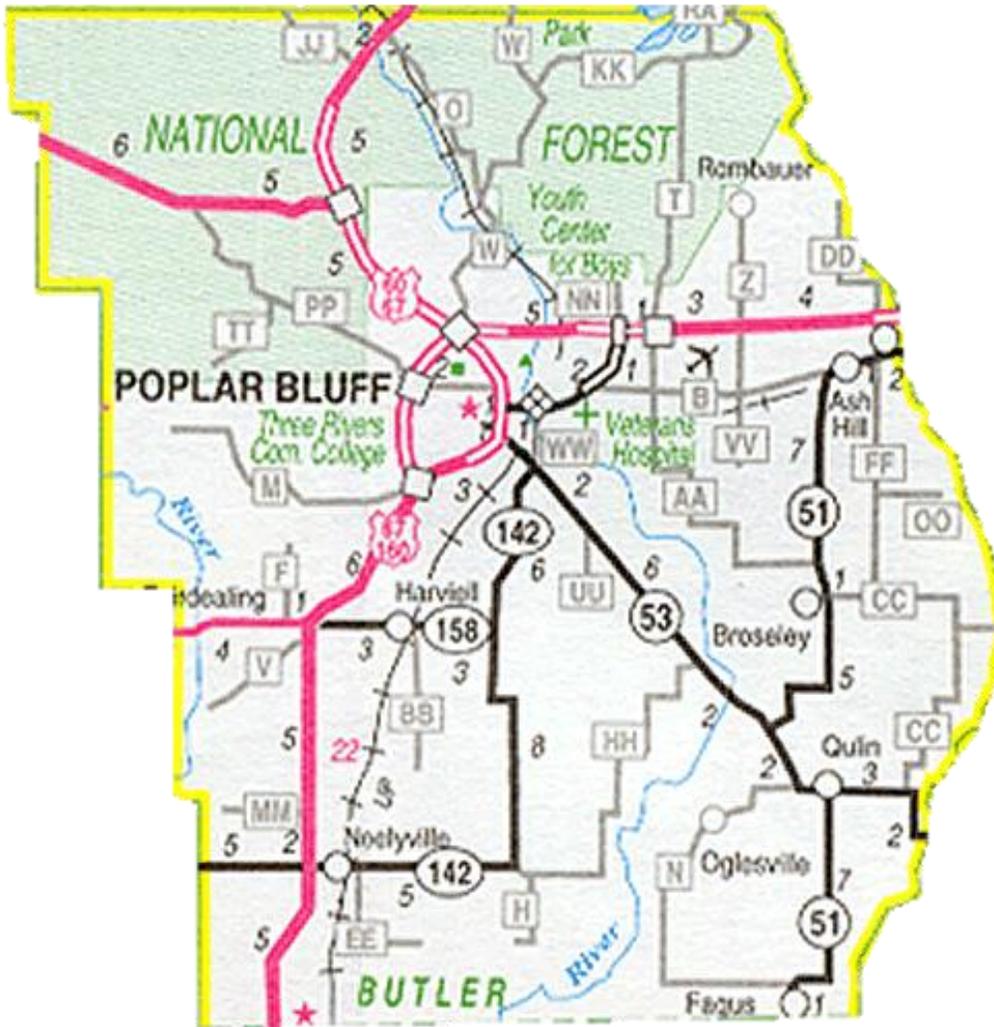
#### 2.2 *Jurisdictional Profiles and Mitigation Capabilities*

- 2.2.1 *Unincorporated Portions of Butler County, Missouri*
- 2.2.2 *City of Poplar Bluff, Missouri*
- 2.2.3 *Special Districts Within Butler County, Missouri*
- 2.2.4 *Public School District Profiles and Mitigation Capabilities*

### **Butler County, Missouri Planning Area Profile**



Figure 2.1, Map of County Butler County, Missouri



The population of Butler County, as reported in the 2010 United States Census, was 42,794, a growth of 1,927 persons from the 2000 US Census that was reported as 40,867. In reviewing the 2011-2015 American Community Survey 5-Year Estimates, the population has not changed much since the 2010 Census. A total population reported in this estimate was 42,951, an estimated growth of 157 residents.

In reviewing this census data, Butler County, as much of rural America, saw a much lower rate of growth than both the State of Missouri and the country as a whole from 2000 through 2010. Butler County grew at a rate of 4.7%, compared to Missouri's growth rate of 7.0% and the growth rate for the United States of America reported 9.7%, more than twice the rate of the county's growth rate.

Butler County is also a county with a very-low median household income (MHI), as compared to the State of Missouri and the United States. The 2011-2015 American Community Survey 5-Year Estimates (ACS) reports that the MHI for Butler County is \$35,738, a 31% increase from the 2000 Census MHI of \$27,228. The ACS also reports that the MHI in Missouri has grown at 26% from 2000 through 2014, from \$37,934 to \$47,764 respectively. The United States MHI grew 27% during the same time period. Even though the MHI grew at a higher percentage rate than either the state or national MHI, Butler County residents exist on 75% of the income of their fellow Missourians and 69% of their fellow Americans. As can be seen in examining the MHI of local residents, the county is one of extreme poverty with few opportunities for financial gains.

## 2.1.2 Geography, Geology and Topography

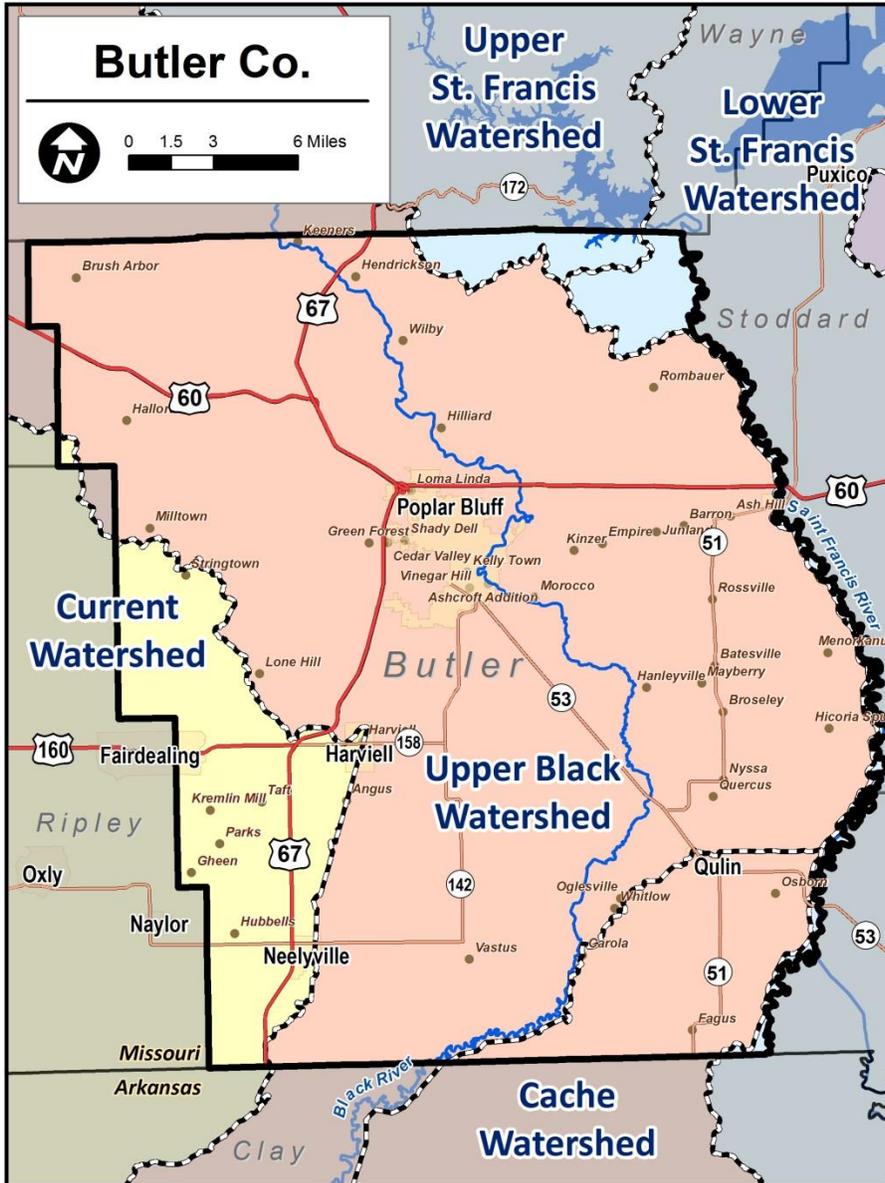
Butler County consists of 698 square miles or 446,720 acres. According to the U.S. Census of Agriculture, Butler County has approximately 202,267 acres of harvested land, 12,270 acres of deciduous upland mixed oak forest, 67,471 acres of non-native, cool season grasslands, and 11,564 acres of deciduous seasonally flooded river front forest. A portion of the Mark Twain National Forest is in the northern portion of the county.

As a rural county with no planning or zoning, single family residences and mobile homes are sprawled throughout the county, usually tucked away in the dense forested areas and accessible by county-maintained gravel roads. There are only four incorporated cities within the county limits. The City of Poplar Bluff is the largest incorporated city in Butler County with a population of 17,023 as reported in the 2010 US Census. Poplar Bluff also serves as the county seat. The other incorporated cities in Butler County include the City of Fisk with a reported population of 342 persons according to the 2010 Census, the City of Neelyville with a population of 483, and the City of Qulin with a population of 458 persons.. There are other, smaller, unincorporated communities within the county that include Broseley, Fagus, and Rombauer among others.

Butler County's geology includes Tertiary- and Quaternary- Age Materials and Ordovician-Age Bedrock. Butler County's topography consists of half Highly Dissected Plateaus and Flat Lowlands.

The County has two main rivers running through it; the Black River and the St. Francis River, as well as several creeks and drainage ditches throughout the county. According to the United States Environmental Protection Agency, there are four (4) watersheds that cross Butler County, the Upper Black River, Current River, Lower St. Francis Watershed, and Upper St. Francis Watershed. A map of the watersheds is shown below in **Figure 2.2** below.

Figure 2.2, Butler County, Missouri Watershed Map



Source: Missouri Department of Natural Resources

### 2.1.3 Climate

According to the National Weather Service (NWS) the average annual precipitation is 46.8 inches, higher

than the United States average of 37 inches. It is reported that of these 46.8 inches of precipitation, 10 inches of that is snowfall annually. The average US city gets 25 inches of snow per year. The number of days with any measurable precipitation is 97 annually.

On average, there are 216 sunny days per year in Butler County. The month with the highest average temperature is July with an average of 92 degrees. The month with the lowest average temperature is January with an average low of 34 degrees. The High Plains Regional Climate Center provides monthly climate averages based on data collected from 1981-2010. According to this data the Maximum average monthly temperature in Butler County occurs in July at 90.51 degrees with the Minimum average monthly temperature occurring in January at 22.26 degrees. The month that averages the highest precipitation is November with 4.97 inches and the month with the lowest precipitation average is August with 3.17 inches.

### 2.1.4 Population/Demographics

The following table (**Table 2.1**) provides the populations for each city and the unincorporated county for 2000 and 2010 along with the percentage change in population. The unincorporated area population was determined by subtracting the populations of the incorporated areas from the overall county population.

**Table 2.1, Butler County Population 2000-2010 by Community**

Jurisdiction	2000 Population	2010 Population	2000-2010 # Change	2000-2010 %Change
Butler County (total)	40,867	42,794	1,927	4.7%
City of Poplar Bluff	16,651	17,023	402	2.4%
City of Fisk	363	342	-21	-5.7%
City of Neelyville	487	483	-4	-.8%
City of Qulin	467	458	-9	-1.9%
Unincorporated Butler County	22,899	24,488	1,589	6.9%

Source: U.S. Bureau of the Census, Decennial Census

In reviewing population data provided by the US Census Bureau, vulnerable populations can also be identified. The first vulnerable populations to consider are those persons under the age of 5 years old, according to the Decennial Census, there are 2,752 children under the age of 5 residing in Butler County. This number represents 6.4% of the total population of the county, a rate that is only slightly lower than the percentage of children under 5 in the State of Missouri (6.5%), and in the United States (6.5%). Other vulnerable populations to consider are those residents over the age of 65. In Butler County there are 7,265 persons over 65, or 17% of the County population. This rate of seniors residing in the county is higher than the rates reported for the State of Missouri (14.0%) and the United States (13.0%). When considering hazard mitigation planning, measures need to be considered to deal with these vulnerable populations and their safety.

The Decennial Census reports that there are 17,614 households in Butler County, with an average household size of 2.49 persons. The average household size for Missouri is similar, being reported as 2.43

persons per household, while the average household size for the United States is slightly higher being reported as 2.58 persons per household.

The median age of residents of Butler County is 40.6, compared to Missouri as 37.9, and the United States being reported as 37.2 years of age. The largest percentage differences in population between Butler County and residents elsewhere is that 20.6% of all Butler County residents are over the age of 62, a much higher rate for persons over 62 than either the State of Missouri (17.2%) or the United States (16.2%).

The University of South Carolina developed an index to evaluate and rank the ability to respond to, cope with, recover from, and adapt to disasters. The index synthesizes 30 socioeconomic variables which research literature suggests contribute to reduction in a community’s ability to prepare for, respond to, and recover from hazards. SoVI® data sources include primarily those from the United States Census Bureau.

The SoVI Score for Butler County is reported as 2.349999905, which ranks as one of the most 20 vulnerable counties in the state. The score also places Butler County in the top 20% of vulnerable counties throughout the country, 84.6%. As can be seen from this score, Butler County is a vulnerable county as it relates to preparing, responding and recovering from hazards.

In the table below (**Table 2.2**), further demographic data is provided to present a better picture of the local population in comparison the State of Missouri and the United States as a whole. As can be seen from this data, the residents are poorer and less educated than residents across the state and the nation.

**Table 2.2, Unemployment, Poverty, Education, and Language Percentage Demographics, Butler County, Missouri**

Jurisdiction	Total in Labor Force	Percent of Population Unemployed	Percent of Families Below the Poverty Level	Percentage of Population (High School graduate)	Percentage of Population (Bachelor’s degree or higher)	Percentage of population (spoken language other than English)
Butler County	19,149	5.2%	16.0%	81.4%	15.9%	2.3%
City of Fisk	186	5.4%	29.1%	80.4%	8.6%	2.3%
City of Neelyville	182	12.1%	29.3%	79.5%	7.1%	1.2%
City of Poplar Bluff	7,262	9.3%	21.2%	80.5%	15.1%	2.8%
City of Qulin	155	7.9%	30.6%	68.35	10.0%	0.0%
State	3,053,938	4.7%	11.1%	88.4%	27.1%	6.0%
Nation	159,913,288	5.2%	11.3%	86.7%	29.8%	21.0%

Source: U.S. Census, 2011-2015 American Community Survey, 5-year Estimates.

### 2.1.5 History

Butler County is in southeastern portion of Missouri, bounded on the north by Wayne County; on the east by Stoddard and Dunklin Counties; on the south by the State of Arkansas; and on the west by Ripley and Carter Counties (see Appendix B for Base Map of Butler County).

Prior to the advent of early settlers in what is now Butler County it was one of the great hunting grounds of the Indians and the early French hunters. For many years after the settlers began cultivation of the soil the Indians remained in camps along the Big Black River. The first person to become a permanent settler in the section now comprising Butler County was Solomon Kittrell, a Kentuckian, who located near Cane Creek and opened a trading post. He was the first storekeeper in the county, and hauled his goods from Cape Girardeau by oxen.

The county was organized from a part of Wayne County by a legislative act approved February 27, 1849. It was named in honor of William O. Butler. At that time nearly all its land belonged to the government. The majority of the settlers had no title, other than that acquired by settlement, to the tracts upon which they lived.

There were many skirmishes between the Union and Confederates in the county during the Civil War. Many depredations were committed by lawless bands, which burned and plundered houses, stole stock, captured and, in a few instances, killed citizens. Terror reigned within the county limits, and many residents left it. At the close of the war only four families resided in Poplar Bluff. For some years after peace was declared organized bands of robbers made raids into the county, terrorizing citizens and stealing stock.

In 1869, a school was established at Poplar Bluff by the Butler County Educational Society. The first paper published in the county was the "Black River News", started in 1869 by G. L. Poplin and G. T. Bartlett.  
*Source: Deed's History of Butler County, Missouri*

Over the past 100 years, Butler County has seen a steady increase in population. However, in 1940 the county saw a 3.8 percent increase in population, the largest gain in the 100 years. The county did experience a couple of decades (1960 & 1970) of population loss, but these were extremely small percentages.

## 2.1.6 Occupations

The table below (**Table 2.3**) provides occupation statistics for the incorporated cities and the county as a whole. As can be seen employment is relatively evenly divided across four of the five occupational categories.

**Table 2.3, Occupation Statistics, Butler County, Missouri**

Place	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Butler County	29.5%	20.2%	24.0%	7.9%	18.5%
City of Fisk	13.5%	18.4%	28.6%	15.1%	24.3%
City of Neelyville	26.9%	28.1%	16.9%	10.6%	17.5%
City of Poplar Bluff	24.5%	25.0%	26.5%	5.1%	18.9%
City of Quilin	4.7%	28.9%	20.3%	15.6%	30.5%

Source: U.S. Census, 2011-2015 American Community Survey, 5-year Estimates.

### 2.1.7 Agriculture

According to the United States Department of Agriculture, 234,110 acres of the 446,720 total acres that make up Butler County are utilized as farm land. There are reportedly 509 farms in the County with an average size of 460 acres. The eastern section of the county is flat, fertile farmland that is used in the production of a variety of crops. The most popular are corn, wheat, soybeans, and rice, with soybeans being the most popular harvested crop covering some 90,900 acres in the county.

The most recent data available from the USDA’s Census of Agriculture were 2012 figures. This data reported that there were 27,899 acres of corn grown in the county. The Census also reveals that there were 11,528 acres of wheat grown in the county, and 360 acres of sorghum, 47,448 acres of rice, and 9,651 acres of land used for all hay and all haylage, grass silage, and greenchop.

As you travel west through the county, the landscape becomes more rolling hills and the popularity of hay farming and livestock farming becomes more popular. USDA reports that approximately 92,700 acres in the county is used for livestock farm land. The livestock raised in Butler County is primarily cattle with smaller numbers of hogs, sheep, and chickens. The Census of Agriculture reports that there were 273 farms with cattle and calves inventory that totaled 18,641 head. This figure includes beef cattle which was the majority at 246 farms, and milk cows that made up on seven of the total cattle farms. It is also reported that there are five hog farms, three sheep and/or lamb farms, and there are reportedly 42 chicken farms in the county.

### 2.1.8 FEMA Hazard Mitigation Assistance Grants in Planning Area

According to the Federal Emergency Management Agency, there have been six Hazard mitigation Grant Awards made to jurisdictions within the boundaries of Butler County. Four of these grant awards were for

school districts to construct tornado safe rooms and two of the projects were removing structures from the floodplain through a flood buyout programs. The total federal dollar amount of these six projects was \$7,281,300. The table below provides information for each of the projects.

**Table 2.4, FEMA HMA Grants in County from January 2003 - March 2017**

Project Title	Subgrantee	Type	Date Approved	Approved Net	Federal Share Obligated	Non Federal Share
Residential Buyout - Poplar Bluff	Poplar Bluff	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine (44)	01/09/2003	\$1,647,669	\$1,235,752	\$411,917
City of Poplar Bluff / Acquisition/Demolition 22 residential Homes	Poplar Bluff	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine (23)	12/03/2013	\$599,557	\$449,667	\$149,890
TRCC Community Saferoom	THREE RIVERS COMMUNITY COLLEGE	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	06/17/2015	\$3,382,873	\$2,537,155	\$845,718
POPLAR BLUFF R-I SCHOOL DISTRICT SAFE ROOM	POPLAR BLUFF R-I SCHOOL DISTRICT	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	12/02/2016	\$1,406,823	\$1,055,118	\$351,706
Neelyville R-IV School District Tornado Safe Room	NEELYVILLE SCHOOL	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	01/28/2015	\$171,477	\$128,608	\$42,869
TRC #2 Safe Room-Poplar Bluff	THREE RIVERS COMMUNITY COLLEGE	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	12/15/2014	\$2,500,000	\$1,875,000	\$625,000
					\$7,281,300	\$2,427,100

## 2.2 Jurisdictional Profiles and Mitigation Capabilities

This section includes individual profiles for each participating jurisdiction. It also includes a discussion of previous mitigation initiatives in the planning area. A summary table indicating specific capabilities of each jurisdiction that relate to their ability to implement mitigation opportunities. The unincorporated county is profiled first, followed by the incorporated communities, the special districts, and the public school districts.

### 2.2.1 Unincorporated Portions of Butler County, Missouri

Butler County is a third-class county administered by a three-member County Commission. One commissioner from each of the two County Districts join a Presiding Commissioner elected at-large for terms of four years. County property taxes are collected to support the road, school, and library infrastructure of the county. Only a sales tax is levied for county general revenue purposes. The Commission has general supervision of the county public roads and maintains the courthouse and other county owned buildings. The Commission oversees the budgets of a number of independently elected officers such as the County Clerk, Sheriff, Prosecuting Attorney, Coroner, Public Administrator, Assessor, Collector, Treasurer, and Surveyor.

The County Commission meets three times per week in the Courthouse located in the county seat of Poplar Bluff on Monday, Wednesday and Friday mornings from 9:00am-12:00pm and at other times in special session as needed. The County Clerk is also present for these meetings and serves as the Chief

Financial Officer of the Commission.

The following is a list of county officials as of August 1, 2017:

- Presiding County Commissioner, Vince Lampe
- Associate Commissioner East District, Don Anderson
- Associate Commissioner West District, Dennis LeGrand
- County Clerk, Tonyi Deffendal
- Recorder, Debby Lundstrom
- Assessor, Chris Rickman
- Collector, Emily Clark-Parks
- Treasurer, Joe Humphrey
- Prosecuting Attorney, Kevin Barbour
- Public Administrator, Sharron Payne
- Circuit Clerk, Cindi Bowman
- Sheriff, Mark Dobbs
- Coroner, Andy Moore
- Emergency Management Director, Robbie Myers

## **Mitigation Initiatives/Capabilities**

Butler County is a small, poor, rural county that lacks in many staffed positions. The County highway department has a supervisor that manages the maintenance of the county roads and reports directly to the commissioners. The County also has an emergency management director that serves full-time in that role.

Due to the size of Butler County, its small staff and lack of resources, many times planning is conducted on a regional basis as opposed to county level. The county works often with the Ozark Foothills Regional Planning Commission on projects such as developing a regional Comprehensive Economic Development Strategy plan, or on transportation planning such as the Regional Transportation Plan and the regional Public Transit – Human Services Transportation Plan. The county also works with a regional Local Emergency Planning District (LEPD), the Ozark Foothills LEPD that includes Ripley, Butler, and Wayne Counties.

Butler County utilizes its elected prosecuting attorney for legal direction and services. Its Highway Department supervisor is responsible for overseeing the county's transportation infrastructure, which consists primarily of gravel-surfaced roadways. The county funds a sheriff's department, which is responsible for maintaining order and enforcing law within the county and operating a detention center. Butler County's fire protection is provided by volunteer fire departments including the Butler County Volunteer Fire Department and the Qulin Volunteer Fire Department. The county's emergency management director also functions as the county floodplain manager. Butler County, just as all of its neighboring counties, has established no planning and zoning committee or land use designations within the balance of the county.

Butler County participates with in the Ozark Foothills Local Emergency Planning District (LEPD), and is, consequently, included within the district's Local Emergency Operations Plan. The data found in the table

below, **Table 2.5**, is based upon data reported by the county within its *Data Collection Questionnaire*.

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
Planning Capabilities	
Comprehensive Plan	None
Builder's Plan	None
Capital Improvement Plan	None
Local Emergency Plan	<i>Ozark Foothills Local Emergency Operations Plan</i>
County Emergency Plan	None
Local Recovery Plan	None
County Recovery Plan	None
Local Mitigation Plan	None
County Mitigation Plan	August 2012
Local Mitigation Plan (PDM)	None
County Mitigation Plan (PDM)	None
Economic Development Plan	<i>Ozark Foothills Comprehensive Economic Development Strategy</i> , March 2013
Transportation Plan	<i>Ozark Foothills Regional Transportation Plan</i> , June 11, 2017 <i>Public Transit-Human Service Transportation Plan</i> , June 13, 2013
Land-Use Plan	None
Flood Mitigation Assistance (FMA) Plan	None
Watershed Plan	None
Firewise or other fire mitigation plan	None
School Mitigation Plan	None
Critical Facilities Plan (Mitigation/Response/Recovery)	None
Policies/Ordinance	
Zoning Ordinance	None
Building Code	None
Floodplain Ordinance	Yes, 9/9/1998
Subdivision Ordinance	None
Tree Trimming Ordinance	None
Nuisance Ordinance	None
Storm Water Ordinance	None
Drainage Ordinance	None
Site Plan Review Requirements	None
Historic Preservation Ordinance	None
Landscape Ordinance	None
Wetlands and Riparian Areas Conservation Plan	None
Debris Management Plan	None
Program	
Zoning/Land Use Restrictions	None
Codes Building Site/Design	None
National Flood Insurance Program (NFIP) Participant – Non-Delegated	Yes, 01/17/86

NFIP Community Rating System (CRS) Participating Community	None
Hazard Awareness Program	None
National Weather Service (NWS) Storm Ready	Yes
Building Code Effectiveness Grading (BCEGs)	None
ISO Fire Rating	Yes, Varies Among Fire Department Service Areas

Capabilities	Status Including Date of Document or Policy
Economic Development Program	None
Land Use Program	None
Public Education/Awareness	Yes, EMA, Health Department and Fire Dept
Property Acquisition	None
Planning/Zoning Boards	None
Stream Maintenance Program	None
Tree Trimming Program	None
Engineering Studies for Streams (Local/County/Regional)	None
Mutual Aid Agreements	None
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	None
Hazard Analysis/Risk Assessment (County)	None
Flood Insurance Maps	Yes, 1/17/1986, Community #290830
FEMA Flood Insurance Study (Detailed)	None
Evacuation Route Map	None
Critical Facilities Inventory	None
Vulnerable Population Inventory	None
Land Use Map	None
Staff/Department	
Building Code Official	None
Building Inspector	None
Mapping Specialist (GIS)	None
Engineer	None
Development Planner	None
Public Works Official	None
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes (same as Emergency Management Director)
Bomb and/or Arson Squad	None
Emergency Response Team	None
Hazardous Materials Expert	None
Local Emergency Planning Committee (LEPC)	Ozark Foothills LEPC
County Emergency Management Commission	None
Sanitation Department	None
Transportation Department	County Highway Department

Economic Development Department	None (Greater Poplar Bluff Area Chamber of Commerce)
Housing Department	None
Planning Consultant	Ozark Foothills Regional Planning Commission
Regional Planning Agencies	Ozark Foothills Regional Planning Commission
Historic Preservation	None
Non-Governmental Organizations (NGOs)	
American Red Cross	Southeast Missouri Chapter of Red Cross
Salvation Army	Yes
Veterans Groups	VFW and American Legion
Environmental Organization	Nature Conservancy
Homeowner Associations	None
Neighborhood Associations	None
Chamber of Commerce	Poplar Bluff Area Chamber of Commerce
Community Organizations (Lions, Kiwanis, etc.)	Rotary, Kiwanis, Lions, Altrusa
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes

Capabilities	Status Including Date of Document or Policy
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes (Via Public Water Supply Districts)
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Butler County Data Collection Questionnaire, 2017

### 2.2.21 City of Poplar Bluff, Missouri

The City of Poplar Bluff is located in the central portion of Butler County, is the largest incorporated place, and serves as the county seat of Butler County, Missouri. The city is overseen by a city manager and a city council that includes five council positions elected by designated wards and two elected at-large. From the seven council members, they elect a mayor that leads all meetings of the council and executes legal documents on behalf of the city. A city clerk and assistant to the clerk assist the council and city manager in the management of the city budget and operations.

The City of Poplar Bluff contracts with a local attorney for legal direction and services. Its public works director is responsible for overseeing the city's municipal water, wastewater systems and electric utilities. The City has a separate parks department and director that manages all city parks and city sponsored

recreational activities. The city also funds a police department, which is responsible for maintaining order and enforcing local ordinances, as well as a fire department. The city's planning and zoning committee meets regularly to ensure the city's established zones and land use designations are maintained. The City of Poplar Bluff and the unincorporated areas adjacent to the city limits have seen the most residential, commercial or industrial development. Major developments that have occurred since the last plan update include the area commonly known as Eight Points Development located on Oak Grove Road. The development includes a new 250 bed regional hospital, the Poplar Bluff Regional Medical Center. The area also includes an expansion of the local high school and several retail stores. Other development in the city has included the expansion of Oak Grove Road from two-lanes to four-lanes with a turning lane and the construction of Shelby Road, a four-lane city street. Both roads were constructed as part of a newly created Regional Transportation Development District (TDD). Future infrastructure projects included with this TDD is an extension of Shelby Road to connect into Missouri State Highway 53 on the south side of town. This roadway will alleviate some traffic congestion on Westwood Boulevard, the main corridor through Poplar Bluff. Other commercial development has included some office and retail spaces under construction during the summer of 2017 on the newly constructed Shelby Road and updates to existing retail shopping centers and new construction of retail and food service buildings in existing commercial areas. There has also been some limited residential development including a new apartment complex that is completed and a recently approved, but not yet constructed low-income housing complex that will include 48 units.

The largest employers located within the City of Poplar Bluff include the Poplar Bluff R-I School District, the Poplar Bluff Regional Medical Center, Briggs and Stratton Corporation, V.A. Medical Center, Gates Corporation, Wal Mart Stores, and Three Rivers College.

The City of Poplar Bluff participates with in the Ozark Foothills Local Emergency Planning District (LEPD). Consequently, the city is included within the district's Local Emergency Operations Plan. The city has completed the acquisition and demolition of multiple residential and commercial properties, and is currently demolishing multiple residential structures within city limits. Two outdoor warning sirens comprise the public warning siren system. The data found in the table below, **Table 2.6, is** based upon data reported by the city upon its *Data Collection Questionnaire*.

The population of the City of Poplar Bluff in 2010 was reported to be 17,023 according to the US Census. This was an increase of 402 persons from the 2000 US Census population of 16,621 persons. The City of Poplar Bluff has also seen a steady increase in the number of housing units, in 2000 the number of housing units in the City was reported as 7,871, in the 2010 Census that figure had grown to 8,271, and then with the 2011-2015 American Community Survey, it is estimated that there are 8,344 housing units, an increase of 473 housing units or 6% increase.

According to the 2011-2015 American Community Survey 5-Year Estimates, 205 housing units have been constructed from 2010-2015. Approximately 75% of the housing units in the City of Poplar Bluff are single-family detached homes. The median home value in Poplar Bluff is \$91,800, with the largest number of housing units, 42.2% being valued at \$50,000-\$99,999. Only 2.1% of housing units in Poplar Bluff are mobile homes. The percent of owner-occupied housing units in Poplar Bluff is 47.8% while the renter-occupied rate is 52.2%, a much higher rate of rental-occupied homes than that reported for the State of Missouri as 32.8%.

The loss of power among vulnerable and special needs populations residing in units without emergency

backup power systems is of particular concern to the current city administration. The Butler County Health Department works to maintain a database that includes this vulnerable population, maintaining this information is addressed in the Actions section of this plan update.

The information found within **Table 2.6**, below, is based on the *Data Collection Questionnaire* distributed to and collected from the City of Poplar Bluff, Missouri.

**Table 2.6, City of Poplar Bluff, Missouri - Mitigation Capabilities**

<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Planning Capabilities	
Comprehensive Plan	Yes, 2008
Builder's Plan	None
Capital Improvement Plan	Yes, 2016
Local Emergency Plan	Yes, 2012
County Emergency Plan	N/A
Local Recovery Plan	None
County Recovery Plan	N/A
Local Mitigation Plan	None
County Mitigation Plan	Yes, 8/2012
Local Mitigation Plan (PDM)	None
County Mitigation Plan (PDM)	None
Economic Development Plan	Yes, 2008
Transportation Plan(s)	Yes, 6/11/2015 & 6/13/2013
Land-use Plan	Yes, Planning and Zoning Regulations
Flood Mitigation Assistance (FMA) Plan	None
Watershed Plan	None
Firewise or other fire mitigation plan	None
School Mitigation Plan	None
Critical Facilities Plan	None
Mitigation/Response/Recovery	
<b>Policies/Ordinance</b>	<b>Status Including Date of Document or Policy</b>
Zoning Ordinance	Yes, 1972
Building Code	Yes, IBC 2012
Floodplain Ordinance	Yes, 2010
Subdivision Ordinance	Yes
Tree Trimming Ordinance	Yes, Poplar Bluff Municipal Utilities
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes, 2003
Drainage Ordinance	None
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	Yes
Landscape Ordinance	None
Wetlands and Riparian Areas Conservation Plan	None
Debris Management Plan	None
<b>Program</b>	<b>Status Including Date of Document or Policy</b>

Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
National Flood Insurance Program (NFIP) Participant - Nondelegated	Yes
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	Yes
National Weather Service (NWS) Storm Ready	None
Building Code Effectiveness Grading (BCEGs)	None
ISO Fire Rating	Yes, Class 4
Economic Development Program	Yes, Poplar Bluff Chamber of Commerce
Land Use Program	Yes
Public Education/Awareness	Yes
Property Acquisition	None
Planning/Zoning Boards	Yes
Stream Maintenance Program	Yes
Tree Trimming Program	Yes, through Municipal Utilities Dept.
Engineering Studies for Streams (Local/County/Regional)	None
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (Local)	Yes, September 2016
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	Yes, 11/2010
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	None
Critical Facilities Inventory	None
Vulnerable Population Inventory	None
Land Use Map	Yes
<b>Staff/Department</b>	
<b>Status Including Date of Document or Policy</b>	
Building Code Official	Yes
Building Inspector	Yes
Mapping Specialist (GIS)	None
Engineer	None
Development Planner	Yes
Public Works Official	Yes
Emergency Management Coordinator	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	Yes
Emergency Response Team	Yes
Hazardous Materials Expert	Yes
Local Emergency Planning Committee	Yes
County Emergency Management Commission	None
Sanitation Department	Yes
Transportation Department	Yes

Economic Development Department	Yes, Planning Department
Housing Department	Yes
Planning Consultant	Yes
Regional Planning Agencies	Yes, Ozark Foothills Regional Planning Comm.
Historic Preservation	Yes
<b>Non-Governmental Organizations (NGOs)</b>	<b>Status Including Date of Document or Policy</b>
American Red Cross	Yes
Salvation Army	Yes
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Veterans Groups	Yes
Environmental Organization	Yes
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	<b>Status Including Date of Document or Policy</b>
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	No

Source: City of Poplar Bluff Data Collection Questionnaire, 2017

### 2.2.22 City of Fisk, Missouri

The City of Fisk is located in the eastern portion of Butler County. The city is overseen by a mayor and city council that includes four council positions elected by designated wards and the mayor elected by the all voters. A city clerk assists the council and mayor in the management of the city budget and operations.

The City of Fisk contracts with a local attorney for legal direction and services. Its public works director is responsible for overseeing the city’s municipal water, wastewater systems and electric utilities. The city relies on the Butler County Sheriff’s Department for law enforcement and the Butler County Volunteer Fire Department provides fire protection services.

The City of Fisk participates with in the Ozark Foothills Local Emergency Planning District (LEPD). Consequently, the city is included within the district’s Local Emergency Operations Plan. One outdoor warning siren comprises the public warning siren system. The data found in the table below, **Table 2.6**, is based upon data reported by the city upon its *Data Collection Questionnaire*.

The population of the City of Fisk in 2010 was reported to be 342 according to the US Census. This was a

decrease of 21 persons from the 2000 US Census population of 363 persons. The City of Fisk has seen a slight decrease in the number of housing units, in 2000 the number of housing units in the City was reported as 189, in the 2010 Census that figure had declined to 180.

The median home value in Fisk is \$47,900, with the largest number of housing units, 53.5% being valued at Less than \$50,000. Approximately 18% of housing units in Fisk are mobile homes. The percent of owner-occupied housing units in Fisk is 64.5% while the renter-occupied rate is 35.5%.

The information found within **Table 2.61**, below, is based on the *Data Collection Questionnaire* distributed to and collected from the City of Fisk, Missouri.

**Table 2.61, City of Fisk, Missouri - Mitigation Capabilities**

<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
<b>Planning Capabilities</b>	
Comprehensive Plan	None
Builder's Plan	None
Capital Improvement Plan	None
Local Emergency Plan	Yes, 2012
County Emergency Plan	N/A
Local Recovery Plan	None
County Recovery Plan	N/A
Local Mitigation Plan	None
County Mitigation Plan	Yes, 8/2012
Local Mitigation Plan (PDM)	None
County Mitigation Plan (PDM)	None
Economic Development Plan	Yes, 2008
Transportation Plan(s)	Yes, 6/11/2015 & 6/13/2013
Land-use Plan	None
Flood Mitigation Assistance (FMA) Plan	None
Watershed Plan	None
Firewise or other fire mitigation plan	None
School Mitigation Plan	None
Critical Facilities Plan	None
Mitigation/Response/Recovery	
<b>Policies/Ordinance</b>	<b>Status Including Date of Document or Policy</b>
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes, 2010
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	Yes, 2003
Drainage Ordinance	None
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Site Plan Review Requirements	No
Historic Preservation Ordinance	No

Landscape Ordinance	None
Wetlands and Riparian Areas Conservation Plan	None
Debris Management Plan	None
<b>Program</b>	<b>Status Including Date of Document or Policy</b>
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant - Nondelegated	Yes
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	None
National Weather Service (NWS) Storm Ready	None
Building Code Effectiveness Grading (BCEGs)	None
ISO Fire Rating	Yes, Class 4
Economic Development Program	Yes, Greater Poplar Bluff Chamber of Commerce
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	None
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	Yes, through Ozark Border Electric Coop
Engineering Studies for Streams (Local/County/Regional)	None
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	Yes, 11/2010
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	None
Critical Facilities Inventory	None
Vulnerable Population Inventory	None
Land Use Map	None
<b>Staff/Department</b>	<b>Status Including Date of Document or Policy</b>
Building Code Official	None
Building Inspector	None
Mapping Specialist (GIS)	None
Engineer	None
Development Planner	None
Public Works Official	None
Emergency Management Coordinator	Yes – County Emergency Manager
NFIP Floodplain Administrator	Yes – County Emergency Manager
Bomb and/or Arson Squad	None
Emergency Response Team	None

Hazardous Materials Expert	None
Local Emergency Planning Committee	Yes – Regional
County Emergency Management Commission	None
Sanitation Department	Yes
Transportation Department	None
Economic Development Department	None
Housing Department	None
Planning Consultant	None
Regional Planning Agencies	Yes, Ozark Foothills Regional Planning Comm.
Historic Preservation	None
<b>Non-Governmental Organizations (NGOs)</b>	<b>Status Including Date of Document or Policy</b>
American Red Cross	Yes
Salvation Army	Yes
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Veterans Groups	Yes
Environmental Organization	None
Homeowner Associations	None
Neighborhood Associations	None
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	<b>Status Including Date of Document or Policy</b>
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	No

Source: City of Fisk Data Collection Questionnaire, 2017

### 2.2.23 City of Neelyville, Missouri

The City of Neelyville is located in the south-central portion of Butler County. The city is overseen by a mayor and city council that includes four council positions elected by designated wards and the mayor elected by the all voters. A city clerk assists the council and mayor in the management of the city budget and operations.

The City of Neelyville contracts with a local attorney for legal direction and services. Its public works director is responsible for overseeing the city’s municipal water and wastewater systems. The city relies on the Butler County Sheriff’s Department for law enforcement and the Butler County Volunteer Fire Department provides fire protection services.

The City of Neelyville participates with in the Ozark Foothills Local Emergency Planning District (LEPD). Consequently, the city is included within the district’s Local Emergency Operations Plan. One outdoor warning siren comprises the public warning siren system. The data found in the table below, **Table 2.6, is** based upon data reported by the city upon its *Data Collection Questionnaire*.

The population of the City of Neelyville in 2010 was reported to be 483 according to the US Census. This was a slight decrease of 4 persons from the 2000 US Census population of 487 persons. The City of Neelyville has seen an increase in the number of housing units, in 2000 the number of housing units in the City was reported as 215, in the 2011-2015 American Community Survey 5-Year Estimates that figure had grown to 245.

The median home value in Neelyville is \$27,100, with the largest number of housing units, 71.3% being valued at Less than \$50,000. Approximately 39% of housing units in Neelyville are mobile homes. The percent of owner-occupied housing units in Neelyville is 55.8% while the renter-occupied rate is 44.2%.

The information found within **Table 2.62, below**, is based on the *Data Collection Questionnaire* distributed to and collected from the City of Neelyville, Missouri.

**Table 2.62, City of Neelyville, Missouri - Mitigation Capabilities**

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	None
Builder's Plan	None
Capital Improvement Plan	None
Local Emergency Plan	Yes, 2012
County Emergency Plan	N/A
Local Recovery Plan	None
County Recovery Plan	N/A
Local Mitigation Plan	None
County Mitigation Plan	Yes, 8/2012
Local Mitigation Plan (PDM)	None
County Mitigation Plan (PDM)	None
Economic Development Plan	Yes, 2008
Transportation Plan(s)	Yes, 6/11/2015 & 6/13/2013
Land-use Plan	None
Flood Mitigation Assistance (FMA) Plan	None
Watershed Plan	None
Firewise or other fire mitigation plan	None
School Mitigation Plan	None
Critical Facilities Plan	None
Mitigation/Response/Recovery	
<b>Policies/Ordinance</b>	<b>Status Including Date of Document or Policy</b>
Zoning Ordinance	No
Building Code	No

Floodplain Ordinance	Yes, 2010
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	Yes, 2003
Drainage Ordinance	None
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	None
Wetlands and Riparian Areas Conservation Plan	None
Debris Management Plan	None
<b>Program</b>	<b>Status Including Date of Document or Policy</b>
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant - Nondelegated	Yes
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	None
National Weather Service (NWS) Storm Ready	None
Building Code Effectiveness Grading (BCEGs)	None
ISO Fire Rating	Yes, Class 4
Economic Development Program	Yes, Greater Poplar Bluff Chamber of Commerce
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	None
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	Yes, through Ozark Border Electric Coop
Engineering Studies for Streams (Local/County/Regional)	None
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	Yes, 11/2010
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	None
Critical Facilities Inventory	None
Vulnerable Population Inventory	None
Land Use Map	None
<b>Staff/Department</b>	<b>Status Including Date of Document or Policy</b>
Building Code Official	None
Building Inspector	None

Mapping Specialist (GIS)	None
Engineer	None
Development Planner	None
Public Works Official	None
Emergency Management Coordinator	Yes – County Emergency Manager
NFIP Floodplain Administrator	Yes – County Emergency Manager
Bomb and/or Arson Squad	None
Emergency Response Team	None
Hazardous Materials Expert	None
Local Emergency Planning Committee	Yes – Regional
County Emergency Management Commission	None
Sanitation Department	Yes
Transportation Department	None
Economic Development Department	None
Housing Department	None
Planning Consultant	None
Regional Planning Agencies	Yes, Ozark Foothills Regional Planning Comm.
Historic Preservation	None
<b>Non-Governmental Organizations (NGOs)</b>	<b>Status Including Date of Document or Policy</b>
American Red Cross	Yes
Salvation Army	Yes
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Veterans Groups	Yes
Environmental Organization	None
Homeowner Associations	None
Neighborhood Associations	None
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	<b>Status Including Date of Document or Policy</b>
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	No

Source: City of Neelyville Data Collection Questionnaire, 2017

### 2.2.24 City of Qulin, Missouri

The City of Qulin is located in the eastern portion of Butler County. The city is overseen by a mayor and city council that includes four council positions elected by designated wards and the mayor elected by the all

voters. A city clerk assists the council and mayor in the management of the city budget and operations. The City of Qulin contracts with a local attorney for legal direction and services. Its public works director is responsible for overseeing the city’s municipal water and wastewater systems. The city relies on the Butler County Sheriff’s Department for law enforcement and the Qulin Volunteer Fire Department provides fire protection services.

The City of Qulin participates with in the Ozark Foothills Local Emergency Planning District (LEPD). Consequently, the city is included within the district’s Local Emergency Operations Plan. One outdoor warning siren comprises the public warning siren system. The data found in the table below, **Table 2.6, is** based upon data reported by the city upon its *Data Collection Questionnaire*.

The population of the City of Qulin in 2010 was reported to be 458 according to the US Census. This was a slight decrease of 9 persons from the 2000 US Census population of 467 persons. The City of Qulin has seen an increase in the number of housing units, in 2000 the number of housing units in the City was reported as 232, in the 2011-2015 American Community Survey 5-Year Estimates that figure had grown to 251.

The median home value in Qulin is \$34,400, with the largest number of housing units, 67.5% being valued at Less than \$50,000. Approximately 32% of housing units in Qulin are mobile homes. The percent of owner-occupied housing units in Qulin is 56.2% while the renter-occupied rate is 43.8%.

The information found within **Table 2.63**, below, is based on the *Data Collection Questionnaire* distributed to and collected from the City of Qulin, Missouri.

**Table 2.63, City of Qulin, Missouri - Mitigation Capabilities**

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	None
Builder's Plan	None
Capital Improvement Plan	None
Local Emergency Plan	Yes, 2012
County Emergency Plan	N/A
Local Recovery Plan	None
County Recovery Plan	N/A
Local Mitigation Plan	None
County Mitigation Plan	Yes, 8/2012
Local Mitigation Plan (PDM)	None
County Mitigation Plan (PDM)	None
Economic Development Plan	Yes, 2008
Transportation Plan(s)	Yes, 6/11/2015 & 6/13/2013
Land-use Plan	None
Flood Mitigation Assistance (FMA) Plan	None
Watershed Plan	None
Firewise or other fire mitigation plan	None
School Mitigation Plan	None
Critical Facilities Plan	None
Mitigation/Response/Recover	

y	
<b>Policies/Ordinance</b>	<b>Status Including Date of Document or Policy</b>
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes, 2010
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	Yes, 2003
Drainage Ordinance	None
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	None
Wetlands and Riparian Areas Conservation Plan	None
Debris Management Plan	None
<b>Program</b>	<b>Status Including Date of Document or Policy</b>
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
National Flood Insurance Program (NFIP) Participant - Nondelegated	Yes
NFIP Community Rating System (CRS) Participating Community	No
Hazard Awareness Program	None
National Weather Service (NWS) Storm Ready	None
Building Code Effectiveness Grading (BCEGs)	None
ISO Fire Rating	Yes, Class 4
Economic Development Program	Yes, Greater Poplar Bluff Chamber of Commerce
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	None
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	Yes, through Ozark Border Electric Coop
Engineering Studies for Streams (Local/County/Regional)	None
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (Local)	No
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	Yes, 11/2010
FEMA Flood Insurance Study (Detailed)	Yes
Evacuation Route Map	None
Critical Facilities Inventory	None

Vulnerable Population Inventory	None
Land Use Map	None
<b>Staff/Department</b>	<b>Status Including Date of Document or Policy</b>
Building Code Official	None
Building Inspector	None
Mapping Specialist (GIS)	None
Engineer	None
Development Planner	None
Public Works Official	None
Emergency Management Coordinator	Yes – County Emergency Manager
NFIP Floodplain Administrator	Yes – County Emergency Manager
Bomb and/or Arson Squad	None
Emergency Response Team	None
Hazardous Materials Expert	None
Local Emergency Planning Committee	Yes – Regional
County Emergency Management Commission	None
Sanitation Department	Yes
Transportation Department	None
Economic Development Department	None
Housing Department	None
Planning Consultant	None
Regional Planning Agencies	Yes, Ozark Foothills Regional Planning Comm.
Historic Preservation	None
<b>Non-Governmental Organizations (NGOs)</b>	<b>Status Including Date of Document or Policy</b>
American Red Cross	Yes
Salvation Army	Yes
<b>Capability</b>	<b>Status Including Date of Document or Policy</b>
Veterans Groups	Yes
Environmental Organization	None
Homeowner Associations	None
Neighborhood Associations	None
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	<b>Status Including Date of Document or Policy</b>
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur dept through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	Yes
Ability to withhold spending in hazard prone areas	No

Source: City of Qulin Data Collection Questionnaire, 2017

**Table 2.7, Mitigation Capabilities Summary Table**

<b>CAPABILITIES</b>	<b>Unincorporated Portions of Butler County</b>	<b>City of Poplar Bluff</b>	<b>City of Fisk</b>	<b>City of Neelyville</b>	<b>City of Quilin</b>
<b>Planning Capabilities</b>					
Comprehensive Plan	No	Yes, 2008	No	No	None
Builder's Plan	No	No	No	No	None
Capital Improvement Plan	No	Yes, 2016	No	No	None
Local Emergency Plan	N/A	Yes, 2012	Yes	Yes	None
County Emergency Plan	Yes	N/A	N/A	N/A	N/A
Local Recovery Plan	N/A	Yes, 2016	No	No	No
County Recovery Plan	No	N/A	N/A	No	No
Local Mitigation Plan	N/A	No	No	No	No
County Mitigation Plan	Yes, 8/2012	Yes, 8/2012	Yes, 8/2012	Yes, 8/2012	Yes, 8/2012
Local Mitigation Plan (PDM)	No	No	No	No	No
County Mitigation Plan (PDM)	No	Yes, 8/2012	No	No	No
Debris Management Plan	No	No	No	No	No
Economic Development Plan	Yes, 3/2013	Yes 3/2013	Yes 3/2013	Yes, 3/2013	Yes, 3/2013
Transportation Plan	Yes, 6/2017 & 6/2013	Yes, 6//2017 & 6/2013	Yes, 6/2017 & 6/2013	Yes, 6/2017 & 6/2013	Yes, 6/2017 & 6/2013
Land-use Plan	No	Yes	No	No	No
Flood Mitigation Assistance (FMA) Plan	No	No	No	No	No
Watershed Plan	No	No	No	No	No
Firewise or other fire mitigation plan	No	No	No	No	No
School Mitigation Plan	No	No	No	No	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No	No	No	No	No
<b>Policies/Ordinance</b>					
Zoning Ordinance	No	Yes	No	No	No
Building Code	No	Yes	No	No	No

Floodplain Ordinance	Yes	Yes	Yes	Yes	Yes
Subdivision Ordinance	No	Yes	No	No	No
Tree Trimming Ordinance	No	Yes	No	No	No
Nuisance Ordinance	No	Yes	Yes	Yes	Yes
Storm Water Ordinance	No	Yes	No	No	No
Drainage Ordinance	No	Yes	No	No	No
Site Plan Review Requirements	No	Yes	No	No	No
Historic Preservation Ordinance	No	Yes	No	No	No
Landscape Ordinance	No	No	No	No	No
Wetlands and Riparian Areas Conservation Plan	No	No	No	No	No
<b>Program</b>					
Zoning/Land Use Restrictions	No	Yes	Yes	No	No
Codes Building Site/Design	No	Yes	No	No	No
National Flood Insurance Program (NFIP) Participant	Yes	Yes	Yes	Yes	Yes
NFIP Community Rating System (CRS) Participating Community	No	No	No	No	No
Hazard Awareness Program	Yes	Yes	No	No	No
National Weather Service (NWS) Storm Ready	Yes	No	No	No	No
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No
ISO Fire Rating	Yes	Yes, 4	Yes	Yes	Yes, 7
Economic Development Program	Yes	Yes	No	No	No
Land Use Program	No	Yes	No	No	No
Public Education/Awareness	Yes	Yes	No	No	No
Property Acquisition	No	No	No	No	No
Planning/Zoning Boards	No	Yes	No	No	No
Stream Maintenance Program	Yes	Yes	No	No	No
Tree Trimming Program	No	Yes	No	No	No
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	No
Mutual Aid Agreements	No	Yes	No	No	No
<b>Studies/Reports/Maps</b>					
Hazard Analysis/Risk Assessment (Local)	N/A	Yes	Yes	No	No

Hazard Analysis/Risk Assessment (County)	Yes	N/A	N/A	N/A	No
Flood Insurance Maps	Yes	Yes	Yes	Yes	Yes
FEMA Flood Insurance Study (Detailed)	No	Yes	Yes	Yes	Yes
Evacuation Route Map	No	No	No	No	No
Critical Facilities Inventory	No	No	No	No	No
Vulnerable Population Inventory	Yes	No	No	No	No
Land Use Map	No	Yes	No	No	No
<b>Staff/Department</b>					
Building Code Official	No	Yes	No	No	No
Building Inspector	No	Yes	No	No	No
Mapping Specialist (GIS)	No	None	No	No	No
Engineer	No	None	No	No	No
Development Planner	No	Yes	No	No	No
Public Works Official	No	Yes	Yes	No	No
Emergency Management Coordinator	Yes	Yes	Yes – County	Yes – County	Yes – County
NFIP Floodplain Administrator	Yes	Yes	Yes	Yes	Yes
Bomb and/or Arson Squad	No	Yes	No	No	No
Emergency Response Team	No	Yes	No	No	No
Hazardous Materials Expert	No	Yes	No	No	No
Local Emergency Planning Committee	Yes	Yes	Yes	No	No
County Emergency Management Commission	No	None	No	No	No
Sanitation Department	No	Yes	No	No	No
Transportation Department	Yes	Yes	No	No	No
Economic Development Department	No	Yes	No	No	No
Housing Department	No	Yes	No	No	No
Planning Consultant	No	Yes	No	No	No
Regional Planning Agencies	Yes	Yes	Yes	Yes	Yes
Historic Preservation	No	Yes	No	No	No
<b>Non-Governmental Organizations (NGOs)</b>					
American Red Cross	Yes	Yes	Yes	Yes	Yes
Salvation Army	Yes	Yes	Yes	Yes	Yes

Veterans Groups	Yes	Yes	Yes	No	No
Environmental Organization	No	Yes	No	No	No
Homeowner Associations	No	Yes	No	No	No
Neighborhood Associations	No	Yes	No	No	No
Chamber of Commerce	Poplar Bluff Chamber of Commerce	Poplar Bluff Chamber of Commerce	Poplar Bluff Chamber of Commerce	No	No
Community Organizations (Lions, Kiwanis, etc.)	Yes	Yes	yes	Yes	Yes
<b>Financial Resources</b>					
Apply for Community Development Block Grants	Yes	Yes	Yes	Yes	Yes
Fund projects through Capital Improvements funding	Yes	Yes	Yes	Yes	Yes
Authority to levy taxes for specific purposes	Yes	Yes	Yes	No	No
Fees for water, sewer, gas, or electric services	No	Yes	Yes	Yes	Yes
Impact fees for new development	No	No	No	No	No
Incur dept through general obligation bonds	Yes	Yes	Yes	Yes	Yes
Incur debt through special tax bonds	Yes	Yes	Yes	Yes	Yes
Incur debt through private activities	No	Yes	No	No	No
Withhold spending in hazard prone areas	No	No	No	No	No

Source: Data Collection Questionnaires, 2017

### 2.2.3 Special Districts Within Butler County, Missouri

#### Butler County Public Water Supply Districts

There are four separately organized public water supply districts within Butler County that are organized as special districts providing water distribution to approximately 12,630 households and businesses in the unincorporated areas of Butler County.

There exist no past or ongoing projects or programs designed to reduce disaster losses. Mitigation-related capabilities applicable to the PWSD include the following:

- executing mutual aid agreements with neighboring water districts;
- inventorying district-owned critical facilities and infrastructure;
- retaining the services of a resident engineer;
- developing and fostering a continued relationship with the County’s Emergency Management Director;
- consulting with the regional planning commission to explore funding opportunities; and,
- ensure annually that adequate fees are collected for water services.

**Table 2.8** below provides details on each of the four PWSD’s. This data was provided by the Missouri Department of Natural Resources.

Water System Name	Year Organized	Population Served	Service Connections	Supply Capacity (Million Gallons)	Daily Used (Million Gallons)	Finished Water Storage(Million Gallons)
Butler County PWSD #1	1969	8,000	3,050	0.2450	0.9570	0.2000
Butler County PWSD #104	2004	25	1	Unknown	Unknown	Unknown
Butler County PWSD #2	1969	1,603	641	0.2880	0.0750	0.7500
Butler County PWSD #3	1972	3,000	1,250	0.6264	0.2167	0.2500

## 2.2.4 Public School District Profiles and Mitigation Capabilities

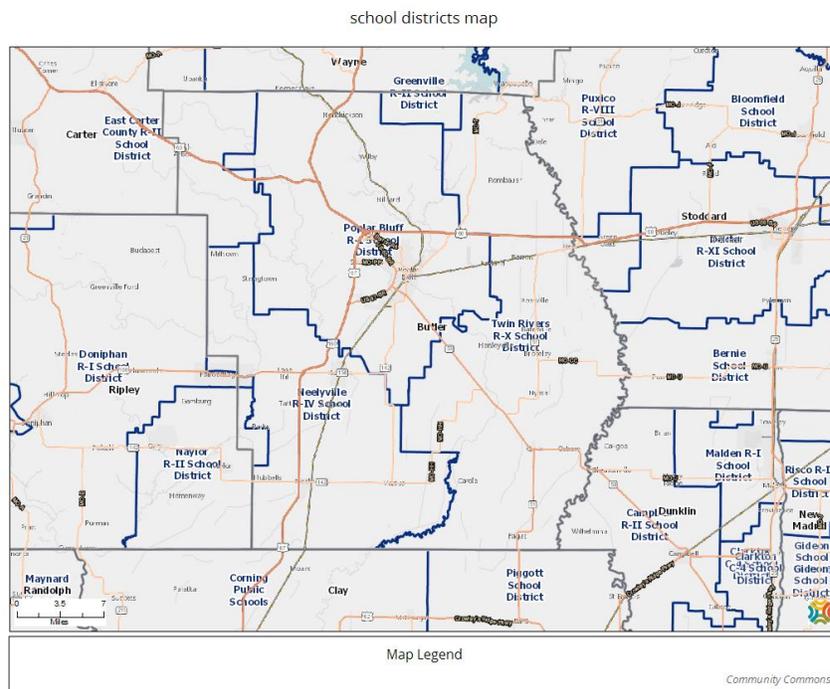
Two of the three school districts within Butler County, Missouri participated within the current plan compilation. The participating school districts include the following:

- Poplar Bluff R-I School District;
- Twin Rivers R-X School District.

Neelyville R-IV School District did not participate in the update of the plan. A map of the three school districts within Butler County is shown below in **Figure 2.3**.

In addition to the public school districts in the county, Three Rivers College participated and adopted the plan. TRC is a public two-year college, with its main campus located in Poplar Bluff, Missouri. TRC's taxing district include the counties of Butler, Carter, Ripley, and Wayne in southeast Missouri.

**Figure 2.3, Map of School Districts within Butler County, Missouri**



Source: Community Commons

All three school district in Butler County, Missouri are accredited as “A” districts by the Missouri School Improvement Program 5 as mandated by Missouri Law and regulations of the State Board of Education. The Poplar Bluff R-I School District has constructed two tornado safe rooms per FEMA standards as of the writing of this plan update, one safe room on the campus of O’Neal Elementary School and one on the campus of the Poplar Bluff Junior High School. The Twin Rivers R-X School District submitted a Notice of Interest for a proposed tornado safe room in April 2017 and at the time of this update were awaiting an

invitation to prepare a full grant application for the proposed safe room that would be constructed on their high school campus in Broseley, Missouri.

The Poplar Bluff R-I School District maintains thirty-nine (39) buildings in total (including two tornado safe rooms) and has assets valued at \$121,479,037. The Poplar Bluff R-I School District completed major renovations, construction and rearrangement of its campuses in the 2016-2017 school year. The high school was remodeled, added on to and converted to a middle school that houses fourth, fifth, and sixth grades, prior to this conversion, fourth graders were on the campuses of the four elementary schools in the district. The Fifth and Sixth Grade Center was reconfigured and 132,000 square foot addition was built on to convert that facility to the new High School. This also included the construction of a new football stadium, new baseball field and new tennis courts on this new high school campus. A new tornado safe room was also constructed on the site of the Poplar Bluff Junior High School that is used as classroom space and a gymnasium.

Twin Rivers R-X School District has not completed any major construction projects since the last update of this plan. The district is planning for the construction of a tornado safe room on their high school campus located in the unincorporated community of Broseley, Missouri.

Three Rivers College, the Community College of Southeast Missouri (TRC) is located within the city limits of Poplar Bluff. The campus of TRC has seen dramatic growth since the last update. One building on campus has undergone major renovations, the Lambert C. Drury Academic Resource Commons. The Robert W. Plaster Free Enterprise Center is a new building that has been constructed on campus, which was partially funded as a FEMA approved tornado safe room. As of the writing of this update, construction is also underway on the Libla Sports Complex that, when completed will be a 3,000 seat, 60,000 square foot gymnasium that also includes a tornado safe room. Other infrastructure improvements are currently underway that include improved parking and sidewalks throughout the campus.

All three public school districts within Butler County are, for the most part, located entirely within Butler County's jurisdictional boundaries—the "planning area" for the purposes of this plan. Consequently, little data limitations exist for those school districts whose district service area extends beyond the county boundary lines into an adjacent county. Those districts for which this is the case comprise a small portion (approximately 5%) of Twin Rivers R-X designated service area extends into a neighboring county. Given this, the data and mitigation capabilities shown in **Table 2.9, Table 2.10, and Table 2.11** below can be safely assumed to be representative of the portions of the district located within the planning area.

**Table 2.9, School District Buildings and Enrollment Data, May 2017, Butler County, Missouri**

District Name	Building Name	Building Enrolment
Poplar Bluff R-I	Poplar Bluff High School (9-12)	1333
Poplar Bluff R-I	Poplar Bluff Jr. High School (7-8)	749
Poplar Bluff R-I	Poplar Bluff Middle School (4-6)	1172

Poplar Bluff R-I	Eugene Field Elementary School (1-3)	330
Poplar Bluff R-I	Lake Road Elementary School (1-3)	183
Poplar Bluff R-I	Oak Grove Elementary School (1-3)	329
Poplar Bluff R-I	O'Neal Elementary School (1-3)	366
Poplar Bluff R-I	Kindergarten Center (K)	384
Poplar Bluff R-I	Early Childhood Center (PK)	287
Poplar Bluff R-I	Technical Career Center	141
Poplar Bluff R-I	Alternative School	24
Neelyville R-IV	Hillview Elementary (PK-02)	176
Neelyville R-IV	Neelyville Elementary (3-6)	188
Neelyville R-IV	Neelyville High School (7-12)	261
Twin Rivers R-X	Twin Rivers High School (9-12)	306
Twin Rivers R-X	Fisk Elementary (K-08)	320
Twin Rivers R-X	Qulin Elementary (K-08)	326

Source: <http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx>

**Table 2.10, Butler County School District Data, by District**

<u>NAME OF DISTRICT</u>	<u>ASSESSMENT VALUATION (\$)</u>	<u>DISTRICT ENROLLMENT</u>	<u>FACULTY (FTE)</u>	<u>ADMINISTRATIVE (FTE)</u>	<u>ATTENDANCE RATE (%)</u>	<u>SQUARE MILES OF DISTRICT</u>
<b>Poplar Bluff R-I</b>	\$442,874,222	5,298	419	21	86.2%	211.4753
<b>Twin Rivers R-X</b>	\$67,171,654	952	99	5	96.0%	271.6217
<b>Neelyville R-IV</b>	\$37,324045	584	74	5	91.6%	166.7124
<b>Three Rivers College</b>	\$601,114,074	3,017	FT – 62 PT – 186	121		4-county taxing district

Source: <http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx>

**Table 2.11, Summary of Mitigation Capabilities - Public School Districts Serving Butler County, Missouri**

Capability	Poplar Bluff R-I School District	Twin Rivers R-X School District	Three Rivers Community College	Neelyville R-IV School District
------------	----------------------------------	---------------------------------	--------------------------------	---------------------------------

Planning Elements				
Master Plan/ Date	Yes	No	Yes	Unknown – No Participation
Capital Improvement Plan/Date	Yes	No	Yes	Unknown – No Participation
School Emergency Plan / Date	Yes	Yes	Yes	Unknown – No Participation
Weapons Policy/Date	Yes	Yes	Yes	Unknown – No Participation
Personnel Resources				
Full-Time Building Official (Principal)	Yes	Yes	Yes	Unknown – No Participation
Emergency Manager	No	No	Yes – Director of Public Safety	Unknown – No Participation
Grant Writer	Yes	No	No	Unknown – No Participation
Public Information Officer	Yes	Yes	Yes	Unknown – No Participation
Financial Resources				
Capital Improvements Project Funding	Yes	No	No	Unknown – No Participation
Local Funds	Yes	Yes	Yes	Unknown – No Participation
General Obligation Bonds	Yes	No	No	Unknown – No Participation
Special Tax Bonds	Yes	No	No	Unknown – No Participation
Private Activities/Donations	Yes	No	Yes	Unknown – No Participation
State And Federal Funds/Grants	Yes	Yes	Yes	Unknown – No Participation
Other				
Public Education Programs	Yes	Yes	Yes	Unknown – No Participation
Privately Or Self- Insured?	Privately	Privately	Privately	Unknown – No Participation
Fire Evacuation Training	Yes	Yes	Yes	Unknown – No Participation
Tornado Sheltering Exercises	Yes	Yes	Yes	Unknown – No Participation
Public Address/Emergency Alert System	Yes	Yes	Yes	Unknown – No Participation
NOAA Weather Radios	Yes	Yes	No	Unknown – No Participation
Lock-Down Security Training	Yes	Yes	Yes	Unknown – No Participation
Mitigation Programs	Yes	No	Yes	Unknown – No Participation

Tornado Shelter/Safe room	Yes	No	Yes	Unknown – No Participation
Campus Police	Yes – SRO's	Yes – SRO's	Yes	Unknown – No Participation

School District Data Collection Questionnaires, 2017

## 3 RISK ASSESSMENT

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[3.4.11 Winter Weather/Snow/Ice/Severe Cold](#)

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## 3.1 Hazard Identification

**44 CFR Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.**

Following is a community-wide risk assessment for Butler County, Missouri. The data used to compile this assessment can be found throughout the body of this document, primarily in the profile of each hazard and capabilities of each jurisdiction. The natural hazards discussed throughout this document were examined using available data relevant and necessary for determining the types of hazards, frequency and strength of those hazards, areas vulnerable to those hazards, potential impacts, and probability that each hazard will occur.

The goal of the risk assessment is to estimate the potential loss in the planning area, including loss of life, personal injury, property damage, and economic loss, from a hazard event. The risk assessment process allows communities and school/special districts in the planning area to better understand their potential risk to the identified hazards. It will provide a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The previously approved Butler County Hazard Mitigation Plan was approved in August 2012. Since that time there has been a variety of changes in development within the unincorporated areas of the county and within the city limits of the City of Poplar Bluff that were addressed in Section 2. In reviewing the American Community Surveys the County had a minimal population increase of 159 persons from 2012 to 2015, the most recent population estimates available. The bulk of this increase occurred in the unincorporated areas of the county. There have been no areas annexed by the City of Fisk, Neelyville, Poplar Bluff or Qulin since the last plan update. Officials also report that there have been multifamily housing complexes constructed in the unincorporated areas around Poplar Bluff. North of Poplar Bluff has seen apartment complexes constructed. A low income housing complex has also been constructed just south of the Poplar Bluff city limits. There have been small subdivisions developed outside the city limits of the City of Poplar Bluff. However, these areas are adjacent to other, already existing residential neighborhoods.

This chapter is divided into four main parts:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and provides a factual basis for elimination of hazards from further consideration;
- **Section 3.2 Assets at Risk** provides the planning area's total exposure to natural hazards, considering critical facilities and other community assets at risk;
- **Section 3.3 Future Land Use and Development** discusses areas of planned future development
- **Section 3.4 Hazard Profiles and Vulnerability Analysis** provides more detailed information about the hazards impacting the planning area. For each hazard, there are three sections: 1) Hazard Profile provides a general description and discusses the threat to the planning area, the geographic location at risk, potential severity/magnitude/extent,

previous occurrences of hazard events, probability of future occurrence, risk summary by jurisdiction, impact of future development on the risk; 2) Vulnerability Assessment further defines and quantifies populations, buildings, critical facilities, and other community/school or special district assets at risk to natural hazards; and 3) Problem Statement briefly summarizes the problem and develops possible solutions.

## 3.1 Hazard Identification

**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type...of all natural hazards that can affect the jurisdiction.**

The Butler County Hazard Mitigation Planning Committee has determined that this updated plan, as with past county plans, will address only natural hazards. Natural hazard has been defined by I. Burton, R. Kates, and G. White in *The Environment as Hazard*, as “those elements of the physical environment, harmful to man and caused by forces extraneous to him.” Consistent with this definition, war, chemical contamination, and other manmade phenomena are excluded from classification as natural hazards.

Natural hazards can take many forms (e.g. tornado, wildfire, flood, landslide, and earthquake). Happenings such as those listed above, which occur in a populated area are, according to the Organization of American States, referred to as hazardous events. It is not until significant property damage and loss of life result from a natural hazard that the phenomena can legitimately be classified as a natural disaster.

### 3.1.1 Review of Existing Mitigation Plans

The planning committee reviewed the hazards identified in the 2012 Butler County Hazard Mitigation Plan. In the 2012 plan there were ten natural hazards that were identified:

- Tornado
- Floods
- Severe Winter Weather
- Drought
- Heat Wave
- Earthquake
- Dam Failure
- Levee Failure
- Wildfire
- Land Subsidence/Sinkholes

The planning committee reviewed these hazards and compared them to the known historical hazards that have impacted jurisdictions in Butler County. After this review the committee added the hazard of thunderstorm/high winds/lightning/hail to the above list. The committee then decided to order the hazards alphabetically for a cleaner presentation in this updated version of the hazard mitigation plan. The MPC also chose to add the natural hazard of

Thunderstorms/High Winds/Lightning/Hail to the plan. The updated plan will review and analyze the following natural hazards in the order listed below:

- Dam Failure
- Drought
- Earthquakes
- Extreme Heat
- Fires
- Flooding
- Land Subsidence/Sinkholes
- Levee Failure
- Thunderstorm/High Winds/Lightning/Hail
- Tornado
- Winter Weather/Snow/Ice/Severe Cold

All of the above listed phenomena have either occurred within Butler County at some point in time, or could occur given the geography and other environmental conditions which exist within the county. Some of the above hazards are more likely to occur in this area, while some are less likely. In the pages that follow, each hazard will be described, its history of occurrence in Ripley County examined, and its probability of reoccurrence assessed.

Due to the location and geography of Butler County, the occurrence of certain natural hazards, which may take place elsewhere in the world, is virtually impossible. The following list contains natural hazards, which have been determined to be insignificant threats within Butler County:

- Hurricane and other Tropical Storm-related phenomena
- Tsunami
- Volcano and other volcanic-related phenomena
- Arid and Semi-Arid-related phenomena

Hurricanes, tropical storms, and tsunamis do not occur in or near Butler County due to its central location within North America. Furthermore, the geologic and soil structure found in Butler County does not encourage volcanic activity. Because of this, there are no volcanoes within or near the county. Finally, arid and semi-arid-related phenomena do not occur in Butler County due to its climate and geology.

The planning committee discussed including man-made hazards in the Butler County Plan. However, as only natural hazards are required by FEMA regulations the committee finally decided to only include natural hazards.

### **3.1.2 Review Disaster Declaration History**

The federal government may, at times, issue disaster declarations. These declarations are made when the severity and magnitude of an event surpasses the ability of the local government to respond and recover without assistance. The first step in the declaration

process is that a state may issue a disaster declaration that would allow for the provision of assistance to the local jurisdictions from the state government. If the disaster is so severe that that both the local and state governments' capacities are surpassed, a federal emergency or disaster may be declared, allowing for assistance to be provided to local jurisdictions from the federal government.

The Stafford Act provides for two types of disaster declarations: emergency declarations and major disaster declarations. All declarations discussed within this plan are emergency declarations. The emergency declarations authorize the President to provide supplemental disaster assistance. A major disaster declaration provides for a wide range of federal assistance programs for individuals and public infrastructure for both emergency and permanent repairs.

Individual assistance includes assistance to individuals and households for things such as crisis counseling, case management, unemployment assistance, legal services and supplemental nutrition assistance program. Public assistance provides assistance to states, tribes and local governments for things such as debris removal, emergency protective measures, roads and bridges, water control facilities, buildings and equipment, utilities, and park, recreational, and other facilities.

FEMA also issues emergency declarations, which are more limited in scope and do not include the long-term federal recovery programs of major disaster declarations. Determinations for declaration type are based on scale and type of damages and institutions or industrial sectors affected.

The following table (**Table 3.1**) is a list of all federal disaster declarations issued from 1990-2016 that covered Butler County. The table lists the disaster number, a short description, the date of the declaration, the period of the incident, and the amounts of Individual Assistance (IA) and Public Assistance (PA)

**Table 3.1 FEMA Disaster Declarations that included Butler County, Missouri, 1990-August 2017**

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)
DR-1006	Severe storms, tornadoes & flooding	12/01/1993 11/13/1993-11/19-1993	Unknown
DR-1412	Severe storms & tornadoes	05/06/2002 04/24/2002-06/10/2002	IA: \$0 PA: \$35,299,777.93
DR-1749	Severe storms & flooding	03/19/2008 03/17/2008-05/09/2008	IA: \$13,924,227.09 PA: \$26,045,574.54
DR-1809	Severe storms, flooding & tornadoes	11/13/2008 09/11/2008-09/24/2008	IA: \$6,869,983.55 PA: \$8,529,243.13

DR-1822	Severe Winter Storm	02/17/2009 01/26/2009-01/28/2009	IA: \$0 PA: \$135,849,619.02
DR-1847	Severe storms, tornadoes & flooding	06/19/2009 05/08/2009-05/16/2009	IA: \$5,417,824.37 PA: \$27,072,334.75
DR-1980	Severe storms, tornadoes & flooding	05/09/2011 04/19/2011-06/06/2011	IA: \$37,115,639.63 PA: \$173,882,613.78
DR-4317	Severe Storms, Tornadoes, Straight-line winds and Flooding	06/02/2017 04/28/2017-05/11/2017	IA: \$11,985,910.15 PA: \$63,777.78

Source: Federal Emergency Management Agency <http://www.fema.gov/disasters><http://www.fema.gov/disasters>

### 3.1.3 Research Additional Sources

A number of sources were utilized for research during the development of this plan. Data sources used for this plan are includes the following:

- Missouri Hazard Mitigation Plans (2010 and 2013)
- 2012 Butler County Natural Hazard Mitigation Plan
- Federal Emergency Management Agency (FEMA)
- Missouri Department of Natural Resources (MDNR)
- National Drought Mitigation Center Drought Reporter
- US Department of Agriculture’s (USDA) Risk Management Agency Crop Insurance Statistics
- National Agricultural Statistics Service (Agricultural production/losses)
- Data Collection Questionnaires completed by each jurisdiction
- State of Missouri GIS data
- Environmental Protection Agency
- Flood Insurance Administration
- Hazards US (HAZUS)
- Missouri Department of Transportation
- Missouri Division of Fire Marshal Safety
- Missouri Public Service Commission
- National Fire Incident Reporting System (NFIRS)
- National Oceanic and Atmospheric Administration’s (NOAA) National Climatic Data Center (NCDC);
- Pipeline and Hazardous Materials Safety Administration
- County Emergency Management
- County Flood Insurance Rate Map, FEMA
- Flood Insurance Study, FEMA
- SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin
- U.S. Army Corps of Engineers
- U.S. Department of Transportation
- United States Geological Survey (USGS)
- Various articles and publications available on the internet that will be cited in the body of the plan

The only centralized source of data for many of the weather-related hazards is the National

Oceanic and Atmospheric Administration's (NOAA) National Climatic Data Center (NCDC). Although it is usually the best and most current source, there are limitations to the data. The NCDC documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in the NCDC may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS.

The NCDC damage amounts are estimates received from a variety of sources, including those listed above in the Data Sources section. For damage amounts, the NWS makes a best guess using all available data at the time of the publication. Property and crop damage figures should be considered as a broad estimate. Damages reported are in dollar values as they existed at the time of the storm event. They do not represent current dollar values.

The database currently contains data from January 1950 to March 2017, as entered by the NWS. Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures.

1. Tornado: From 1950 through 1954, only tornado events were recorded.
2. Tornado, Thunderstorm Wind and Hail: From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.
3. All Event Types (48 from Directive 10-1605): From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

Injuries and deaths caused by a storm event are reported on an area-wide basis. When reviewing a table resulting from an NCDC search by county, the death or injury listed in connection with that county search did not necessarily occur in that county. When local information is available, the information regarding the numbers of injuries and deaths are listed specifically for Butler County.

### 3.1.4 Hazards Identified

Not all of the hazards included in this plan impact the entire planning in the same manner. For instance, dam failure will only affect the areas below the dam in the inundation area if the dam were to fail. The City of Doniphan is not in the inundation area of a dam; therefore, dam failure would not impact the City of Doniphan. Some hazards do have the potential to impact the entire planning area. For example, winter weather will impact the entire planning area, the county, all cities and school districts will be impacted when severe winter weather strikes the county. The table below lists each jurisdiction and each hazard. The "x" indicates that the hazard has the potential to impact a jurisdiction whereas the "-" indicates the hazard is not applicable to the jurisdiction.

**Table 3.2 Hazards Identified for Each Jurisdiction**

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Heat	Wildfires	Flooding (River and Flash)	Land Subsidence/Sinkholes	Levee Failure	Thunderstorm/Lightning/Hail High Wind	Tornado	Severe Winter Weather
Butler County	X	X	x	X	x	X	X	X	X	X	X
City of Fisk	X	X	x	X	X	X	X	X	X	X	X
City of Neelyville	-	X	x	X	x	X	X	-	X	X	X
City of Poplar Bluff	X	X	X	X	X	X	X	X	X	X	X
City of Qulin	-	X	X	X	X	X	X	X	X	X	X
Poplar Bluff R-I School District	-	-	X	-	-	X	X	-	X	X	X
Twin Rivers R-X School District	-	-	X	-	-	X	X	-	X	X	X
Neelyville R-I School District	-	*	X	-	-	X	X	-	X	X	X
Three Rivers Community College	-	-	x	-	-	X	X	-	X	X	X

### 3.1.5 Multi-Jurisdictional Risk Assessment

Following is a multi-jurisdictional hazard profile for Butler County, Missouri and all jurisdictions within the boundaries of Butler County. The data used to compile this assessment can be found throughout the body of Section 3 as well as the tables included in this section. This plan is an update of the Butler County Natural Hazard Mitigation Plan approved in 2012. The data and information included reflect changes and updates since that time.

Each of the hazards has a profile that includes an assessment of the risks to the local jurisdictions. Some hazards, like flooding, vary in risk across the planning area. These variations in risk are discussed in the profile of each hazard.

Butler County is fairly uniform in terms of climate; temperatures and precipitation are relatively consistent throughout the county. There are some variations in topography across the county. The southeastern corner of the county is lowlands that are used for row crop farming such as soybeans, rice, and corn. As you travel west across the county the terrain changes to the foothills of the Ozark Mountains and large areas of the Mark Twain National Forest. These differences in topography and land use lead to a difference in assets such as the agricultural assets of crops in the southeast to the livestock assets that can be found as you travel west in the county. These differences and the impact of hazards will be discussed in more detail throughout the hazard profiles.

Butler County is sparsely populated with only four incorporated places, the City of Fisk, City of

Neelyville, the City of Poplar Bluff and the City of Qulin. Outside of these incorporated cities, there are a few small, unincorporated communities such as Broseley, Harviell, Fagus, and Rombauer. Throughout the county the types of buildings are relatively consistent. Residential structures are mainly comprised of wooden structures with also a large number of mobile homes scattered throughout the county. The vulnerability of these areas will be discussed in more detail with each hazard profile.

In addition to these differences there are other variations across the county that will be discussed in greater detail throughout the hazard profiles. One of these differences is the locations of dams that can impact certain areas, flooding that will impacts different areas of the county in different ways, and sinkholes that are mainly only present on the western side of the county.

## 3.2 Assets at Risk

This section assesses the planning area population, structures, critical facilities and infrastructure, and other important assets that may be at risk to hazards. There have been limited changes to the planning areas since the approval of the 2012 Butler County plan. Although there has been a slight population growth of 159 persons, much of this growth was seen scattered throughout the unincorporated county and not concentrated in a specific area.

### 3.2.1 Total Exposure of Population and Structures

#### Unincorporated Butler County and Incorporated Cities

In the following three tables, population data is based on 2010 Census Bureau data. Building counts and building exposure values are based on parcel data provided by the State of Missouri Geographic Information Systems (GIS) database which can be found at the following website, [http://sema.dps.mo.gov/programs/mitigation\\_management.php](http://sema.dps.mo.gov/programs/mitigation_management.php). Contents exposure values were calculated by factoring a multiplier to the building exposure values based on usage type. The multipliers were derived from the HAZUS MH 2.1 and are defined below in **Table 3.3**. Land values have been purposely excluded from consideration because land remains following disasters, and subsequent market devaluations are frequently short term and difficult to quantify. Another reason for excluding land values is that state and federal disaster assistance programs generally do not address loss of land (other than crop insurance). It should be noted that the total valuation of buildings is based on Butler County Assessors' data which may not be current. In addition, government-owned properties are usually taxed differently or not at all, and so may not be an accurate representation of true value. Note that public school district assets and special districts assets are included in the total exposure tables assets by community and county.

**Table 3.3** shows the total population, building count, estimated value of buildings, estimated value of contents and estimated total exposure to parcels for the unincorporated Butler County and each incorporated city. For multi-county communities, the population and

building data may include data on assets located outside the planning area. **Table 3.4** that follows provides the building value exposures for Butler County and each city in the planning area broken down by usage type. Finally, **Table 3.5** provides the building count total for Butler County and each city in the planning area broken out by building usage types (residential, commercial, industrial, and agricultural).

**Table 3.3 Maximum Population and Building Exposure by Jurisdiction-**

Jurisdiction	2010 Population	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
City of Fisk	342	191	27,100	17,128.50	44,228.50
City of Neelyville	483	227	37,864	23,902	61,766
City of Poplar Bluff	17,023	8,500	1,326,173	848,748	2,174,921
City of Quin	458	259	36,307	22,969	59,276
Unincorporated Butler County	24,488	11,716	1,934,381	1,220,796	3,155,177
<b>Totals</b>	<b>42,794</b>	<b>20,893</b>	<b>3,379,825</b>	<b>1,220,796</b>	<b>4,600,621</b>

Sources: Population, 2010 U.S. Census; Building Count and Building Exposure, Missouri GIS Database: [http://sema.dps.mo.gov/programs/mitigation\\_management.php](http://sema.dps.mo.gov/programs/mitigation_management.php); Contents Exposure derived by applying multiplier to Building Exposure based on HAZUS MH 2.1 standard contents multipliers per usage type as follows: Residential (50%), Commercial (100%), Industrial (150%), Agricultural (100%). For purposes of these calculations, government, school, and utility were calculated at the commercial contents rate.  
 \*\$ values listed are in thousands

**Table 3.4 Building Values/Exposure by Usage Type**

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Total
City of Fisk	20,838	5,160	895	207	27,100
City of Neelyville	29,174	7,150	1,250	290	37,864
City of Poplar Bluff	1,035,943	253,590	44,370	10,270	1,326,173
City of Quin	27,871	6,725	1,195	516	36,307
Unincorporated Butler County	1,491,010	364,999	63,841	14,531	1,934,381
<b>Totals</b>	<b>2,604,836</b>	<b>637,624</b>	<b>111,551</b>	<b>25,814</b>	<b>3,379,825</b>

Source: Missouri GIS Database, [http://sema.dps.mo.gov/programs/mitigation\\_management.php](http://sema.dps.mo.gov/programs/mitigation_management.php);  
 \*All \$ values listed are in thousands

**Table 3.5 Building Counts by Usage Type**

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Total
City of Fisk	180	7	2	2	191
City of Neelyville	213	10	2	2	227
City of Poplar Bluff	8,038	346	81	35	8,500
City of Quin	244	9	2	4	259

Unincorporated Butler County	11,034	499	110	73	11,716
<b>Totals</b>	<b>19,709</b>	<b>871</b>	<b>197</b>	<b>116</b>	<b>20,893</b>

Source: Missouri GIS Database, [http://sema.dps.mo.gov/programs/mitigation\\_management.php](http://sema.dps.mo.gov/programs/mitigation_management.php); Public School Districts and Special Districts

Even though schools and special districts' total assets are included in the tables above, the following tables are based on the data that is available from the districts' completion of the Data Collection Questionnaire and district maintained websites. The number of enrolled students at the participating public school districts is provided in **Table 3.6** below. Additional information includes the number of buildings, building values (building exposure) and contents value (contents exposure). These numbers will represent the total enrollment and building count for the public school districts regardless of the county in which they are located.

**Table 3.6 Population and Building Exposure by Jurisdiction-Public School Districts**

Public School District	Enrollment	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Poplar Bluff R-I School District	5,399	68	99,532,367	21,946,670	121,479,037
Twin Rivers R-X School District	952	21	24,867,844	3,868,679	28,736,523
Neelyville R-IV School District	606	Unknown	Unknown	Unknown	Unknown

Source: <http://mcids.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx>, and Data Collection Questionnaires from Public School Districts.

## 3.2.2 Critical and Essential Facilities and Infrastructure

This section will include information from the Data Collection Questionnaire and other sources concerning the vulnerability of participating jurisdictions' critical, essential, high potential loss, and transportation/lifeline facilities to identified hazards. Definitions of each of these types of facilities are provided below:

- **Critical Facility:** Those facilities essential in providing utility or direction either during the response to an emergency or during the recovery operation.
- **Essential Facility:** Those facilities that if damaged, would have devastating impacts on disaster response and/or recovery.
- **High Potential Loss Facilities:** Those facilities that would have a high loss or impact on the community.
- **Transportation and lifeline facilities:** Those facilities and infrastructure critical to transportation, communications, and necessary utilities.

**Table 3.7** includes a summary of the inventory of critical and essential facilities and infrastructure in the planning area. The list was compiled from the Data Collection Questionnaire as well as the following sources:

- Poplar Bluff Area Chamber of Commerce
- Discussion with members of the Mitigation Planning Committee
- City Clerks

- Chemical Facilities (Tier II Facilities) information (if included in the list of hazards identified by the participants) can be obtained by contacting the county LEPC. The LEPC will then request information (name, address, purpose for asking, etc.) and then provide the information. In order to find out who the LEPC contact is for your planning areas, see <http://sema.dps.mo.gov/docs/programs/executive/MERC/LEPC-addresses.pdf>.
- HAZUS contains an inventory of critical facilities that can be exported for each jurisdiction.
- The Homeland Security Infrastructure Protection Program (HSIPP) is another source.

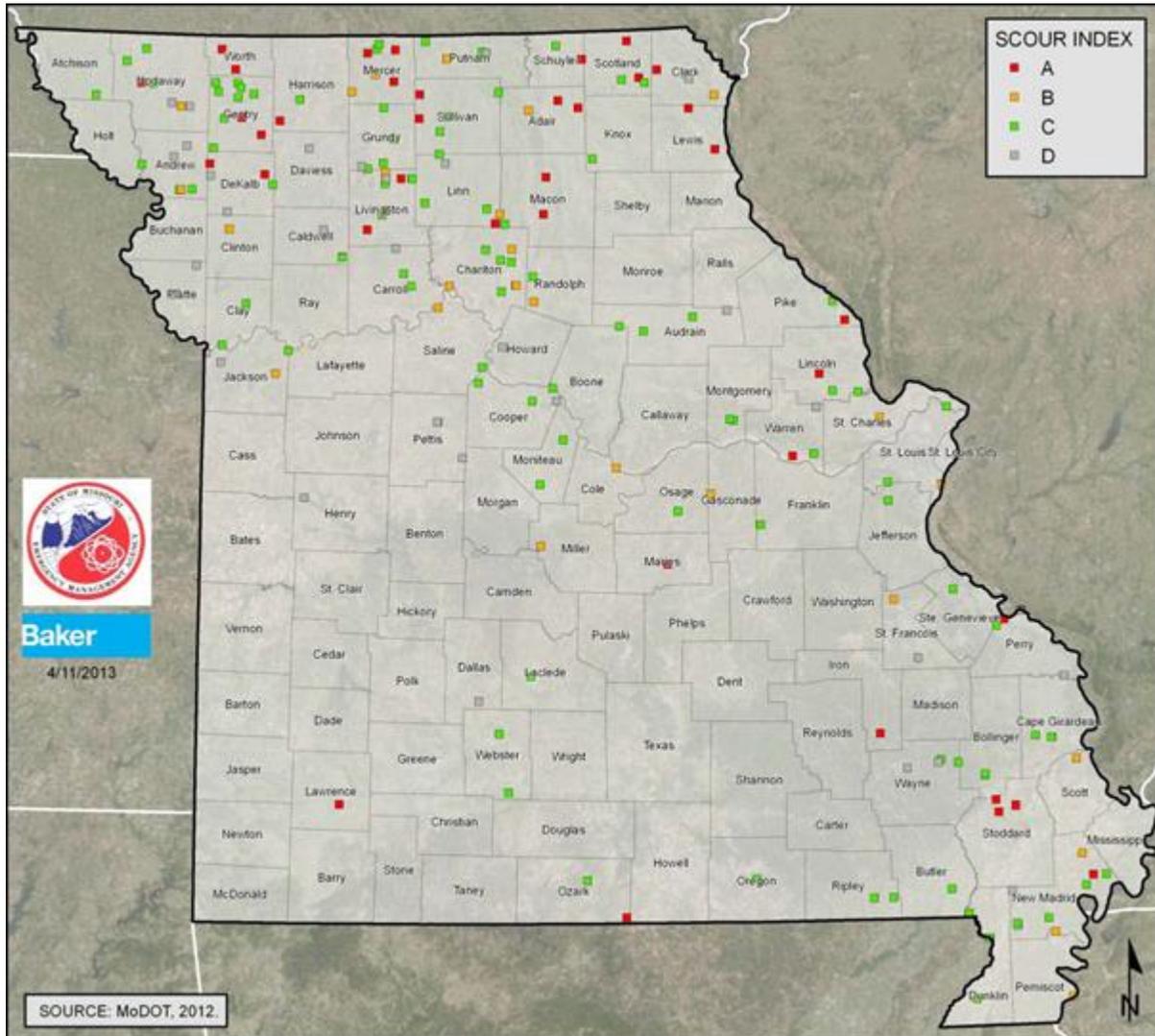
**Table 3.7 Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction**

Jurisdiction	Airport Facility	Bus Facility	Childcare Facility	Communications Tower	Electric Power Facility	Emergency Operations	Fire Service	Government	Housing	Shelters	Highway Bridge	Hospital/Health Care	Military	Natural Gas Facility	Nursing Homes	Police Station	Potable Water Facility	Rail	Sanitary Pump Stations	School Facilities	Stormwater Pump Stations	Tier II Chemical Facility	Wastewater Facility	Total
City of Fisk	0	0	0		0	0	1	1	0	0	0	0	0	0	0	0	1	1	1	1	0	0	1	7
City of Neelyville	0	0	1		0	0	1	1	0	0	0	1	0	0	0	1	1	0	1	1	0	0	1	9
City of Poplar Bluff	1	1	8		1	1	3	7	5	2	2	4	1	1	4	1	1	1	1	9	1	0	1	56
City of Quin	0	0	0		0	0	1	1	1	0	0	0	0	0	0	1	1	0	1	2	0	0	1	9
Butler County	0	0	4		14	1	4	3	1	0	4	0	0	1	2	1	3	0	2	1	0	0	2	43
<b>Totals</b>	<b>1</b>	<b>1</b>	<b>13</b>		<b>15</b>	<b>2</b>	<b>10</b>	<b>13</b>	<b>7</b>	<b>2</b>	<b>6</b>	<b>5</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>7</b>	<b>2</b>	<b>6</b>	<b>14</b>	<b>1</b>	<b>0</b>	<b>6</b>	<b>124</b>

Source: Data Collection Questionnaires; HAZUS, etc.

According to the National Bridge Inventory there are 239 bridges located within Butler County. Of these 239 bridges, 28 have been identified as structurally deficient and 15 are functionally obsolete. Included in this total number of bridges is one bridge that is scour critical. This scour critical bridge is both located on Missouri Highway 53 over Drainage Ditch #1, southeast of Poplar Bluff. A scour critical bridge is defined as a bridge that is susceptible to scouring, or the removal of sediments, such as sand and rocks from around bridge abutments or piers by swiftly moving water. The Missouri Department of Transportation uses a classification system of A-D to indicate the potential for scour. Those bridges in the "A" class are those that are most vulnerable and those in the "D" class are the least vulnerable to scour. As can be seen in the map below, the two scour bridges located in Butler County are rated as "C".

Figure 3.1 Butler County Scour Critical Bridges



Source: Missouri State Hazard Mitigation Plan - 2013

### 3.2.3 Other Assets

Assessing the vulnerability of the planning area to disaster also requires data on the natural, historic, cultural, and economic assets of the area. This information is important for many reasons.

- These types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- Knowing about these resources in advance allows for consideration immediately following a hazard event, which is when the potential for damages is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.

- The presence of natural resources can reduce the impacts of future natural hazards, such as wetlands and riparian habitats which help absorb floodwaters.
- Losses to economic assets like these (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

Threatened and Endangered Species: **Table 3.8 lists** Federally Threatened, Endangered, Proposed and Candidate Species in Butler County.

**Table 3.8 Threatened and Endangered Species in Butler County**

Common Name	Scientific Name	Status
Indiana Bat	<i>Myotis sodalists</i>	Endangered
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened
Curtis' pearlymussel	<i>Epioblasma florentina curtisi</i>	Endangered
Pink mucket	<i>Lampsilis abrupta</i>	Endangered
Rabbitsfoot	<i>Quadrula cylindrica cylindrica</i>	Endangered
Pondberry	<i>Lindera milissifolium</i>	Endangered

Source: U.S. Fish and Wildlife Service, <http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html>

Natural Resources: The Missouri Department of Conservation (MDC) provides a database of lands the MDC owns, leases, or manages for public use. **Table 3.9** provides the names and locations of conservation areas and **Table 3.10** provides the names of parks in the planning area.

**Table 3.9 Conservation Areas in Butler County**

Area Name	Address	City
Allred Lake NA	Butler County Road 2601	Neelyville
Big Cane CA	Butler County Road 276	Neelyville
Coon Island CA	Butler County Road 244	Poplar Bluff
Dan River Access	Butler County Road 611	Poplar Bluff
Fisk Access	Highway 51	Fisk
Harviell Access	Butler County Road 321	Poplar Bluff
Hilliard Access	Route W	Poplar Bluff
James Clark Access	County Road 579	Fisk
Mark Twain NF (Hendrickson Access)	Highway 67	Poplar Bluff
Otter Slough CA	Stoddard County Road 675	Fisk
Poplar Bluff (Sportsman's Park Access)	Highway 60	Poplar Bluff
Poplar Bluff CA	Butler County Road 544	Poplar Bluff
Ringo Ford Access	Highway 160	Neelyville
Sun (Stephen J) CA	Butler County Road 544	Poplar Bluff
University Forest CA	Route W	Poplar Bluff
Wilhelmina CA	Route DD	Quilin

<http://mdc4.mdc.mo.gov/applications/moatlas/AreaList.aspx?txtUserID=quest&txtAreaNm=s>

Park Name	Address	City
Fisk City Park	Garfield Street	Fisk
Kramer Memorial Park	Park Street	Neelyville
Bacon Park	Highland Drive	Poplar Bluff
Hendrickson Park	Davis Street	Poplar Bluff
Mini Rotary Park	Apple Street	Poplar Bluff
Hillcrest Park	2 <sup>nd</sup> Street	Poplar Bluff
Link Street	D Street	Poplar Bluff
Black River Park	Barnhart Road	Poplar Bluff
Ray Clinton Park	Park Avenue	Poplar Bluff
Whiteley Park	Highway 53	Poplar Bluff
Ozark Ridge Public Golf Course	Cravens Road	Poplar Bluff
Qulin Lions Park	5 <sup>th</sup> Street	Qulin

Source: Poplar Bluff Chamber of Commerce, Visitors Guide

**Historic Resources:** The National Register of Historic Places is the official list of registered cultural resources worthy of preservation. It was authorized under the National Historic Preservation Act of 1966 as part of a national program. The purpose of the program is to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures and objects that are significant in American history, architecture, archeology, engineering, and culture. The following table lists all properties in Butler County that are on the National Register of Historic Places in (Table 3.10).

**Table 3.10 Butler County Properties on the National Register of Historic Places**

Property	Address	City	Date Listed
Butler County Courthouse	100 North Main Street	Poplar Bluff	1994
Greer, Alfred W., House	955 Kinzer	Poplar Bluff	1998
Hargrove Pivot Bridge	CR 159	Poplar Bluff	1985
Koehler Fortified Archeological Site	Address Restricted	Naylor	1970
Little Black River Archeological District	Address Restricted	Naylor	1975
Mark Twain School	1012 N. Main Street	Poplar Bluff	1998
J. Herbert Moore House	445 N. Eleventh St	Poplar Bluff	1998
Thomas Moore House	435 Lester St	Poplar Bluff	1998
Moore-Dalton House	421 N Main St	Poplar Bluff	1994
North Main Street Historic District	400 Block of North Main St	Poplar Bluff	2011
John Archibald Phillips House	522 Cherry St	Poplar Bluff	1998
Poplar Bluff Commercial Historic Dist	Downtown Poplar Bluff	Poplar Bluff	1994
Poplar Bluff Public Library	3118 North Main Street	Poplar Bluff	1994

Rodgers Theatre Building	North Broadway	Poplar Bluff	2001
South 6 <sup>th</sup> Street Historic District	205-225-303 South 6 <sup>th</sup> Street	Poplar Bluff	1998
St. Louis, Iron Mountain Southern RR Depot	400 S. Main Street	Poplar Bluff	1994
St Louis-San Francisco Railroad Depot	303 Moran Street	Poplar Bluff	1994
Wheatley Public School	921 Garfield Street	Poplar Bluff	1998
Wilborn-Steinberg Site	Address restricted	Neelyville	1972
Williams-Gierth House	848 Vine Street	Poplar Bluff	2012
Williamson-Kennedy School	614 Lindsay Street	Poplar Bluff	1998
Wright-Dalton-Bell-anchor Department Store Building	201-205 South Main	Poplar Bluff	2006

Source: Missouri Department of natural Resources – Missouri National Register Listings by County  
<http://dnr.mo.gov/shpo/mnrlist.htm>

**Economic Resources:** Below is a table showing major non-government employers in the planning area (**Table 3.11**).

**Table 3.11 Major Non-Government Employers in Butler County**

Employer Name	Main Locations	Product or Service	Employees
Poplar Bluff Regional Medical Center	Poplar Bluff	Healthcare	1300
Briggs and Stratton Corp	Poplar Bluff	Manufacturing	1050
Poplar Bluff RI School District	Poplar Bluff	Education	720
VA Medical Center	Poplar Bluff	Healthcare	580
Gates Corporation	Poplar Bluff	Manufacturing	550
WalMart Supercenter	Poplar Bluff	Retail	456

Source: Greater Poplar Bluff Area Chamber of Commerce

### Agriculture

Agriculture plays an important role in the economy of Butler County. This is more true on the eastern side of the county that is flat, fertile soil used for row crop farming. As you move west across the county in the foothills of the Ozark Mountains the terrain becomes less conducive to row crop farming and more livestock is found. According to the United States Department of Agriculture 2012 Census of Agriculture, there are 509 farms in Butler County and 234,110 acres of land in farms. The market value of the agricultural products sold that were produced in Butler County in 2012 was \$126,328,000, 97% of that was crop sales and 3% was livestock sales. The table below, **Table 3.12**, provides an overview of agriculture employment in Butler County.

**Table 3.12 Agriculture-Related Jobs in Butler County**

Hired Farm Labor	2012
Farms	175

Workers	645
Payroll (\$1000)	5,880
Unpaid workers	
Farms	185
Workers	371

Source: USDA 2012 Census of Agriculture

### 3.3 Future Land Use and Development

Between 2000 and 2010, the United States Census reports that Butler County grew by 4.5% in population or 1,927 persons. By reviewing the growth of the four incorporated cities of Fisk, Neelyville, Poplar Bluff, and Qulin with growth in the unincorporated areas of the County it can be seen that the majority of the growth has come in the unincorporated areas. The table below, **Table 3.13** provides the breakdown of this growth.

**Table 3.13 County Population Growth, 2000-2010**

Jurisdiction	Total Population 2010	Total population 2000	2000-2010 # Change	2000-2010 % Change
Butler County – Total population	42,794	40,867	1,927	4.5%
City of Fisk	342	363	-21	-6%
City of Neelyville	483	487	-4	-8%
City of Poplar Bluff	17,023	16,651	372	2.1%
City of Qulin	458	467	-9	-1.9%
Unincorporated Areas of Butler County	24,488	22,899	1,589	6.5%

Source: U.S. Bureau of the Census, Decennial Census

The population growth illustrated in the table above has led to a growth in the number of housing units in the county. **Table 3.14** provides the change in numbers of housing units in the planning area from 2000 to 2010.

**Table 3.14 Change in Housing Units, 2000-2010**

Jurisdiction	Housing Units 2010	Housing Units 2000	2000-2010 # Change	2000-2010 % Change
Butler County	19,731	18,707	1,024	5.2%

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City of Fisk	163	189	-26	-15.9%
City of Neelyville	213	215	-2	-0.9%
City of Poplar Bluff	8,038	7,871	167	2.1%
City of Qulin	244	232	12	4.9%

Source: U.S. Bureau of the Census, Decennial Census; Population Statistics are for entire incorporated areas as reported by the U.S. Census Bureau

According to the American Community Survey 2015 estimates Butler County population increased by 157 persons or 0.3% from 2010-2015. In reviewing further data regarding this increase from 2010-2015, a portion is a result of natural increase which is defined as births minus deaths. Butler County had 69 more births than deaths between 2010 and 2015. A second component of the population decline is net migration which is the difference between the number of people that moved out of the County compared to the number of people that moved into the county. During this five year time period, the net migration for Butler County was reported as 88 persons.

As is demonstrated in the growth of the county and the bulk of the population living in the unincorporated areas of the county, most future residential development will be seen in the unincorporated areas, primarily surrounding the City of Poplar Bluff. Future commercial development will occur in the city limits of Poplar Bluff. The majority of residential development will be seen in small subdivisions scattered throughout the County. Most of this development is seen in close proximity to city limits of the City of Poplar Bluff, primarily to the west and north. The City of Poplar Bluff is the regional hub for employment, shopping and medical care, this has attracted residents to reside near the city for convenience and shorter commutes.

### ***City of Fisk***

In reviewing data provided above, it is evident that the City of Fisk has seen a decline in population from 2000 through 2010 of 21 individuals and another decline from 2010-2015 of 19 persons. The American Community Survey 2015 estimates reports the population at 464 residents. The City of Fisk has no plans for significant development in the foreseeable future. The City has no formal comprehensive plan and no organized planning and zoning board. The City is governed by a city council and mayor.

### ***City of Neelyville***

The City of Neelyville saw a slight decrease in population of 4 persons from 2000-2010, and then saw an increase in population of 46 persons from 2010-2015. There has been no annexation and no significant housing developments within the city. The City has no land use or zoning regulations. Neelyville is a small, farming community with a K-12 school district. There has been little new commercial development in Neelyville in recent years, and no future growth or development is anticipated.

### ***City of Poplar Bluff***

The City of Poplar Bluff saw an increase in population of 372 persons or 2.15 from 2000-2010. The City also saw another increase from 2010-2015 of 172 persons. The city has seen the development of some residential areas within the city limits and some new multifamily housing units within the city. The City anticipates continued residential growth at similar rates in the coming years. A new forty-eight unit low-income housing development is currently under construction within the city limits.

The City has a comprehensive plan that was adopted in 2008. The City is governed by a council who hires a city manager to oversee day-to-day operations. The city also employs a full-time planner who oversees the city’s planning and zoning ordinances.

**City of Qulin**

The City of Qulin saw a slight decrease in population of 9 persons from 2000-2010, and then saw another decrease in population of 12 persons from 2010-2015. There has been no annexation and no significant housing developments within the city. The City has no land use or zoning regulations. Qulin is a small, farming community. The City is currently partnering with the Qulin Nutrition Center to construct a new 5,000 square foot nutrition center and also recently partnered with the Qulin Volunteer Fire Department to construct a new fire station. There has been little new commercial development in Qulin in recent years other than the two new buildings mentioned above a new Dollar General Store, and no future growth or development is anticipated.

**School District’s Future Development**

The Poplar Bluff R-I School District completed in 2016 a large scale redevelopment project where some of their campuses were realigned and a large scale construction was conducted at their middle school and high school. A new FEMA funded tornado safe room was also constructed on their junior high school campus. The high school and middle school projects involved the renovations of existing buildings and construction of additions to existing buildings. All of the district’s elementary schools have had smaller scale construction projects to renovate and update their campuses. Following these projects, there are no significant development plans in the near future for the Poplar Bluff school district.

The Twin Rivers R-X School district has elementary campuses located in Fisk and Qulin with the high school located in the unincorporated community of Broseley. The district is planning on renovations and construction of a new building on their high school campus in Broseley. No other development plans are scheduled.

Three Rivers College is located in Poplar Bluff. Over the past few years TRC has seen large scale renovations. One building on campus has been completely remodeled, including some additions. A new building has been constructed on campus. A new sports complex that includes a new basketball arena is scheduled to be completed in 2018. There are other renovations occurring on campus that include new sidewalks. Once these renovations are completed, there are no major projects planned for the near future.

**Special District’s Future Development**

The special districts that are found in Butler County are four public water districts, Butler County Public Water Supply District (PWSD) #1, #2, and #3 and the Wayne Butler County PWSD #4 that serves customers in Butler and Wayne County. Table 3.15 below provides details on the districts.

**Table 3.15, Butler County Public Water Supply Districts**

Name	Population Served	Service Connections	Supply Capacity	Average Daily Consumption	Finished Water Storage
PWSD #1	9,500	3,826	2,901,000	900,000	990,000
PWSD #2	1,603	584	288,000	75,000	150,000

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PWSD #3	3,150	1,050	626,000	192,000	437,000
Wayne Butler PWSD #4	1,500	655	Unknown	285,000	200,000

Source: Missouri Department of Natural Resources, Census of Missouri Public Water Systems, 2015

### 3.4 Hazard Profiles, Vulnerability, and Problem Statements

Each hazard will be analyzed individually in a hazard profile. The profile will consist of a general hazard description, location, severity/magnitude/extent, previous events, future probability, a discussion of risk variations between jurisdictions, and how anticipated development could impact risk. At the end of each hazard profile will be a vulnerability assessment, followed by a summary problem statement.

#### Hazard Profiles

**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the...location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.**

Each hazard identified in Section 3.1.4 will be profiled individually in this section in alphabetical order. The level of information presented in the profiles will vary by hazard based on the information available. With each update of this plan, new information will be incorporated to provide better evaluation and prioritization of the hazards that affect the planning area. Detailed profiles for each of the identified hazards include information categorized as follows:

**Hazard Description:** This section consists of a general description of the hazard and the types of impacts it may have on a community or school/special district.

**Geographic Location:** This section describes the geographic location of the hazard in the planning area. Where available, use maps to indicate the specific locations of the planning area that are vulnerable to the subject hazard. For some hazards, the entire planning area is at risk.

**Severity/Magnitude/Extent:** This includes information about the severity, magnitude, and extent of a hazard. For some hazards, this is accomplished with description of a value on an established scientific scale or measurement system, such as an EF2 tornado on the Enhanced Fujita Scale. Severity, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the severity/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Severity/magnitude/extent defines the characteristics of the hazard regardless of the people and property it affects.

**Previous Occurrences:** This section includes available information on historic incidents and their impacts. Historic event records form a solid basis for probability calculations.

**Probability of Future Occurrence:** The frequency of recorded past events is used to estimate the likelihood of future occurrences. Probability was determined by dividing the number of recorded events by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. For events occurring more than once annually, the probability will be reported 100% in any given year, with a statement of the average number of events annually.

## **Vulnerability Assessments**

**Requirement §201.6(c)(2)(ii) :[The risk assessment shall include a] description of the jurisdiction’s vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.**

**Requirement §201.6(c)(2)(ii)(A) :The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.**

**Requirement §201.6(c)(2)(ii)(B) :[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.**

**Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the**

Following the hazard profile for each hazard will be the vulnerability assessment. The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to damages from natural hazards. The vulnerability assessments will be based on the best available county-level data, which is in the Missouri Hazard Mitigation Plan (2013). The county-level assessments in the State Plan were based on the following sources:

- Statewide GIS data sets compiled by state and federal agencies; and
- FEMA's HAZUS-MH loss estimation software.

The vulnerability assessments in the Butler County plan will also be based on:

- Written descriptions of assets and risks provided by participating jurisdictions;
- Existing plans and reports;
- Personal interviews with planning committee members and other stakeholders; and
- Other sources as cited.

Within the Vulnerability Assessment, the following sub-headings will be addressed:

### **Vulnerability Overview**

**Potential Losses to Existing Development:** (including types and numbers, of buildings, critical facilities, etc.)

**Future Development:** This section will include information on anticipated future development in the county, and how that would impact hazard risk in the planning area.

**Hazard Summary by Jurisdiction:** For hazard risks that vary by jurisdiction, this section will provide an overview of the variation and the factual basis for that variation.

### **Problem Statements**

Each hazard analysis must conclude with a brief summary of the problems created by the hazard in the planning area, and possible ways to resolve those problems. Include jurisdiction-specific information in those cases where the risk varies across the planning area.

### 3.4.1 Dam Failure

#### Hazard Profile

##### ***Hazard Description***

According to the *State of Missouri's Hazard Mitigation Plan*, the National Dam Safety Act defines a dam as an artificial barrier impounding and/or diverting water and having the following characteristics:

- 1) Height in excess of six feet and storage capacity of fifty acre-feet or more
- 2) Height at least twenty-five feet and storage capacity more than fifteen acre-feet

Typically, levees (either general or sewage) are not considered dams by definition.

Dams can be owned and overseen by either private residents or public institutions. The responsibility for the safe operation and regular maintenance of dams falls to the owner of the property. In some states, the State may regulate the construction, modification, maintenance, and operations of any dam. This is so because a State has “ultimate responsibility for public safety.” In Missouri, according to the Department of Natural Resources, the State regulates “all non-agricultural, non-federal dams more than thirty-five feet in height” and provides technical assistance and informational resources to all dam owners.

Dams fail for many reasons. The 2013 *State of Missouri's Hazard Mitigation Plan* cites four reasons as the most common. They are listed below.

1. Erosion – includes internal erosion caused by leakage and deterioration.
2. Piping – caused by inadequate spillway capacity.
3. Structural Failure – a result of faulty construction or seismic event.
4. Overtopping – inadequate spillway design, debris blockage of spillways, or settlement of the dam crest.

Most often these types of potential failures can be recognized during visual inspections. Such warning signs may include any of the following:

- animal burrows
- cracks in dam wall (both longitudinal and transverse)
- debris in spillway
- erosion
- scour in stilling basin
- sliding along dam wall
- seepage
- trees and brush on dam

A dam failure is considered to be either the partial or complete collapse of an impoundment, according to the *Butler County Emergency Operations Plan*. Should any of the above signs culminate into a dam failure, deadly and destructive flash flooding can occur downstream. Other conditions associated with dam failure may include intense rainfall, prolonged flood conditions, and earthquakes.

Naturally, those persons and structures most in danger as a result of a dam failure are those immediately downstream. Specifically, persons residing in the inundation area, as defined by the U.S. Army Corps of Engineers are at the greatest risk, according to the *Butler County Emergency Operations Plan*. The Missouri Department of Natural Resources classifies dams into three (3) classes described below in **Table 3.16**. The National Inventory of Dams also uses a three-tier rating system that is described in **Table 3.17**.

**Table 3.16 MDNR Dam Hazard Classification Definitions**

Hazard Class	Definition
Class I	The area downstream from the dam that would be affected by inundation contains ten (10) or more permanent dwellings or any public building. Inspection of these dams must occur every two years
Class II	The area downstream from the dam that would be affected by inundation contains one (1) to nine (9) permanent dwellings, or one (1) or more campgrounds with permanent water, sewer, and electrical services or one (1) or more industrial buildings. Inspection of these dams must occur every three years
Class III	Area downstream from the dam that would be affected by inundation does not contain any of the structures identified for Class I or Class II dams. Inspection of these dams must occur once every five years.

Source: Missouri Department of Natural Resources, [http://dnr.mo.gov/env/wrc/docs/rules\\_reg\\_94.pdf](http://dnr.mo.gov/env/wrc/docs/rules_reg_94.pdf)

**Table 3.17 NID Dam Hazard Classification Definitions**

Hazard Class	Definition
High Hazard	Loss of one human life is likely if the dam fails
Significant Hazard	Possible loss of human life and likely significant property or environmental destruction
Low Hazard	Equal or exceed 25 feet in height and which exceed 15 acre-feet in storage, or Equal or exceed 50 acre-feet and exceed 6 feet in height

Source: National Inventory of Dams

**Geographic Location**

Dams in Planning Area

There are twenty-seven (27) dam locations within Butler County according to the Missouri Department of Natural Resources and the National Inventory of Dams. None of these 27 dams are regulated dams. One of the dams has been identified as Class I as defined by the Missouri Department of Natural Resources, eight (8) classified as Class 2 and eighteen (18) classified as Class 3. **Table 3.18** provides a listing of all regulated dams in the Butler County along with the height of the dam, the drainage area of the dam, and the area of the dam.

**Table 3.18 High Hazard Dams in the Butler County Planning Area**

Dam Name	Emergency Action Plan (EAP)AP	Dam Height (Ft)	Lake Area (Acre)	Drainage Area (acres)	River	Hazard Class	NID Class
Beaver Lake Dam	No	23	14	290	Ten Mile Creek	3	Low
Carlton Lake Dam	No	30	8	105		3	Low
Chamberlain Lake Dam	No	19	10	245	Pike Creek	3	Low
Crum Lake Dam	No	30	7	380	Mud Creek	3	Low
East Twin Pond	No	11	1	0		-	-
Elston Dam	No	15	10	190	Bluewater Creek	3	Low
Garver Lake Dam	No	25	9	700	Bluewater Creek	3	Low
WL and Mary Hays dam-North	No	13	60	12	Indian Creek	3	Low

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WL and Mary Hays Dam-South	No	14	12	120	Indian Creek	3	Low
Hewlett Lake Dam	No	25	3	35	Pike Creek	2	High
Holloway Lake Dam	No	15	15	130	Black River	3	Low
Karl's Lake Dam-Lower	No	25	8	940	Cane Creek	3	Low
Kelley Lake Dam	No	25	8	140	Black Creek	2	High
Lake Christine Dam	No	22	15	60	Cane Creek	3	Low
Lake Lockloma Dam	No	15	26	160	Black River	2	High
Lake Shore Acres Dam	No	20	8	610	Pike Creek	2	High
Maple Ridge Dam	No	15	20	-	Black River	3	Low
Mason Memorial Dam	No	28	12	150	Aldridge Creek	2	High
Mononame 667	No	15	2	32		3	-
Mononame 646	No	10	2	90		3	-
Oak Brier Estates Dam	No	27	7	64	West Prong Indian Creek	3	High
Piney Pond	No	12	1	0		-	-
Resnik Lake Dam	No	20	8	30	Dolly Branch	2	High

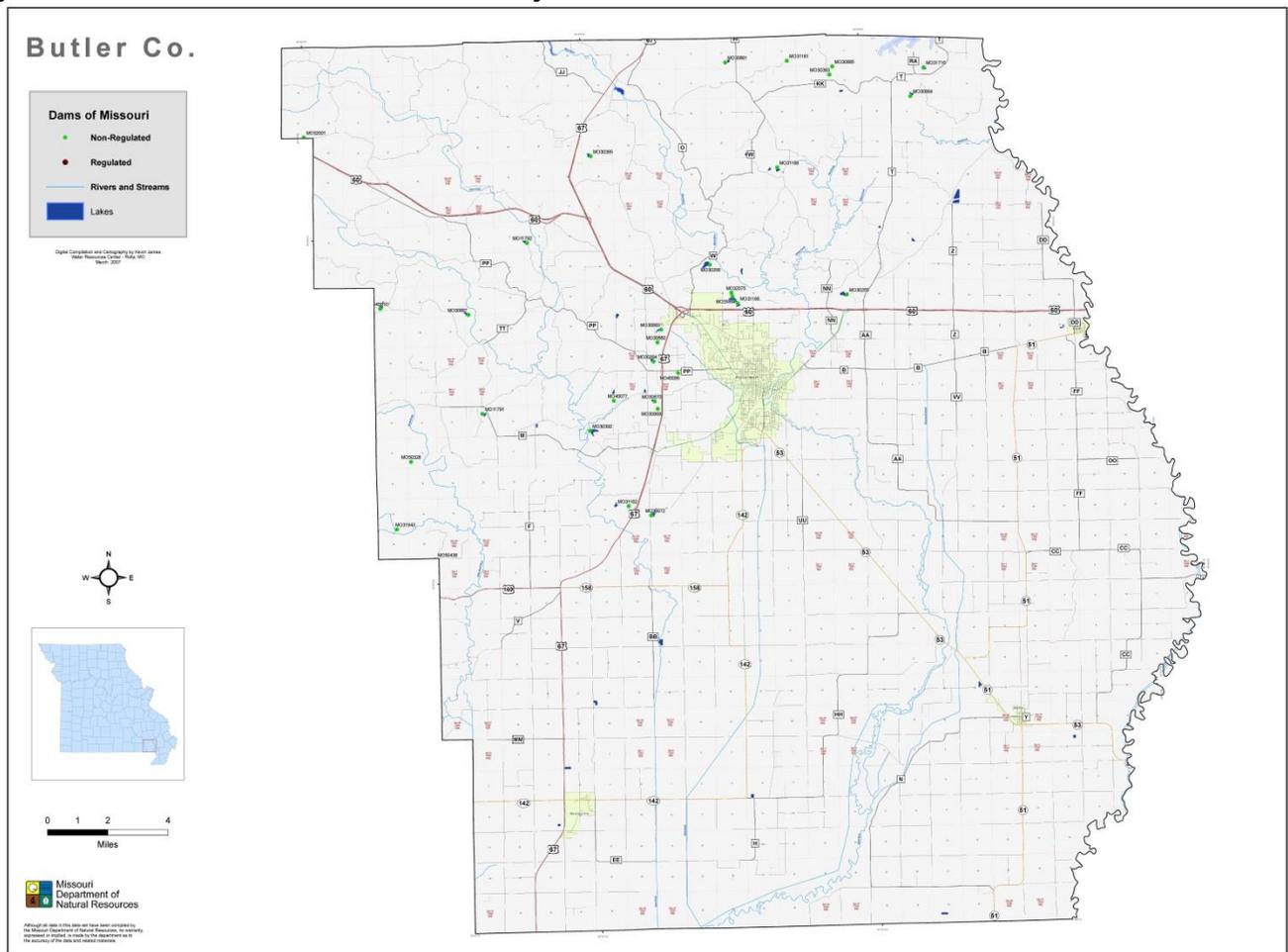
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Resnik's Lake Dam	No	15	24	200	Cane Creek	3	Low
Rolling Hills Estates Lake Dam	No	25	5	75	Kenner Spring Branch	1	High
Roper Lake Dam	No	25	4	120	Redman Creek	3	Low
Russell Lake Dam	No	20	24	260	Cane Creek	3	Low
Tomaro Oaks Dam	No	15	40	360	Black River	2	High
Upper Little Black Dam A-5	No	34	16	2	Little Black River	-	Low
Upper Little Black Site D-9 Dam	No	33	11	802	Little Black River	-	Low
Wren Lake Dam	No	15	10	70	Black River	3	Low

Sources: Missouri Department of Natural Resources, <http://dnr.mo.gov/env/wrc/dam-safety/statemap.htm> and National Inventory of

The map following, **Figure 3.2**, provides the location of the dams within Butler County. The map, provided by the Missouri Department of Natural Resource displays the location of all twenty-seven (27) dams, the non-regulated dams are indicated with a green dot while the regulated dams are marked with a red dot on the map. According to the National Inventory of Dams, there are nine (9) high hazard dams within the boundaries of Butler County. There are no dams in the county that would impact incorporated areas, or concentrations of populations in the event of a dam breach or failure. The vulnerability assessment on the pages following will discuss in greater detail, the assets that would be impacted by a dam failure.

Figure 3.2 Dam Locations in Butler County



Source: U.S. Army Corps of Engineers, Missouri Department of Natural Resources

### Upstream Dams Outside Butler County

In the opinion of Butler County emergency management officials, one manmade impoundment (Wappapello Lake) poses a potential threat to Butler County residents. Although this U.S. Army Corps-maintained property is located in Wayne County, its inundation area covers the majority, if not all, of the eastern half of Butler County. The Wappapello Dam is located along the St. Francis River and is nearly 420 feet high. Its reservoir holds 31,000 acre-feet of water within the conservation pool and 63,000 acre-feet within the recreation pool, with a total storage capacity of 613,300 acre-feet. Should the dam fail a number of persons residing near the eastern boundary of Butler County would be affected with damages lessening southward.

Another dam of real concern to county officials is Clearwater Dam, also located in Wayne County, and boasting 1,630 surface acres of lake. This property is maintained by the U.S. Army Corps and restricts flow along the Black River. Should this structure fail the northwestern and north central

portions of Butler County could be affected. According to the *State of Missouri Hazard Mitigation Plan 2007*, if the Clearwater Dam were to fail, such an event could result in 369 deaths and \$200 million in property damage. It is important to note, however, that there are no recorded significant dam failures listed for Butler County, Missouri, according to the Water Resources Program of the Missouri Department of Natural Resources.

### **Severity/Magnitude/Extent**

The probable severity of a future dam failure event in Butler County depends primarily upon two variables—the location and size of the dam in question. As stated above, there are twenty-seven (27) unregulated dams located in Butler County—all of varying sizes. Should any one of these structures fail, resulting damages could range from negligible to critical depending upon both the dam’s location and its size.

For example, many dams in the county are smaller impoundments, located on private property. Should any one of these structures fail, damages to property would most likely be negligible. Yet, the Wappapello Lake Dam and the Clearwater Dam, both located in Wayne County would inundate sections of Butler County if either were to fail.

Of the dams located in Butler County, the Missouri Department of Natural Resources shows none as holding more than 500 acre-feet of water, while only one is shown to hold between 100 and 500 acre-feet. The remaining thirty hold less than 100 acre-feet of water. Based solely upon this data and consideration of threats resulting from the Wappapello and Clearwater dams, severity classifications ranging from limited to catastrophic can be assigned to future incidents.

According to the 2013 Missouri State Hazard Mitigation Plan there are no buildings in the county vulnerable to a dam failure. The estimated total population that is vulnerable to a dam failure is 45 persons. The state plan also states that 71 Butler County residents could be exposed to the failure of a state-regulated dam.

The severity/magnitude of dam failure would be similar in some cases to the impacts associated with flood events (see the flood hazard vulnerability analysis and discussion). Based on the hazard class definitions, failure of any of the High Hazard/Class II or III dams could result in a serious threat of loss of human life, serious damage to residential, industrial or commercial areas, public utilities, public buildings, or major transportation facilities. Catastrophic failure of any high hazard dams has the potential to result in greater destruction due to the potential speed of onset and greater depth, extent, and velocity of flooding. Note that for this reason, dam failures could flood areas outside of mapped flood hazards.

Inundation maps are not available for any of the dams in Butler County.

### **Previous Occurrences**

According to the Missouri Department of Natural Resources, the 2010 and 2013 Missouri State Hazard Mitigation Plan and interviews with local officials, there have been no reported dam failures in Butler County.

## ***Probability of Future Occurrence***

According to all available data sources there have been no recorded dam failures in Butler County; therefore a probability calculation is not possible.

## **Vulnerability**

### ***Vulnerability Overview***

As reported above, according to the Missouri Department of Natural Resources there are thirty-one dams in Butler County and none are regulated by the state or by the USACE. Of these thirty-one dams, 27 have been assigned Hazard Classifications by the Missouri Department of Natural Resources. There is one dam classified as Hazard Class 1, eight as Hazard Class 2, and eighteen as Hazard Class 3. The National Inventory of Dams also classifies nine (9) of the dams in Butler County as high hazard. There are no school district facilities or critical facilities that are located within the inundation area of any dam in Butler County. Dams fail on an individual basis, when one dam fails not all dams fail. Any vulnerability will be limited to those persons and structures and persons that are within the inundation zone of a failed dam. Therefore, the vulnerability of the county to one dam breaking is minimal.

### ***Potential Losses to Existing Development: (including types and numbers, of buildings, critical facilities, etc.)***

According to the 2013 Missouri State Hazard Mitigation Plan, there are no buildings vulnerable to a dam failure in Butler County. There are also 71 persons estimated to be exposed to a potential failure of a state regulated dam upstream from Butler County. It should be noted that dam failures are generally isolated incidents and do not often occur in conjunction with failure at additional dam sites. Since it is unknown which dams, if any might fail at any given time, this analysis provides for a countywide view of dam failure. It is nearly certain that not all state regulated dams would fail simultaneously. These estimates should be viewed in light of these considerations.

There are no incorporated places or school districts that are within the inundation zones of any dams in Butler County. Additionally, from reviewing the available inundation maps, there are no other critical facilities located in the inundation zones.

### ***Impact of Future Development***

Butler County is very rural in nature and sparsely populated. There is little to no development anticipated within the inundation areas of any of the dams located in the county.

### ***Hazard Summary by Jurisdiction***

The only jurisdiction vulnerable to a dam failure is the unincorporated county. None of the four incorporated towns in Butler County, any of the school districts, or any of the water districts are vulnerable to damage caused by a dam failure.

**Problem Statement**

As stated above there are no dams in Butler County that are state regulated. The rural nature and sparse population of Butler County reduces the potential impact of a dam failure significantly.

## 3.4.2 Drought

### Hazard Profile

#### *Hazard Description*

Drought has been defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. A drought period can last for months, years, or even decades. There are four types of drought conditions relevant to Missouri, according to the State Plan, which are as follows.

- Meteorological drought is defined in terms of the basis of the degree of dryness (in comparison to some “normal” or average amount) and the duration of the dry period. A meteorological drought must be considered as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.
- Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, groundwater). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and groundwater and reservoir levels. As a result, these impacts also are out of phase with impacts in other economic sectors.
- Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced groundwater or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.
- Socioeconomic drought refers to when physical water shortage begins to affect people.

**Data sources:** <http://www.drought.unl.edu/> <http://droughtreporter.unl.edu/>

#### *Geographic Location*

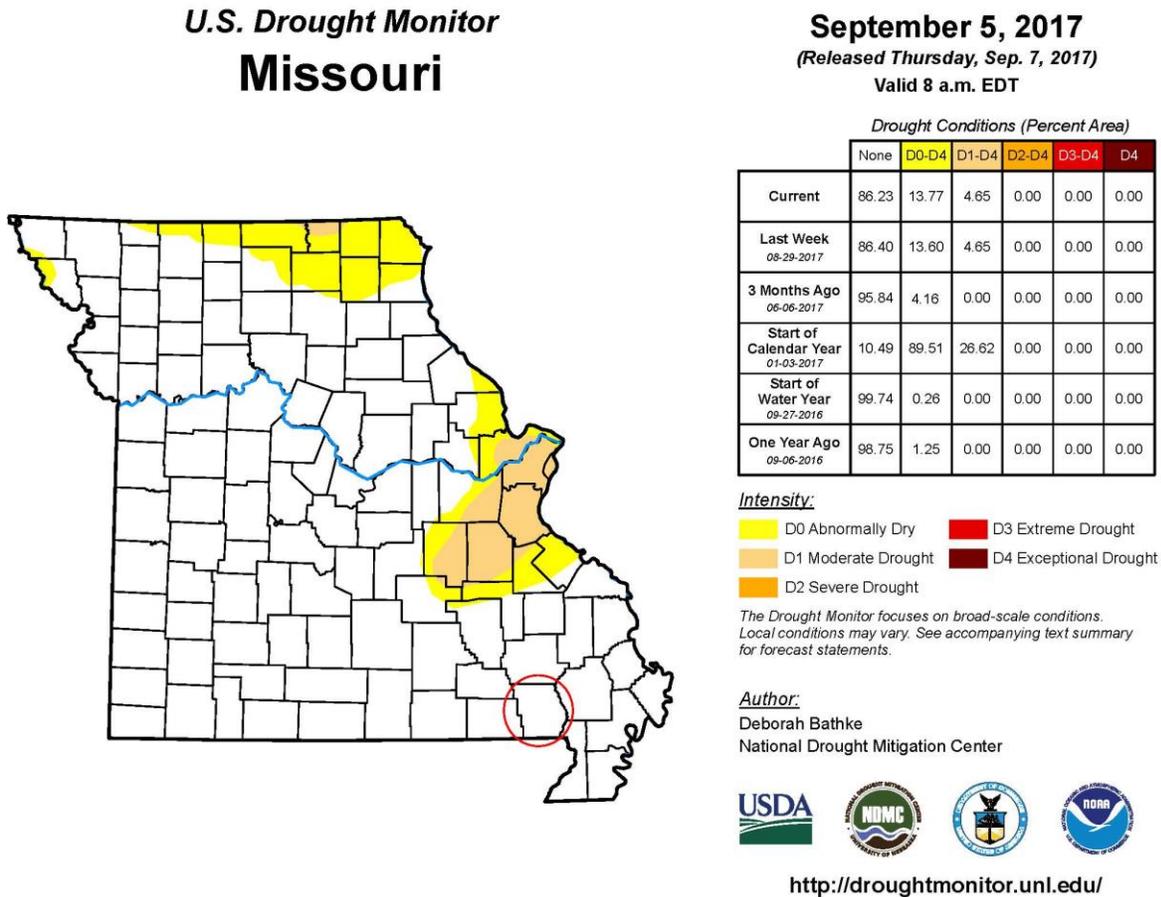
The entire planning area of Butler County is vulnerable to the effects of drought. Although all jurisdictions in the county are at risk, droughts most directly impact the agriculture sector. According to the United States Department of Agriculture, Ag Census 2012 there are 509 farms in Butler County and 234,110 acres of the county are used for agriculture. The majority of row crop farming that includes rice, soybeans and corn is found in the flat, fertile soils of the eastern section of the county. This cropland makes up 186,202, with 123,634 acres being irrigated; the remaining farmland is used for livestock, primarily cattle.

### ***Severity/Magnitude/Extent***

The National Drought Monitor Center at the University of Nebraska at Lincoln summarized the potential severity of drought as follows. Drought can create economic impacts on agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface water supplies. In addition to losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. Droughts also bring increased problems with insects and disease to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn place both human and wildlife populations at higher levels of risk. Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Finally, while drought is rarely a direct cause of death, the associated heat, dust and stress can all contribute to increased mortality.

The following US Drought Monitor Map for September 5, 2017, **Figure 3.3**, is a weekly map of drought conditions that is produced jointly by the National Oceanic and Atmospheric Administration, the U.S. Department of Agriculture, and the National Drought Mitigation Center at the University of Nebraska-Lincoln. The map is a composite index that includes the measurements of climatic, hydrological, and soil conditions as well as reported impacts and observations from more than 350 contributors around the country.

Figure 3.3 U.S. Drought Monitor Map of Missouri for September 5, 2017



Source: U.S. Drought Monitor, <http://droughtmonitor.unl.edu/Home/StateDroughtMonitor.aspx?MO>

The USDA's Risk Management Agency provides county specific information concerning insured crop loss payments in Butler County as a result of drought during a period of years. From 2012 through 2016 insurance crop claims were paid resulting from damages to crops due to drought for 2,043.83 acres and totaling \$210,658. This was a small amount compared to the total crop loss claims of \$13,731,888 that resulted from drought, excess rain or moisture, heat, hail, and cold winter weather.

The Palmer Index, published by the National Oceanic and Atmospheric Administration and the U.S. Department of Agriculture, measures both dryness and wetness using a -4.0 to +4.0 scale. This is done by comparing water supply (from precipitation and soil moisture) to water demand (the amount needed to maintain river, lake, and reservoir levels and keep soil sufficiently moist).

Because the Palmer Drought Severity Index is primarily a reactive measuring tool, other indicators of drought have been identified as somewhat more proactive. They include the following:

- ◆ a decline in precipitation;
- ◆ declining reservoir levels;
- ◆ falling well water levels;
- ◆ low soil moisture levels;
- ◆ water demand versus water supply; and,
- ◆ streamflow stage reductions.

These types of observations provide more immediate indicators of dryness, yet are more limited than the Palmer Drought Severity Index in that they provide more localized data rather than regional data. Most likely, the best assessment of drought is a combination of both the Palmer Index and the above bulleted indicators.

There are eight publicly owned and operated water supply districts in Butler County, Butler County PWSD #1; Butler County PWSD #104; Butler County PWSD #2; Butler County PWSD #3; City of Fisk; City of Neelyville; City of Poplar Bluff; and the City of Qulin. Residents that live outside of these service areas rely on private wells for their water supply. The City of Poplar Bluff uses the Black River as its primary water source. The other water supply districts utilize ground wells for water supply.

### ***Previous Occurrences***

According to the National Climatic Database, from January 1, 2010 through August 31, 2017 there were seventeen (17) droughts that impacted Butler County. A listing of those events follows:

- **07/02/2010-07/31/2010** Moderate drought conditions developed over much of southeast Missouri after a very dry June. Poplar Bluff received only about one-half inch of rain in June. Rainfall during July consisted of isolated to widely scattered showers and thunderstorms. Hot conditions increased evaporation rates and crop stress. Corn yields were expected to be cut by half where irrigation was not used. An upper level ridge of high pressure was firmly entrenched over the southeastern states early in the month. The high slowly migrated toward the southern Plains by mid-month and toward the southwestern U.S. by the 20th. It eventually re-established itself over the Southeast late in the month.
- **08/01/2010-08/31/2010** Moderate drought conditions persisted over much of southeast Missouri. After a very dry June, some areas received beneficial rain in July and August. Rainfall for the months of July and August was variable, consisting of isolated to widely scattered showers and thunderstorms. Many locations were one to over three inches below normal for the month of August. Hot conditions increased evaporation rates and crop stress. Unirrigated corn yields were expected to be a total failure in some places. Livestock producers in Ripley and Carter Counties were feeding hay due to pastures that were burned up by not having significant rainfall for six weeks. Livestock water was also becoming a concern for some producers. An upper level ridge of high pressure remained firmly entrenched over the southern states during most of the month.
- **08/01/02-09/19/02** Moderate drought conditions developed over southeast Missouri during early August as a result of dryness that began in June. Farmers anticipated substantial crop losses at harvest time.

- **09/01/2010-09/30/2010** Severe drought developed over a few counties near the Mississippi River, while moderate drought conditions persisted south and west of Cape Girardeau. With the exception of a heavy rainfall event from the remnants of Tropical Storm Hermine, rainfall was rather hard to come by in September. Hermine brought three to five inches of rain on the 9th and 10th to parts of southeast Missouri. While this rainfall was very beneficial, there was generally less than an inch the rest of the month. Hermine greatly improved short-term rainfall deficits, but year-to-date rainfall deficits were still 4 to 8 inches. By month's end, 32 percent of the Missouri cotton harvest was rated poor or very poor. Eighty-seven percent of pasture land in the extreme southeast corner of the state was rated as poor or very poor, which impacted hay crops. Crop harvests were well underway in September, but crop damage figures were not yet available. Unirrigated corn yields were expected to be a total failure in some places.
- **10/01/2010-10/31/2010** Drought conditions expanded and worsened across southeast Missouri during the month of October. Extreme drought developed over a few counties near the Missouri Bootheel, mainly south of Charleston. Severe drought expanded as far north and west as the Poplar Bluff and Sikeston areas. Moderate drought expanded north and west across the remainder of southeast Missouri. Total rainfall for the month was only one-half inch at Cape Girardeau and 1.11 inches at Poplar Bluff. Outdoor fire danger became very high at times. Outdoor burning was banned in Cape Girardeau County. By month's end, 85 percent of pastureland was rated poor or very poor. Ninety-two percent of topsoil was rated short or very short on moisture. A federal disaster declaration was granted for most of southeast Missouri due to anticipated crop losses. Crop harvests were completed in October, but final crop damage figures were not yet available. Unirrigated corn yields were expected to be a total failure in some places.
- **11/01/2010-11/30/2010** Drought conditions worsened across southeast Missouri during the first half of November, then improved with heavy rainfall on the 24th and 25th. At its most widespread extent, extreme drought extended as far north as a Doniphan to Dexter to Charleston line. Moderate to severe drought covered the remainder of southeast Missouri south of Perry County. At the start of the month, 86 percent of pastureland was rated as poor or very poor, and 92 percent of topsoil was short or very short on moisture. Outdoor fire danger became very high at times. A series of wildfires occurred early in the month in Carter and Wayne Counties. Most of the fires were less than 100 acres, and no structures were known to have burned. There were some bans on outdoor burning until heavy rainfall on the 24th and 25th. The cumulative effect of this drought, a catastrophic ice storm in '09, winds from Hurricane Ike in '08, and a record late spring freeze in '07 resulted in a mortality spiral among trees and shrubs. According to a local arborist, the series of damaging weather events diminished the long-term ability of trees to recover from future events. Crop harvests were completed in October, but final crop damage figures were not yet available. Unirrigated corn yields were expected to be a total failure in some places.
- **12/01/2010-12/31/2010** Severe to extreme drought lingered across extreme southern parts of Missouri, mainly along the Arkansas border from Doniphan to New Madrid. Moderate drought extended as far north as a line from Van Buren to Sikeston. Elsewhere in southeast Missouri, the drought ended in December. Subsoil moisture remained low. For the year 2010, most locations ended the year with precipitation deficits of 10 to 13 inches. The long-term moisture deficits were reflected in below normal streamflows on some waterways. Agricultural impacts

were minimal since the growing season ended in the fall.

- **01/01/2011-01/31/2011** Severe to extreme drought lingered across extreme southern parts of Missouri, mainly along the Arkansas border from Doniphan to New Madrid. Moderate drought extended as far north as a line from Van Buren to Sikeston. The drought began during the summer of 2010, and a very dry January exacerbated the drought. Total precipitation for January was only 0.34 inch at Poplar Bluff. Normal monthly precipitation is about three inches. Subsoil moisture remained low. Long-term moisture deficits were reflected in below normal streamflows on some waterways. Agricultural impacts were minimal since the growing season ended in the fall.
- **05/18/2012-05/31/2012** One of the warmest and driest Mays on record worsened the rare spring drought over southeast Missouri. At Cape Girardeau, spring of 2012 was the driest spring on record. Only 5.25 inches of rain fell from March through May. The month of May was the second driest on record. Only 0.79 inch fell at Cape Girardeau in May. By the end of May, the drought was severe in the extreme southeast Missouri counties of New Madrid and Mississippi. Moderate drought conditions existed elsewhere to the south of the Perryville area. Soils continued to dry out, and topsoil moisture deficits began to be reported. Pasture land rapidly deteriorated. Streamflows were running below normal by the end of the month.
- **06/01/2012-06/30/2012** The spring drought worsened considerably across southeast Missouri as summer arrived. By the end of June, all of southeast Missouri except for the Perryville and Van Buren areas was upgraded to extreme drought. Severe drought spread across the remainder of southeast Missouri. Soil moisture deficits continued to increase. By the end of June, 80 to 100 percent of the region's topsoil moisture was reported as short or very short, and 70 to 95 percent of the subsoil moisture was reported as short or very short. Many crops were showing stress. A majority of the corn and soybeans were listed in fair to poor condition. Increasing amounts of livestock and pasture were showing stress. The percentage of pastures rated as poor or very poor was growing. Ponds across the region were drying quickly. Fire danger increased to the point where bans on outdoor burning were implemented in parts of southeast Missouri, including Bollinger, Cape Girardeau, New Madrid, and Scott Counties. A number of cities also imposed bans on burning, including Dexter, Bloomfield, Doniphan, Charleston, East Prairie, and Scott City. In the Mark Twain National Forest, open fires were prohibited due to high fire danger. Streamflows were running below normal. At Cape Girardeau, total rainfall for June was 1.37 inches, which is less than half the normal amount of 3.41 inches. The drought began in May and continued into July.
- **07/01/2012-07/31/2012** The drought which began in May worsened considerably across southeast Missouri as summer progressed. By the end of July, all of southeast Missouri was upgraded to extreme to exceptional drought. The exceptional drought conditions were along and south of a line from Poplar Bluff to Jackson, including Cape Girardeau. The remainder of southeast Missouri was classified as having extreme drought conditions. Soil moisture deficits continued to increase. By the end of July, 90 to 100 percent of the region's topsoil and subsoil moisture was reported as short or very short. Many crops were showing stress, and the situation became dire for many farmers. A majority of the corn and soybeans were listed in poor to very poor condition. Increasing amounts of livestock and pasture were showing stress. The percentage of pastures rated as poor or very poor continued to grow. Ponds across the region were dry or drying quickly. Even with the isolated rainfall from thunderstorms, fire

danger remained high. Bans on outdoor burning were in place for most of southeast Missouri, including Carter, Bollinger, Cape Girardeau, Mississippi, New Madrid, Ripley, Stoddard, and Scott Counties. Additionally, numerous individual towns and villages issued burn bans. Fourth of July fireworks shows were cancelled or banned in many places. Streamflows were running below normal. At Cape Girardeau, total rainfall for July was 2.24 inches, which was 1.12 inches below normal. The drought began in May and continued into August.

- **08/01/2012-08/31/2012** The drought which began in May reached its most extreme stage by early August. Through the month of August, all of southeast Missouri was in extreme to exceptional drought. The exceptional drought conditions were along and south of a line from Doniphan to Jackson. The remainder of southeast Missouri was in extreme drought conditions. Soil moisture deficits remained very high. Throughout August, 80 to 100 percent of the region's topsoil and subsoil moisture was reported as short or very short. Many crops were heavily damaged, and numerous counties were declared natural disaster areas. Corn crops were a partial or complete loss. Soybeans were faring somewhat better. The percentage of pastures rated as poor or very poor held steady from July. Some small trees and shrubs were killed. Ponds across the region were dry or drying quickly. Even with the isolated rainfall from thunderstorms, fire danger remained high. Bans on outdoor burning were in place for numerous counties in southeast Missouri. Streamflows were running normal to below normal. At the Cape Girardeau airport, 1.44 inches of rain fell in August, which was only about half of normal. Rainfall for the year-to-date was 14.27 inches, which was 16.58 inches below normal. The drought began in May and continued into September.
- **09/01/2012-09/30/2012** Significant improvement in drought conditions occurred during the month of September. Heavy rain from the remnants of Hurricane Isaac at the start of the month was a notable factor. The extreme to exceptional summer drought gave way to only moderate drought from Cape Girardeau north and west, including Perryville. The area of extreme drought conditions shrank to include only New Madrid and Mississippi Counties in the southeast corner of the state. All other areas of southeast Missouri improved to severe drought conditions by month's end. Soil moisture deficits decreased greatly. By the end of September, soil moisture was near normal. Most of the corn crop was either harvested or plowed under, and corn crop losses were expected to be very high. Estimates on soybean crop losses were not available yet. Numerous counties were declared natural disaster areas earlier in the growing season. Pastures improved, but a majority of them remained in poor or very poor condition. Fire danger decreased significantly, and all bans on outdoor burning were lifted. Streamflows were running about normal. At the Cape Girardeau airport, 6.20 inches of rain fell in September, which was about three inches above normal. The drought began in May and continued into October.
- **10/01/2012-10/31/2012** Slight improvement in long-term drought conditions was observed during the month of October. While the more active fall weather pattern resulted in more frontal passages in October, most locations still reported below normal precipitation for the month. The drought officially ended in Perry County. The small area of extreme drought conditions that had been near the Bootheel area improved to severe drought. By the end of the month, areas south and west of a line from Cape Girardeau to Greenville were in severe drought. The remainder of the drought area was classified as moderate. The main impact of the long-term drought was on farm ponds used for irrigating fields or raising livestock. Soil moisture was near normal. The soybean crop was harvested, but soybean crop loss

estimates were not available yet. Some pastures remained in poor or very poor condition, but many of them improved to adequate condition. Streamflows were running about normal. At Cape Girardeau, October rainfall was 2.58 inches, which was about an inch-and-a-quarter below normal. The year-to-date rainfall deficit hovered around 13 inches. The drought began in May and continued into November in most areas.

- **11/10/2012-11/30/2012** There was slight improvement in long-term drought conditions during the month of November. Rainfall was below normal during the month, but this deficit was partially offset by low evaporation rates caused by unseasonably cool air. The drought officially ended along and north of a line from Marble Hill to Cape Girardeau. The area of severe drought improved to moderate drought. By the end of the month, areas south and west of a line from Cape Girardeau to Marble Hill were in moderate drought. The main impact of the long-term drought was on farm ponds used for irrigating fields or raising livestock. Soil moisture was near normal. Some pastures remained in poor or very poor condition, but many of them improved to adequate condition. Streamflows were running about normal. At Cape Girardeau, November rainfall was 1.32 inches, which was 3.12 inches below normal. The year-to-date rainfall deficit hovered around 18 inches. The drought began in May and continued into December in most areas.
- **12/01/2012-12/31/2012** There was no appreciable change in long-term drought conditions during the month of December. Rainfall was below normal during the month of December, but this deficit was partially offset by low evaporation rates from colder winter weather. Moderate drought conditions persisted throughout the month south and west of a line from Cape Girardeau to Marble Hill. Impacts were very few, since the growing season was over for most crops. Farm ponds used for irrigating livestock remained low. At the Cape Girardeau and Poplar Bluff airports, December monthly rainfall was two to two and one-half inches below normal. The drought began in May and continued into January.
- **01/01/2013-01/31/2013** The drought which began in May of 2012 officially ended across the remainder of southern Illinois. Water supplies returned to normal.
- **11/01/2016-11/30/2016** Severe drought conditions spread into extreme southeast Missouri, southeast of a line from Cape Girardeau to Poplar Bluff. Moderate drought conditions encompassed the remainder of southeast Missouri. A lack of precipitation caused soil moisture to decrease rapidly. Pasture land deteriorated, causing some farmers to begin feeding hay to livestock. Stock ponds began to run low. Some farmers began hauling in water for their livestock. Across the Mississippi River, Paducah, Kentucky recorded its driest September-October combination on record. Only about one-quarter inch of rain fell during the first few weeks of November. This lack of precipitation, combined with above normal temperatures, contributed to the rapid onset of drought conditions. At Paducah, 1.28 inches of rain fell from September 1 to November 18. This was 8.69 inches below normal for that period. Small streams as well as larger rivers were running well below normal. A heavy rainfall event late in the month brought some improvement in the drought.

### ***Probability of Future Occurrence***

The seventeen incidents reported above span a search of data of the prior 7+ years, or 92 months.

During this 92 month timeframe, Butler County experienced drought conditions for 17 months. Therefore, if the total number of months in which drought conditions were experienced is divided by the total number of months (17/92), there is a 18.4% probability of drought in Butler County. The timing of a drought is not predictable, but long-range outlooks and predicted impacts of climate change could indicate an increased chance of drought conditions.

### **Vulnerability**

#### ***Vulnerability Overview***

According to the Missouri State Drought Plan, Butler County has a moderate susceptibility to droughts with the far southeastern corner of the county have only a slight susceptibility. The USDA's Risk Management Agency 2016 Missouri Crop Insurance Profile indicates that the crop loss ratio for Butler County is "Low". In Table 3.5.9a in the 2013 Missouri State Hazard Mitigation Plan it is reported that the total crop insurance paid for drought damage from 1998-2012 in Butler County was \$581,605 with a total crop exposure based on the 2007 Census of Agriculture of \$86,624,000. The county has a loss ratio of 1 according to this table, with an annual crop claims ratio of 0.04%.

#### ***Potential Losses to Existing Development***

Potential crop losses in Butler County are anticipated to be low based on historical data such as that presented above. The total annualized crop insurance claims/drought damage during the 1998-2012 time period in the county was \$38,774.

#### ***Impact of Future Development***

Little future development is anticipated within Butler County due to its being so rural. Any future development will not result in increased impacts from droughts. All of the public water supply districts have ample capacity to meet all foreseen future development. No significant increase is anticipated in the number of acres farmed.

#### ***Hazard Summary by Jurisdiction***

Groundwater is a valuable commodity that is readily available in Butler County. Even when creeks, streams, and rivers may be at low levels, groundwater is readily available. Although the drought conditions are typically constant across the county, in the incorporated cities the magnitude will be different from that experienced by farmers. Where farmers potentially experience crop loss or damage, in cities only lawns and gardens would be impacted. The capacity of the organized public water supply districts is sufficient to provide ample water to local residents. However, there are many local residents that rely on private wells for water supply that could potentially be impacted by a severe drought. In severe drought conditions, there is the possibility for building foundations to be weakened due to shrinking and expanding soils.

### **Problem Statement**

Drought is a hazard that impacts large geographic regions of the country. The sector that is most

impacted in Butler County is the farmer. Drought causes damages to crops and can negatively impact the yield of crops depending on the timing of the drought.

## 3.4.2 Earthquakes

### Hazard Profile

#### *Hazard Description*

Earthquakes are defined as a sudden, rapid shaking of the earth caused by shifting plates under the earth's surface. When these under-earth plates shift, they can sometimes lock together, building pressure, and eventually release accumulated energy. When this happens, an earthquake occurs. Earthquakes strike suddenly and can cause intense ground shaking thereby easily collapsing buildings and bridges. Secondary or cascading hazards may also occur. These can include fires, landslides, flooding, explosions, dam failure, utility interruptions, avalanches, tsunamis and hazardous material leaks.

In the United States, there are several thousand earthquakes annually. The State of California experiences the most damaging earthquakes, while Alaska experiences the highest number of earthquakes. According to an article by the United States Geological Survey, however, earthquakes occurring in the New Madrid seismic zone affect a much larger area than that which is affected by activity along other fault lines. In fact, the New Madrid seismic "region has more earthquakes than any other part of the United States east of the Rocky Mountains," according to the article.

Earthquakes occur primarily along fault zones and tears in the earth's crust. Along these faults and tears in the crust, stresses can build until one side of the fault slips, generating compressive and shear energy that produces the shaking and damage to the built environment. Heaviest damage generally occurs nearest the earthquake epicenter, which is that point on the earth's surface directly above the point of fault movement. The composition of geologic materials between these points is a major factor in transmitting the energy to buildings and other structures on the earth's surface.

As explained by the Federal Emergency Management Agency, major earthquakes and their accompanying foreshocks and aftershocks can be measured in two different ways. In 1935, the Richter Scale was developed by Charles F. Richter to measure the amount of energy released by an earthquake. The Modified Mercalli Intensity Scale was also developed as a tool to measure the severity of a quake using damage observations. The Mercalli Scale uses Roman numerals I to XII to rate an earthquake's intensity. A description of various Richter Scale and Modified Mercalli Scale intensities is offered below:

The most severe earthquakes occurred in the New Madrid Seismic Zone (NMSZ) from December 16, 1811 through March 12, 1812, with the most severe occurring on December 16, 1811 and February 7, 1812. These quakes rank seventh and ninth respectively among the largest earthquakes recorded in the United States.

#### *Geographic Location*

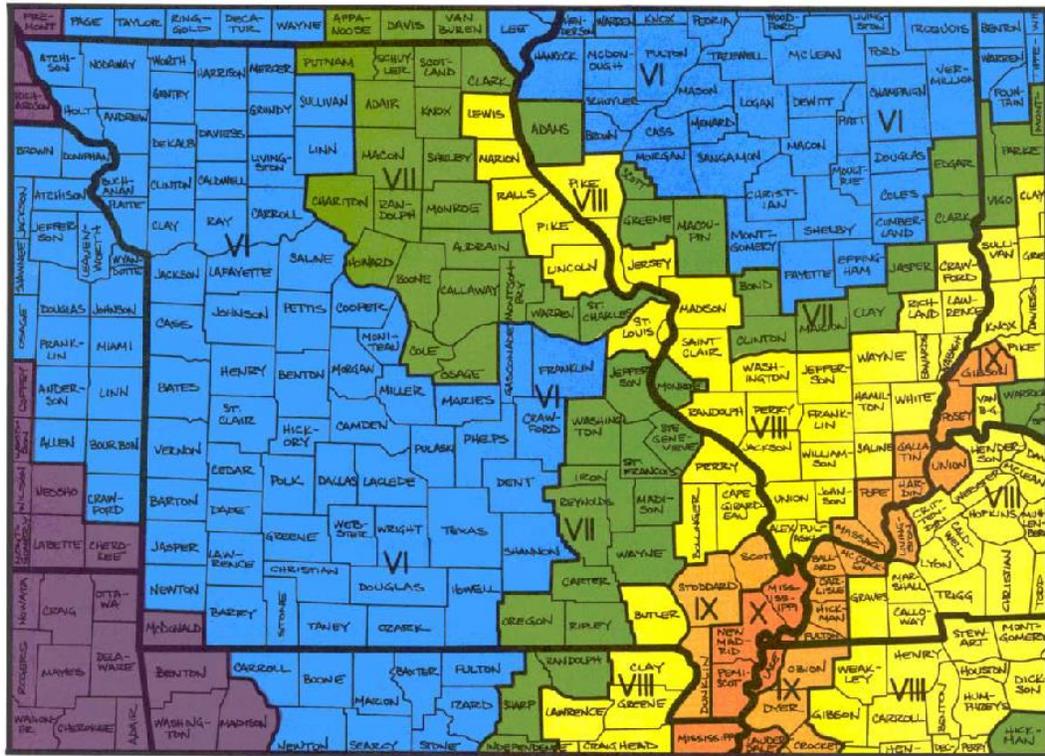
The NMSZ is made up of several thrust faults that stretch from Marked Tree, Arkansas to Cairo, Illinois. Although Butler County is on the western edge of the NMSZ, the effects of a large quake will impact the entire county indiscriminately. All jurisdictions will be expected to experience the

same intensity across the planning area.

Southeast Missouri, including Butler County, is most susceptible to earthquakes because it overlies the NMSZ. The county is at risk to strong ground movements and has a high potential for soil liquefaction due to the presence of loose, sandy consolidated sediments and a high water table. The immediate vicinity of the Ozarks is also at risk from the earthquakes in the New Madrid Seismic Zone because, like in the bootheel, subsurface conditions of the Mississippi and Missouri River valleys tend to amplify earthquakes.

**Figure 3.4** below is a map depicting the impact zones along the New Madrid Fault and **Figure 3.5** illustrates the seismic activity in the United States.

Figure 3.4 Impact Zones for Earthquake Along the New Madrid Fault

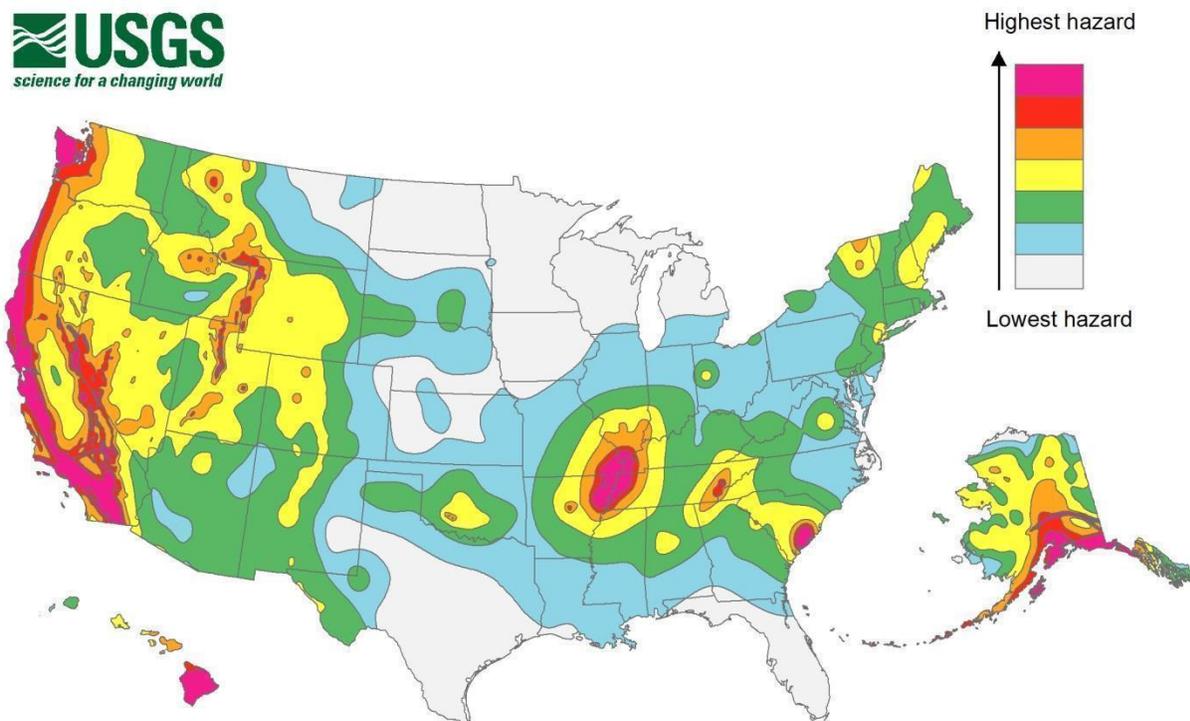


This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude - 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.



Source: 2013 Missouri State Hazard Mitigation Plan

**Figure 3.5** illustrates seismicity in the United States.  
**United States Seismic Hazard Map**



Source: United States Geological Survey at [http://earthquake.usgs.gov/hazards/products/conterminous/2014/HazardMap2014\\_lg.jpg](http://earthquake.usgs.gov/hazards/products/conterminous/2014/HazardMap2014_lg.jpg)

### **Severity/Magnitude/Extent**

The extent or severity of earthquakes is generally measured in two ways: 1) the Richter Magnitude Scale is a measure of earthquake magnitude; and 2) the Modified Mercalli Intensity Scale is a measure of earthquake severity. The two scales are defined as follows.

#### *Richter Magnitude Scale*

The Richter Magnitude Scale was developed in 1935 as a device to compare the size of earthquakes. The magnitude of an earthquake is measured using a logarithm of the maximum extent of waves recorded by seismographs. Adjustments are made to reflect the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. For example, comparing a 5.3 and a 6.3 earthquake shows that the 6.3 quake is ten times bigger in magnitude. Each whole number increase in magnitude represents a tenfold increase in measured amplitude because of the logarithm. Each whole number step in the magnitude scale represents a release of approximately 31 times more energy.

## *Modified Mercalli Intensity Scale*

The intensity of an earthquake is measured by the effect of the earthquake on the earth's surface. The intensity scale is based on the responses to the quake, such as people awakening, movement of furniture, damage to chimneys, etc. The intensity scale currently used in the United States is the Modified Mercalli (MM) Intensity Scale. It was developed in 1931 and is composed of 12 increasing levels of intensity. They range from imperceptible shaking to catastrophic destruction, and each of the twelve levels is denoted by a Roman numeral. The scale does not have a mathematical basis, but is based on observed effects. Its use gives the laymen a more meaningful idea of the severity.

## **Previous Occurrences**

According to the Missouri Department of Natural Resources there were 236 earthquakes that ranged between Magnitude 2.0 and Magnitude 4.9 that shook southeast Missouri from 2000-2010. In reviewing the specific incidents, during that time period four of these earthquakes had an epicenter in Butler County with all four registering between magnitude 2.0 and 2.9.

The largest earthquakes ever felt in the United States occurred along the New Madrid fault line during the winter of 1811-1812. During the course of three months, three earthquakes registering above 8.0 on the Richter Scale were felt by nearly the entire eastern half of the United States. According to the United States Geological Survey, church bells in Boston, Massachusetts rang as a result of the tremendous shaking. In fact, the New Madrid quakes were two to three times stronger than the 1964 Alaska earthquake and ten times more powerful than the 1906 San Francisco quake.

## **Probability of Future Occurrence**

The probability of a magnitude 2.0 through 4.9 earthquakes impacting the area is nearly certain in any given year based on the historical data that 236 occurred in southeast Missouri in 10 years. The probability of an earthquake having an epicenter in Butler County is much lower at 40% in any given year based on the historical data of four earthquakes with an epicenter in Butler County over the same ten-year period. Calculate the probability (x number of reported quakes in y number of years equals z probability of an earthquake of some magnitude in any given year).

The probability of magnitude 5.0 or greater within 50 Years, according to the United States Geological Survey (USGS), is 2% based on a probabilistic seismic hazard shaking grids developed by the USGS for the National Seismic Hazard Maps that are included with HAZUS.

## **Hazard Summary by Jurisdiction**

The earthquake intensity is not likely to vary greatly throughout the planning area, therefore the risk will be the same throughout. The City of Poplar Bluff with its historic downtown that includes the county courthouse and several two and three-story buildings around the courthouse square are more vulnerable to damages from an earthquake due to their age. The courthouse was constructed in 1889 and several of the two story, brick commercial buildings were constructed in the early 1920's and

1930's. Outside of Poplar Bluff's downtown, there are also other vulnerable structures such as the Poplar Bluff Housing Authority's Twin Towers senior housing complex that consists of two fourteen story apartment buildings. There are other multi-story buildings within the city limits of Poplar Bluff including the John J Pershing VA Hospital, the Poplar Bluff Regional Medical Center, and the Poplar Bluff Physician's Park. Buildings occupied by the school districts in the county have all been constructed since 1939, most were built in the 1960's or more recently.

### ***Impact of Future Development***

Future development is not expected to increase the risk other than contributing to the overall exposure of what could become damaged as a result of an event.

## **Vulnerability**

### ***Vulnerability Overview***

#### ***Potential Losses to Existing Development***

HAZUS 2.1 was used to analyze vulnerability and estimate losses due to earthquakes. All HAZUS analyses were run using an enhanced Level 2 inventory database comprised of updated demographic and aggregated data using the 2010 US Census. The information and data for this vulnerability overview and potential loss were gathered from the 2013 Missouri State Hazard Mitigation Plan.

The updated annualized loss scenario presented here shows the economic losses to buildings annualized over eight earthquake return periods (100, 200, 500, 750, 1,500, 2,000 and 2,500 years). HAZUS defines annualized loss as the expected value of loss in any one year. The software develops annualized loss estimates by aggregating the losses and their exceedance probabilities from the eight return periods. Annualized loss is the maximum potential annual dollar loss resulting from various return periods averaged on a 'per year' basis.

Reported in Table 3.5.4a in the 2013 Missouri State Hazard Mitigation Plan is that the annualized building loss in Butler County would be \$2,190,000 or a loss ratio of 0.05%. Annualized income loss is projected to be \$630,000 and total economic loss to buildings at \$2,824,000. Butler County ranks 8th in the state for its loss ratio, whereas Pemiscot County which borders the Mississippi River, is ranked first.

A second scenario, based on an event with a 2% probability of exceedance in 50 years was also done to model a "worst case scenario". The methodology is based on probabilistic seismic hazard shaking grids developed by the USGS. The maps provide estimates of peak ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively, which have a 2% probability of exceedance in the next 5 years. This scenario used a 7.7 driving magnitude, which is typical New Madrid fault planning scenario.

As reported in Table 3.5.4c in the 2013 Missouri State Hazard Mitigation Plan, structural damage would amount to \$222,353,000, with non-structural damage estimated at \$781,152,000. Also contents damage and inventory loss are estimated at \$297,008,000. Total economic loss to buildings

in Butler County is estimated at \$1,658,104,000. The loss ratio for the county is estimated at 27.25% which would rank eighth in the state.

### ***Impact of Future Development***

Future development is not expected to increase the risk other than contributing to the overall exposure of what could become damaged as a result of an event.

### **Problem Statement**

Butler County is very near the New Madrid Seismic Zone, near enough that substantial damage would result in Butler County from a severe earthquake. The estimated loss data provided above demonstrates the level of loss the county would experience. In both scenarios presented above, Butler County ranks in the top ten counties in the state in regards to loss ratio.

The one area that has a higher potential for damage, as discussed above is downtown Poplar Bluff with its historic buildings, the courthouse being built in 1928 and many other surrounding buildings having also been constructed in the early 1900's. The greatest concern of the MPC was the lives of local residents. To address this concern, the MPC developed the following goals for this updated plan:

- Continue participation in earthquake awareness events

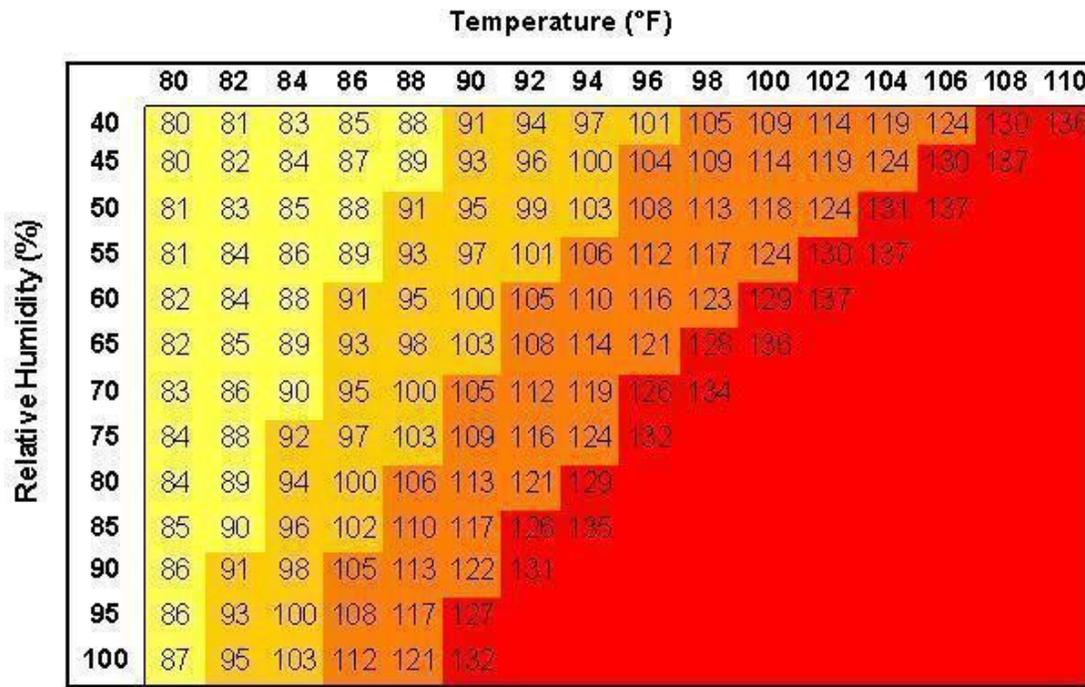
## Extreme Heat

### Hazard Profile

#### *Hazard Description*

Extreme temperature events, both hot and cold, can impact human health and mortality, natural ecosystems, agriculture and other economic sectors. The remainder of this section profiles extreme heat. Extreme cold events are profiled in combination with Winter Storm in **Section 3.4.11**. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown in **Figure 3.6** uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

Figure 3.6 Heat Index (HI) Chart



**Likelihood of Heat Disorders with Prolonged Exposure or Strenuous Activity**

Caution
  Extreme Caution
  Danger
  Extreme Danger

Source: National Weather Service (NWS)

Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

**Geographic Location**

Extreme heat is an area-wide hazard event, and the risk of extreme heat does not vary across the planning area. All areas are equally susceptible to the impacts of extreme heat. Extreme heat events are typically regional in nature and impact multiple counties, and even multiple states.

**Severity/Magnitude/Extent**

Extreme heat can cause stress to crops and animals. According to USDA Risk Management Agency, losses to insurable crops during the 5-year time period from 2012 to 2016 were \$13,731,888 and 132,458.82 acres. Extreme heat can also strain electricity delivery infrastructure overloaded during peak use of air conditioning during extreme heat events. Another type of infrastructure damage from extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

From 2006-2010, there were 3,340 fatalities in the U.S. attributed to summer heat according to the Center for Disease Control. This translates to an annual national average of 668 deaths. During the same period there was one death in 2011 attributed to extreme heat in Butler County. The National Weather Service stated that among natural hazards, no other natural disaster—not lightning, hurricanes, tornadoes, floods, or earthquakes—causes more deaths.

Those at greatest risk for heat-related illness include infants and children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. In agricultural areas, the exposure of farm workers, as well as livestock, to extreme temperatures is a major concern.

**Table 3.19** lists typical symptoms and health impacts due to exposure to extreme heat.

**Table 3.19 Typical Health Impacts of Extreme Heat**

Heat Index (HI)	Disorder
80-90° F (HI)	Fatigue possible with prolonged exposure and/or physical activity
90-105° F (HI)	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure and/or physical activity
105-130° F (HI)	Heatstroke/sunstroke highly likely with continued exposure

Source: National Weather Service Heat Index Program, [www.weather.gov/os/heat/index.shtml](http://www.weather.gov/os/heat/index.shtml)

The National Weather Service has an alert system in place (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when for two or more consecutive days : (1) when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F); and the night time minimum Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees and a warning is

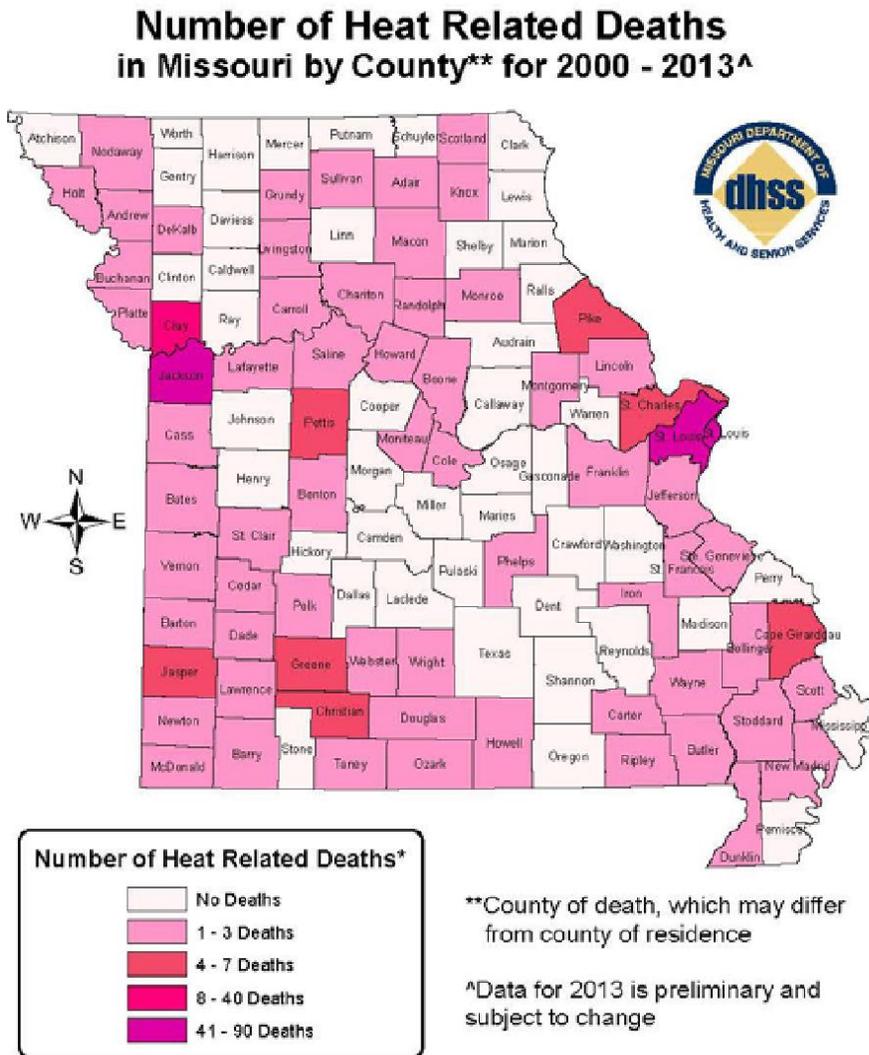
issued at 115 degrees.

### ***Previous Occurrences***

According to the National Climatic Data Center (NCDC) database, from August 1, 2010 through August 1, 2015 there were nine reported excessive heat events. These nine events included 38 days of excessive heat. In reviewing the reports provided by the NCDC there was one fatality in Butler County believed to be related to excessive heat during this time period. The death was reported on July 11, 2011 and was reported as a 57-year old man that died in a camper that only had a fan for cooling and ventilation.

The following map (**Figure 3.7**), depicts the number of heat related deaths by county from 2000-2013. Butler County falls within the same colored category as many of its neighbors that have experienced 1-3 deaths during this same time period.

Figure 3.7 Heat Related Deaths in Missouri 2000 - 2013



\*Source: Bureau of Environmental Epidemiology

Date: 6/5/2014

### ***Probability of Future Occurrence***

The probability of future occurrence can be calculated by dividing the number of extreme heat events by the number of years, in this case 9 events divided by 5 years equals greater than a 100% probability that an extreme heat event will occur in any given year. The average number of events per year would be approximately two. Extreme heat events are often underreported and this data is based on those events reported by NOAA through its NCDC.

### **Vulnerability**

#### ***Vulnerability Overview***

All areas of the county are vulnerable to impacts of extreme heat, however, those with a higher percentage of elderly may be more at risk due to the heightened vulnerability of this segment of the

population. The 2010 US Census reports that 17.0% of the population of Butler County is over 65 years of age, the City of Fisk has a percentage of elderly at 18.7%; Neelyville at 13.3%, Poplar Bluff at 18.2% and Quilin reported as 17.2% elderly.

In addition to the populations are risk from extreme heat, crops are also of concern for the county. According to the United States Department of Agriculture, from 2012-2106 crop insurance loss reports detail that 132,458.82 acres and \$13,731,888 of crops were lost due to extreme heat events.

**Potential Losses to Existing Development**

Based on historical data of two deaths and the losses reported through the United States Department of Agriculture Crop Loss reports, future losses are to be expected. In reviewing the data above, there was one death reported over a five year period, resulting in a 20% chance that a death could occur in any given year due to extreme heat.

Crop loss data is based on five years of history. Using the data presented above regarding losses, it can be estimated that 26,490 acres per year of crops will be lost to extreme heat and \$2,746,377 in revenues from crops would be lost each year.

**Impact of Future Development**

Population growth can result in increases in the age-groups that are most vulnerable to extreme heat. Population growth also increases the strain on electricity infrastructure, as more electricity is needed to accommodate the growing population. There has been a slight decrease in the percentage of local residents over the age of 65 between 2000 and 2010. In the 2010 US Census it was reported that 17% of county residents were over age 65, which is an increase of 3.8% from the 16.7% reported in the 2000 US Census.

**Hazard Summary by Jurisdiction**

Those at greatest risk for heat-related illness and deaths include children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations more vulnerable to extreme heat, demographic data was obtained from the 2010 census on population percentages in each jurisdiction comprised of those under age 5 and over age 65. Data was not available for overweight individuals and those on medications vulnerable to extreme heat. **Table 3.20** below summarizes vulnerable populations in the participating jurisdictions. Note that school and special districts are not included in the table because students and those working for the special districts are not customarily in these age groups.

**Table 3.20 County Population Under Age 5 and Over Age 65, 2010 Census Data**

Jurisdiction	Populati on Under 5 yrs	Population 65 yrs and over
*Butler County	2,752	7,265
City of Fisk	21	64
City of Neelyville	25	64

City of Poplar Bluff	1,276	3,097
City of Quin	26	79

Source: U.S. Census Bureau, (\*) includes entire population of each city or county

All school district buildings in the county have air conditioners that are utilized in times of high temperatures. School is typically not in session during the hottest time of the year which is typically the month of July. All school districts in the county remain open regardless of temperature. However, accommodations are made for extreme heat events such as keeping children indoors during recess times to reduce potential exposure to extreme heat. Additionally, all schools in the county comply with the Missouri State High School Activities Association guidelines for avoiding heat-related problems during practice and sporting events.

All other strategic buildings and critical facilities within the county are air conditioned with no increased susceptibility to damages from extreme heat.

## **Problem Statement**

The risks presented in this section resulting from extreme heat include heat related illness and death and damage to crops in the county. To address the problem of extreme heat the MPC have included the following actions:

- Provide heat related illness educational information to the general public
- Create a database of vulnerable populations in cooperation with home health care agencies

### 3.4.5 Wildfires

#### **Hazard Profile**

##### ***Hazard Description***

Due to the rural nature of Butler County urban and structural fires are not discussed within this plan. The greater and more prevalent hazard in Butler County is wildfires. The fire incident types for wildfires include: 1) natural vegetation fire, 2) outside rubbish fire, 3) special outside fire, and 4) cultivated vegetation, crop fire.

The Missouri Division of Fire Safety (MDFS) indicates that approximately 80 percent of the fire departments in Missouri are staffed with volunteers. In Butler County all of the fire departments are strictly volunteer staffed with the exception of the City of Doniphan that has a fire chief that is paid. These departments are very limited by lack of resources and financial assistance. The majority of the funding for the fire departments in Butler County comes through fundraisers and annual membership fees paid by businesses and households in the department's respective service area. The City of Doniphan Fire Department receives a small amount of funding through the City's budget.

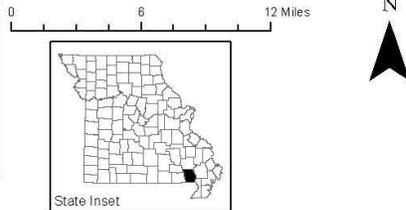
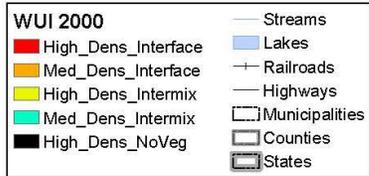
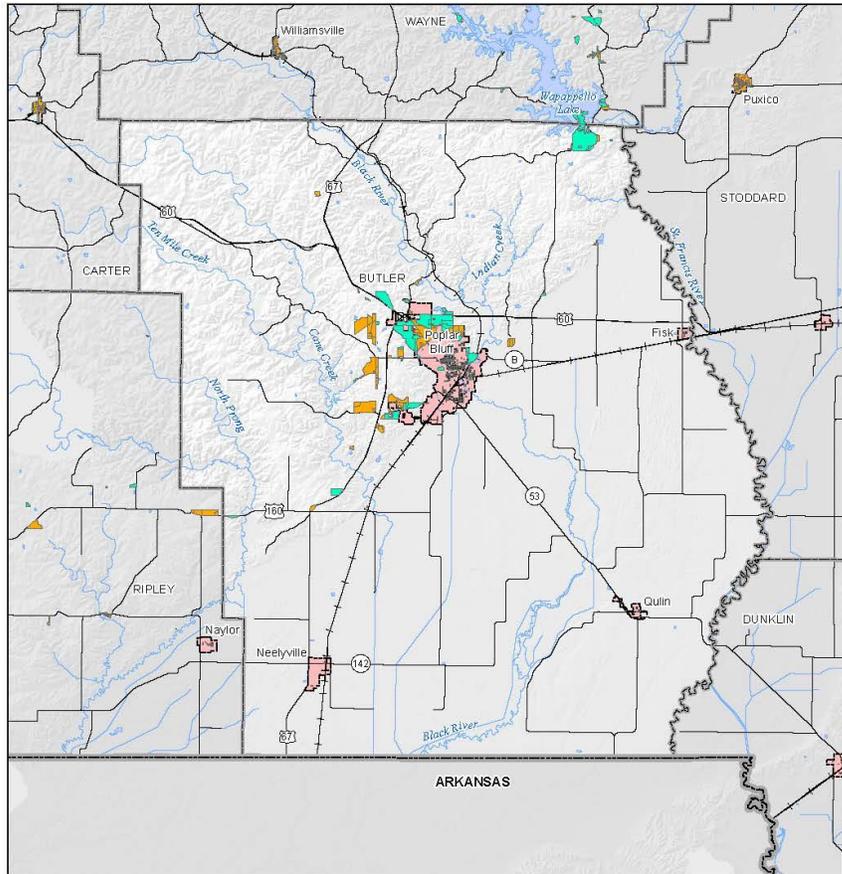
The Forestry Division of the Missouri Department of Conservation (MDC) is responsible for protecting privately owned and state-owned forests and grasslands from wildfires. To accomplish this task, eight forestry regions have been established in Missouri for fire suppression. The Forestry Division works closely with volunteer fire departments and federal partners to assist with fire suppression activities. Currently, more than 900 rural fire departments in Missouri have mutual aid agreements with the Forestry Division to obtain assistance in wildfire protection if needed.

Most of Missouri fires occur during the spring season between February and May. The length and severity of both structural and wildland fires depend largely on weather conditions. Spring in Missouri is usually characterized by low humidity and high winds. These conditions result in higher fire danger. In addition, due to the recent lack of moisture throughout many areas of the state, conditions are likely to increase the risk of wildfires. Drought conditions can also hamper firefighting efforts, as decreasing water supplies may not prove adequate for firefighting. It is common for rural residents burn their garden spots, brush piles, and other areas in the spring. Some landowners also believe it is necessary to burn their forests in the spring to promote grass growth, kill ticks, and reduce brush. Therefore, spring months are the most dangerous for wildfires. The second most critical period of the year is fall. Depending on the weather conditions, a sizeable number of fires may occur between mid-October and late November.

##### ***Geographic Location***

Damages due to wildfires have the potential to be higher in communities with more wildland-urban interface (WUI) areas. The term refers to the zone of transition between unoccupied land and human development and needs to be defined in the plan. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the Intermix areas are those areas that intermingle with wildland areas.

Butler County Wildland Urban Interface



Map intended for planning purposes only.  
 Data Source: silvis.forest.wisc.edu  
 Definitions: <http://silvis.forest.wisc.edu/old/Library/WUIDefinitions.php>

**Severity/Magnitude/Extent**

Wildfires damage the environment, killing some plants and occasionally animals. Firefighters have been injured or killed, and structures can be damaged or destroyed. The loss of plants can heighten the risk of soil erosion and landslides. Although Missouri wildfires are not the size and intensity of those in the Western United States, they could impact recreation and tourism in and near the fires.

Wildland fires in Missouri have been mostly a result of human activity rather than lightning or some

other natural event. Wildfires in Missouri are usually surface fires, burning the dead leaves on the ground or dried grasses. They do sometimes “torch” or “crown” out in certain dense evergreen stands like eastern red cedar and shortleaf pine. However, Missouri does not have the extensive stands of evergreens found in the western US that fuel the large fire storms seen on television news stories.

While very unusual, crown fires can and do occur in Missouri native hardwood forests during prolonged periods of drought combined with extreme heat, low relative humidity, and high wind. Tornadoes, high winds, wet snow and ice storms in recent years have placed a large amount of woody material on the forest floor that causes wildfires to burn hotter and longer. These conditions also make it more difficult for firefighters suppress fires safely.

Often wildfires in Missouri go unnoticed by the general public because the sensational fire behavior that captures the attention of television viewers is rare in the state. Yet, from the standpoint of destroying homes and other property, Missouri wildfires can be quite destructive.

### ***Previous Occurrences***

According to the Missouri Department of Conservation Wildlife Data Search, there have been 729 reported wildfires in Butler County from January 1, 2010 through December 31, 2016. There was a reported 1,517.77 acres that burned during this time period. Also reported by the Department of Conservation was that seven (7) residences were damaged during this time period and eleven (11) outbuildings were also damaged. Additionally, there were a reported four (4) residences and twelve (12) outbuildings destroyed. There are no reports of any deaths or injuries due to these fires.

According to discussions with local fire departments, school districts, public water district officials, and the county emergency management director, there have been no fires that have resulted in damages to any school district facilities within the county. There have also not been any fires that resulted in damages to the public water supply districts.

### ***Probability of Future Occurrence***

To calculate the probability of future occurrences of wildland fires: (729 number of reported wildland fires in 7 number of years equals 100% probability in any given year). Therefore it can be predicted that approximately 104 wildfires occur each year within Butler County. From interviews with local fire fighters and the county emergency management director this probability seems to be accurate from past experiences, articles, or other sources.

## **Vulnerability**

### ***Vulnerability Overview***

A large portion of Butler County is covered by areas of the Mark Twain National Forest which is where many of the wildland fires in the county occur. As presented in the data above, it is certain that a wildland fire will occur, with an historical average of 104 per year. However, most of these fires are small in size, with the average fire burning approximately two acres. In reviewing the data from the reported fires, it can be seen that many of the fires are less than an acre with only a limited number of fire annually being several acres.

The greatest areas of vulnerability are in areas of Wildland/Urban Interfaces (WUI). These areas are defined as zones of transition between unoccupied land and human development. Communities that are within 0.5 miles of the zone may also be included. These lands and communities adjacent to and surrounded by wildlands are at risk of wildfires. These areas in Butler County specifically include areas around the City of Poplar Bluff as the areas around Fisk, Qulin, and Neelyville are comprised mostly of row crop farmland.

### ***Potential Losses to Existing Development***

Although dollar values are not assigned to prior losses, it can be determined that over the seven years of data available from the Missouri Department of Conservation, there have been damages to seven residences and eleven outbuildings. It is also reported that four residences have been destroyed and twelve outbuildings have been destroyed. When adding the two categories together there have been eleven residences impacted by wildland fires and twenty-three outbuildings impacted. When reviewing this historical data it can be predicted that there will be an average of 2 residences either damaged or destroyed every year and 3 outbuildings also either damaged or destroyed every year by wildland fires.

### ***Impact of Future Development***

Future development is not anticipated to increase the potential impact of wildland fires in Butler County.

### ***Hazard Summary by Jurisdiction***

Summarize any differences in vulnerability by jurisdiction, including school and special districts. Communities with more WUI areas will be at greater risk of wildland fires. Absent demographic factors or other variations in housing construction, risk of structural fire probably does not vary greatly across the planning area. A WUI map is included in Appendix B with Butler County outlined on the state map.

### **Problem Statement**

With the rural nature of Butler County and the large areas of the County that are part of the Mark Twain National Forest, wildland fires are inevitable. The greatest risk to property damages occur in the Wildland/Urban Interface areas where residential areas intersect with the wildland areas. Based upon historical data, residences and outbuildings have been damaged and destroyed by wildland fires.

In reviewing the risk of wildland fires and the historical data related to wildland fires, the Mitigation Planning Committee felt that two goals could be incorporated into the plan to help reduce the impacts of wildland fires:

- Seek funding and develop a fire safety awareness program addressing all types of fires. Included in this project would also be the purchase and installation of smoke detectors.
- The continued coordination of burn bans with cooperation from the county commissioners,

county emergency management director, local fire departments, the National Forest Service and the Missouri Department of Conservation.

### 3.4.6 Flooding (Flash and River)

#### Profile

##### *Hazard Description*

A flood is partial or complete inundation of normally dry land areas. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt, or ice. There are several types of riverine floods, including headwater, backwater, interior drainage, and flash flooding. Riverine flooding is defined as the overflow of rivers, streams, drains, and lakes due to excessive rainfall, rapid snowmelt or ice melt. The areas adjacent to rivers and stream banks that carry excess floodwater during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat area adjoining a river or stream. The terms “base flood” and “100- year flood” refer to the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year. Floodplains are part of a larger entity called a basin, which is defined as all the land drained by a river and its branches.

Flooding caused by dam failure is discussed in Section 3.4.1. It will not be addressed in this section.

A flash flood occurs when water levels rise at an extremely fast rate as a result of intense rainfall over a brief period, sometimes combined with rapid snowmelt, ice jam release, frozen ground, saturated soil, or impermeable surfaces. Flash flooding can happen in Special Flood Hazard Areas (SFHAs) as delineated by the National Flood Insurance Program (NFIP), and can also happen in areas not associated with floodplains.

Ice jam flooding is a form of flash flooding that occurs when ice breaks up in moving waterways, and then stacks on itself where channels narrow. This creates a natural dam, often causing flooding within minutes of the dam formation.

In some cases, flooding may not be directly attributable to a river, stream, or lake overflowing its banks. Rather, it may simply be the combination of excessive rainfall or snowmelt, saturated ground, and inadequate drainage. With no place to go, the water will find the lowest elevations – areas that are often not in a floodplain. This type of flooding, often referred to as sheet flooding, is becoming increasingly prevalent as development outstrips the ability of the drainage infrastructure to properly carry and disburse the water flow.

Most flash flooding is caused by slow-moving thunderstorms or thunderstorms repeatedly moving over the same area. Flash flooding is a dangerous form of flooding which can reach full peak in only a few minutes. Rapid onset allows little or no time for protective measures. Flash flood waters move at very fast speeds and can move boulders, tear out trees, scour channels, destroy buildings, and obliterate bridges. Flash flooding can result in higher loss of life, both human and animal, than slower developing river and stream flooding.

In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with rainfall trends and rainfall extremes all demonstrate the high probability, yet generally

unpredictable nature of flash flooding in the planning area.

Although flash floods are somewhat unpredictable, there are factors that can point to the likelihood of flash floods occurring. Weather surveillance radar is being used to improve monitoring capabilities of intense rainfall. This, along with knowledge of the watershed characteristics, modeling techniques, monitoring, and advanced warning systems has increased the warning time for flash floods.

**Geographic Location**

Riverine flooding is most likely to occur in SFHAs. Butler County has two significant rivers that are primarily responsible for riverine flooding. The Black River and the St. Francis River are the causes of riverine flooding most often. In fact, riverine flooding is one of the more common natural hazards that occur in Butler County. The riverine flooding history below was gathered from the National Climatic Data Center (NCDC) for a twenty-year period of July 1, 1997 through June 30, 2017. In reviewing SFHA and data collection questionnaires, there are no school district assets located within any SFHA's. **Table 3.21** shows Butler County riverine flood event history.

**Table 3.21 Butler County NCDC Riverine Flood Events by Location, 1997-2017**

Location	# of Events
Unincorporated County	18
-Unincorporated County (unspecified)- 7 flood events	
-Unincorporated County (Ash Hill)- 1 flood events	
-Unincorporated County (Fagus)- 1 flood events	
-Unincorporated County (Harviel)- 1 flood events	
-Unincorporated County (Hendrickson)- 1 flood events	
-Unincorporated County (Hillard) – 1 flood event	
- Unincorporated County (Lone Hill) – 1 flood event	
- Unincorporated County (Mengo) – 1 flood event	
- Unincorporated County (Rombauer) – 1 flood event	
-Unincorporated County (Stringtown)- 3 flood events	
City of Fisk – 4 flood events	4
City of Neelyville – 1 flood event	1
City of Poplar Bluff – 22 flood events	22
<b>Total Flood Events</b>	<b>45</b>

Source: National Climatic Data Center

Flash flooding occurs in SFHAs and those locations in the planning area that are low-lying. They also occur in areas without adequate drainage to carry away the amount of water that falls during intense rainfall events. The City of Poplar Bluff is the most susceptible to flash flooding incidents. Inside city limits are more streets and impervious areas that often lead to causing flash flooding. Areas such as streets, sidewalks, parking lots, and driveways prevent rain water from being absorbed by the ground and create runoff of water that can lead to flash flooding, especially in low lying areas of the city. In reviewing the incidents reported by the NCDC database for the time period July 1, 1997 through June 30, 2017 there were 46 flash flood events in the county and twenty, or nearly- half of them were reported to impact Poplar Bluff. Table (**Table 3.22**) provides the number of flash flood events by location recorded in NCDC for the 20 year period.

**Table 3.22 Butler County NCDC Flash Flood Events by Location, 1997-2017**

Location	# of Events
Unincorporated County	22
-Unincorporated County (Broseley)- 1 flood events	
-Unincorporated County ("Countywide")- 9 flood events	
-Unincorporated County (East Portion)- 1 flood events	
-Unincorporated County (Fagus)- 1 flood events	
-Unincorporated County (Harviell)- 1 flood events	
-Unincorporated County (Hendrickson)- 2 flood events	
-Unincorporated County (Hillard)- 2 flood events	
-Unincorporated County (Lone Hill)- 2 flood events	
-Unincorporated County (South Portion)- 1 flood events	
-Unincorporated County (Southwest)- 1 flood events	
-Unincorporated County (Stringtown)- 1 flood events	
City of Fisk	1
City of Neelyville	2
City of Poplar Bluff	20
City of Qulin	1
Total Incidents	46

Source: National Climatic Data Center

### ***Severity/Magnitude/Extent***

Missouri has a long and active history of flooding over the past century, according to the 2013 State Hazard Mitigation Plan. Flooding along Missouri's major rivers generally results in slow-moving disasters. River crest levels are forecast several days in advance, allowing communities downstream sufficient time to take protective measures, such as sandbagging and evacuations. Nevertheless, floods exact a heavy toll in terms of human suffering and losses to public and private property. By contrast, flash flood events in recent years have caused a higher number of deaths and major property damage in many areas of Missouri.

Flooding presents a danger to life and property, often resulting in injuries, and in some cases, fatalities. Floodwaters themselves can interact with hazardous materials. Hazardous materials stored in large containers could break loose or puncture as a result of flood activity. Examples are bulk propane tanks. When this happens, evacuation of citizens is necessary.

Public health concerns may result from flooding, requiring disease and injury surveillance. Community sanitation to evaluate flood-affected food supplies may also be necessary. Private water and sewage sanitation could be impacted, and vector control (for mosquitoes and other entomology concerns) may be necessary.

When roads and bridges are inundated by water, damage can occur as the water scours materials around bridge abutments and gravel roads. This is of particular concern for two bridges on Route 142 in Butler County, one over the Little Black River and one over Harris Creek. Floodwaters can also cause erosion undermining road-beds. In some instances, steep slopes that are saturated with water

may cause mud or rock slides onto roadways. These damages can cause costly repairs for state, county, and city road and bridge maintenance departments. When sewer back-up occurs, this can result in costly cleanup for home and business owners as well as present a health hazard.

**National Flood Insurance Program (NFIP) Participation**

The following table (Table 3.23) provides details on NFIP participation for the communities in the planning area. Table 3.24 provides information about NFIP policies as of August 31, 2017.

**Table 3.23 NFIP Participation in Butler County**

Community ID #	Community Name	NFIP Participant (Y/N)	Current Map Date	Effective Date	Regular-Emergency Program Entry Date
290044	Butler County	Y	05/03/2010		04/03/1985
290045	City of Fisk	Y	11/26/2010		09/16/1981
290046	City of Neelyville	Y	11/26/2010		05/05/1981
290047	City of Poplar Bluff	Y	11/26/2010		02/04/1981
290048	City of Qulin	Y	11/26/2010		10/15/1981

Source: NFIP Community Status Book, 9/26/2013; BureauNet, <http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book>; M= No elevation determined – all Zone A, C, and X; NSFHA = No Special Flood Hazard Area; E=Emergency Program

**Table 3.24 NFIP Policy and Claim Statistics as of July 31, 2017**

Community Name	Policies in Force	Insurance in Force	Closed Losses	Total Payments
Butler County	543	57,349,200	269	6,562,361.21
City of Fisk	36	1,838,300	1	9,485.94
City of Neelyville	6	978,700	2	6,174.12
City of Poplar Bluff	137	26,956,500	128	2,999,927.43
City of Qulin	9	682,600	6	51,287.96

Source: NFIP Community Status Book, [insert date]; BureauNet, <http://bsa.nfipstat.fema.gov/reports/reports.html>; \*Closed Losses are those flood insurance claims that resulted in payment. Loss statistics are for the period from [date] to [date].

The unincorporated areas of Butler County had the most closed losses with 269 total payments for those claims of \$6,562,361.21. The City of Poplar Bluff had a high rate of closed losses at 128 with total payments of \$2,999,927.43. These records are based on a timeframe of January 1, 1978 through July 31, 2017.

**Repetitive Loss/Severe Repetitive Loss Properties**

Repetitive Loss Properties are those properties with at least two flood insurance payments of \$5,000 or more in a 10-year period. According to the Flood Insurance Administration, jurisdictions included in the planning area have a combined total of seventy-two (72) repetitive loss properties. As of August 31, 2017 a total of no SRL/RL properties have been mitigated.

The following table (Table 3.25) provides a summary of the repetitive loss properties in the

planning area.

**Table 3.25 Butler County Repetitive Loss Properties**

Jurisdiction	# of Properties	Building Payments	Content Payments	Total Payments	Average Payment	# of Losses
Butler County	56	\$3,527,361.64	\$765,403.94	\$4,292,765.58	\$31,564.45	136
City of Fisk	0	0	0	0	0	0
City of Neelyville	0	0	0	0	0	0
City of Poplar Bluff	15	\$523,509.90	\$1,273,632.18	\$1,797,142.08	\$51,346.92	35
City of Qulin	1	\$24,945.89	\$1,356.45	\$26,302.34	\$13,151.17	2

Source: Flood Insurance Administration as of August 31, 2017

**Severe Repetitive Loss (SRL):** A SRL property is defined it as a single family property (consisting of one-to-four residences) that is covered under flood insurance by the NFIP; and has (1) incurred flood-related damage for which four or more separate claims payments have been paid under flood insurance coverage with the amount of each claim payment exceeding \$5,000 and with cumulative amounts of such claims payments exceeding \$20,000; or (2) for which at least two separate claims payments have been made with the cumulative amount of such claims exceeding the reported value of the property.

There are seventy-two (72) validated Severe Repetitive Loss properties in the county, of these fifty-six (56) are located in unincorporated Butler County, fifteen (15) are within the city limits of Poplar Bluff, and one (1) inside the city limits of Qulin. These 72 properties include 57 residential properties and 15 commercial properties. There have been 173 losses claimed over these 72 properties.

**Previous Occurrences**

Following is a listing of presidential flooding disaster declarations that included the planning area, and their impact:

- DR-4317 – Declared 06/02/2017 for the incident period 04/28/2017 and ending 05/11/2017 for severe storms, tornadoes, straight-line winds, and flooding.
- DR-1980 – Declared 05/09/2011 for incidents beginning 04/19/2011 and ending 06/06/2011 for severe storms, tornadoes, and flooding.
- DR-1847 – Declared 06/19/2009 for incidents beginning 05/08/2009 and ending 05/16/2009 for severe storms, tornadoes, and flooding.
- DR-1822 – Declared 02/17/2009 for incidents beginning 01/26/2009 and ending 01/28/2009 for severe winter storm.
- DR-1809 – Declared 11/13/2008 for incidents beginning 09/11/2008 and ending 09/24/2008 for severe storms, flooding and tornadoes.
- DR-1749 – Declared 03/19/2008 for incidents beginning 03/17/2008 and ending 05/09/2008 for severe storms and flooding

## 2017 Butler County Hazard Mitigation Plan

- DR-1006 – Declared 12/01/1993 for incidents beginning 11/13/1993 and ending 11/19/1993 for flooding, severe storms, and tornadoes.

The following tables (**Tables 3.26 and Table 3.27**) provide annual flash flooding and riverine flooding for Butler County. The data was obtained through the NOAA National Climatic Data Center using the data for events occurring July 1, 1997 through June 30, 2017.

**Table 3.26 NCDC Butler County Flash Flood Events Summary, 1997 to 2017**

Year	# of Events	# of Deaths	# of Injuries	Property Damages \$	Crop Damages \$
1997	1	0	0	40,000	0
1998	5	0	0	50,000	0
1999	2	0	0	70,000	0
2000	1	0	0	40,000	0
2001	1	0	0	5,000	0
2002	5	0	0	45,000	0
2003	2	0	0	0	0
2004	2	0	0	4,000	0
2006	1	0	0	250,000	0
2007	2	0	0	75,000	0
2008	5	0	0	40,000	0
2009	2	0	0	0	0
2010	2	0	0	60,000	0
2011	3	0	0	100,000	0
2012	1	0	0	10,000	0
2013	1	0	1	90,000	0
2014	1	0	0	200,000	0
2015	3	1	0	23,000	0
2016	2	0	0	4,000	0
2017	2	0	0	35,000	0

Source: NCDC, 10/05/2017

**Table 3.27 NCDC Butler County Riverine Flood Events Summary, 1997 to 2017**

Year	# of Events	# of Deaths	# of Injuries	Property Damages \$	Crop Damages \$
1998	1	0	0	5,000	0
1999	1	0	0	0	0
2001	2	0	0	30,000	0
2002	3	0	0	36,000	0
2006	2	0	0	0	0
2007	2	0	0	5,000	0
2008	6	0	0	453,000	0
2009	6	3	1	130,000	0

2011	7	0	0	5,800,000	0
2013	1	0	0	20,000	50,000
2014	1	0	0	0	0
2015	4	0	0	2,000	0
2016	4	1	0	175,000	50,000
2017	3	2	0	2,670,000	120,000

Source: NCDC, data accessed 10/05/2017

### ***Probability of Future Occurrence***

The historical data presented above demonstrates that there have been 43 riverine flooding events over a 20-year time period. The probability of a riverine flooding event for any given year is over 100% somewhere in the planning area. The average number of flooding events based on this data is 2 per year.

Prior data regarding flash flooding demonstrates that over a 20 year time period, Butler County experienced 44 events. The probability of a flash flood event occurring in any given year somewhere in the planning area is greater than 100%. On average, 2 flash flood events occur in Butler County.

### **Vulnerability**

#### ***Vulnerability Overview***

The vulnerability overview for Butler County comes primarily from HAZUS data included in the 2013 Missouri State Hazard Mitigation Plan. HAZUS uses GIS technology to estimate the impacts of disasters. HAZUS-MH produces a flood polygon and flood depth grid that represents the base flood. Data for Butler County utilized HAZUS flood data. The 2013 state plan includes Level 2 HAZUS flood analysis for all 114 Missouri counties, this data is coupled with DFIRM depth grids and enhanced building inventory.

DFIRM data is available for Butler County, and impact estimates in counties where DFIRM data was integrated typically increases the losses when compared to counties where only HAZUS-generated flood data was utilized. The damaged building counts generated by HAZUS are susceptible to rounding errors and are likely the weakest output of the model due to the use of HAZUS census blocks for analysis.

#### ***Potential Losses to Existing Development***

In reviewing the data presented in the 2013 state plan, Table 3.5.1e, provides potential loss estimates at risk to the 100-year flood, the data includes building loss, loss ratio, and displace populations. The data used for Butler County estimates the following losses:

- \$98,419,812.37 in structural damage
- \$124,378,734.24 in contents damage
- \$6,171,919.54 in inventory loss
- \$228,970,466.15 in total direct loss
- \$2,282,793.45 in total income loss

- Loss Ratio of the County: 6.30%
- Displaced households: 10,337
- Population requiring shelter: 6,270

In reviewing available data and discussing with school districts, there are no school district assets located in flood plains, and no prior damage reports from the schools resulting from flooding. In discussions with county personnel and local residents, there has been no damage to any critical facilities in the county that resulted from flooding.

Risk Mapping, Assessment, and Planning (RiskMAP) is a new FEMA program that provides communities with flood information and tools they can use to enhance their mitigation plans and better protect citizens. Through more accurate flood maps, risk assessment tools, and outreach, RiskMAP builds on Map Modernization and strengthens local ability to make informed decisions about reducing risk. There currently is no activity regarding RiskMAP in Butler County. The State RiskMAP is included in Appendix B.

### ***Impact of Future Development***

Minimal future development in flood zones is anticipated within Butler County, the impact of flooding is not anticipated to increase noticeably in the county. The areas of risk would be any residential houses built in flood prone areas. This is especially true for areas along the banks of the Black River or St. Francis River. This development would typically occur in the unincorporated areas of Butler County.

The development of large impervious areas such as areas of commercial development or large subdivisions is anticipated, primarily within the city limits of Poplar Bluff. The City of Poplar Bluff administers a stormwater management program through the city's Planning Department. The purpose of the program is to lessen or avoid hazards to people or property caused by uncontrolled stormwater runoff or by obstructions to drainage. Development projects within the City of Poplar Bluff require the planning department to approve a site specific stormwater management plan and a permit prior to commencing and development activity.

### ***Hazard Summary by Jurisdiction***

Vulnerability varies greatly across the county. To the eastern side and the southern portion of the county, there is potential for flooding from the Black River and St. Francis River. This area includes the Cities of Fisk, Neelyville, Poplar Bluff, and Qulin and the all of the unincorporated areas east of Poplar Bluff. Much of this area is farmland and there are not large concentrations of population or potential for large damages. In the center of the county, around Poplar Bluff is also vulnerable to flooding. Poplar Bluff sits on the bank of the Black River and much of the flooding in Poplar Bluff is along these banks and include the east side of the city and the south side of the city. The map included above in the "Geographic Location" provides a pictorial reference of the areas most vulnerable to flooding. Table 3.21 presents information that flooding is most common in the in the unincorporated areas and the City of Poplar Bluff, There were forty-six (46) incidents of flooding reported, twenty-two (22) in the county, one (1) in Fisk, two (2) in Neelyville, and twenty (20) in Poplar Bluff, and one (1) in Qulin that showed events by location. Although no school district assets are vulnerable to riverine flooding, flooding often impacts the students' ability to get to school. When flooding occurs there are occasions where school must be cancelled due to road

closures and water over some roads. For instance, Poplar Bluff R-I School district superintendent stated that his bus drivers know when it floods which students they will not be able to reach. As discussed later in this section, several members of the MPC see a great need for mapping of alternate routes for flooding that are clearly marked.

In reviewing data questionnaires from all participating jurisdictions, including the county, the cities, school districts and Three Rivers College, there do not appear to be any critical facilities located within the floodplain. There is also no recorded damage to critical facilities within the county from a flooding event.

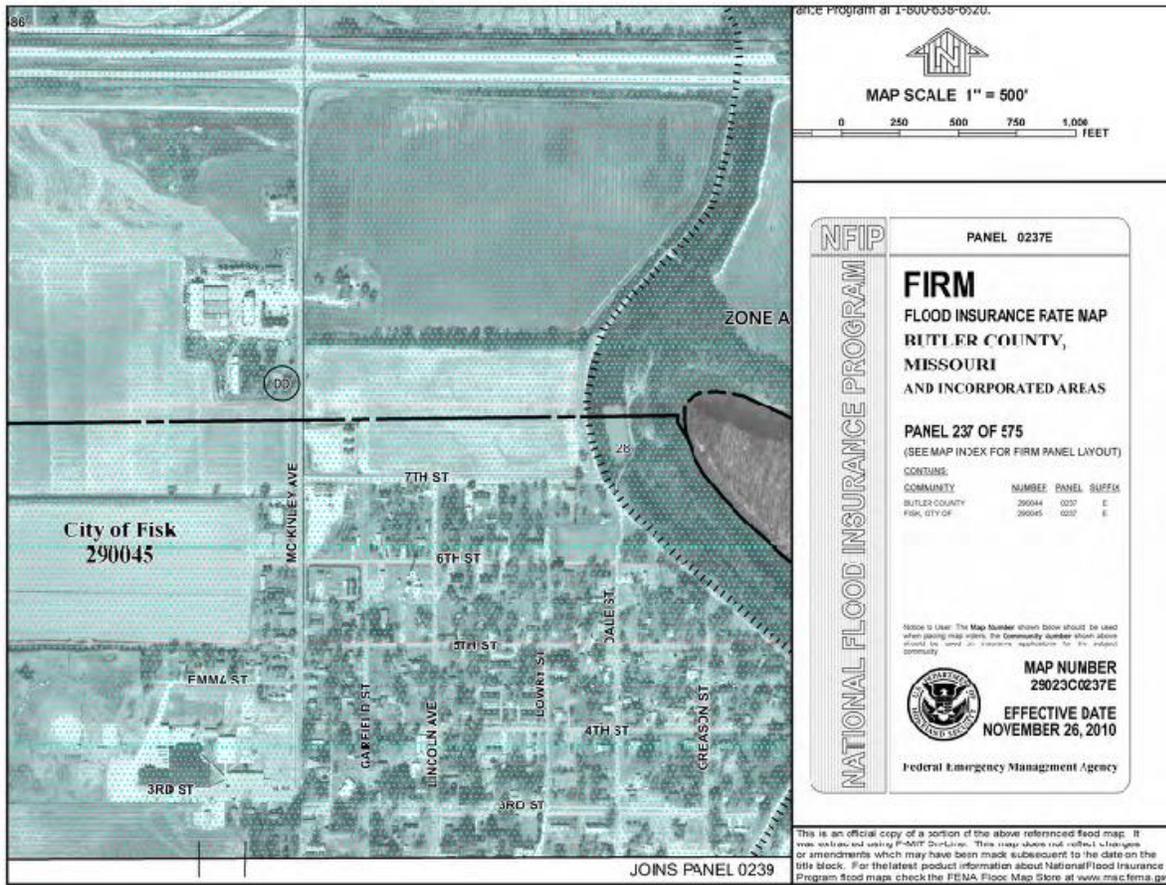
### **Problem Statement**

Butler County is crisscrossed by numerous stream and rivers and is often susceptible to flooding, both flash flooding and riverine flooding. Both types of this flooding have resulted in damages to businesses and to residences in the county and within the City of Poplar Bluff and the City of Quin. The MPC recognizes flooding as one of the most common hazards to strike the county and cause damage to local businesses and residents. As such, the MPC included actions in this plan to mitigate future losses:

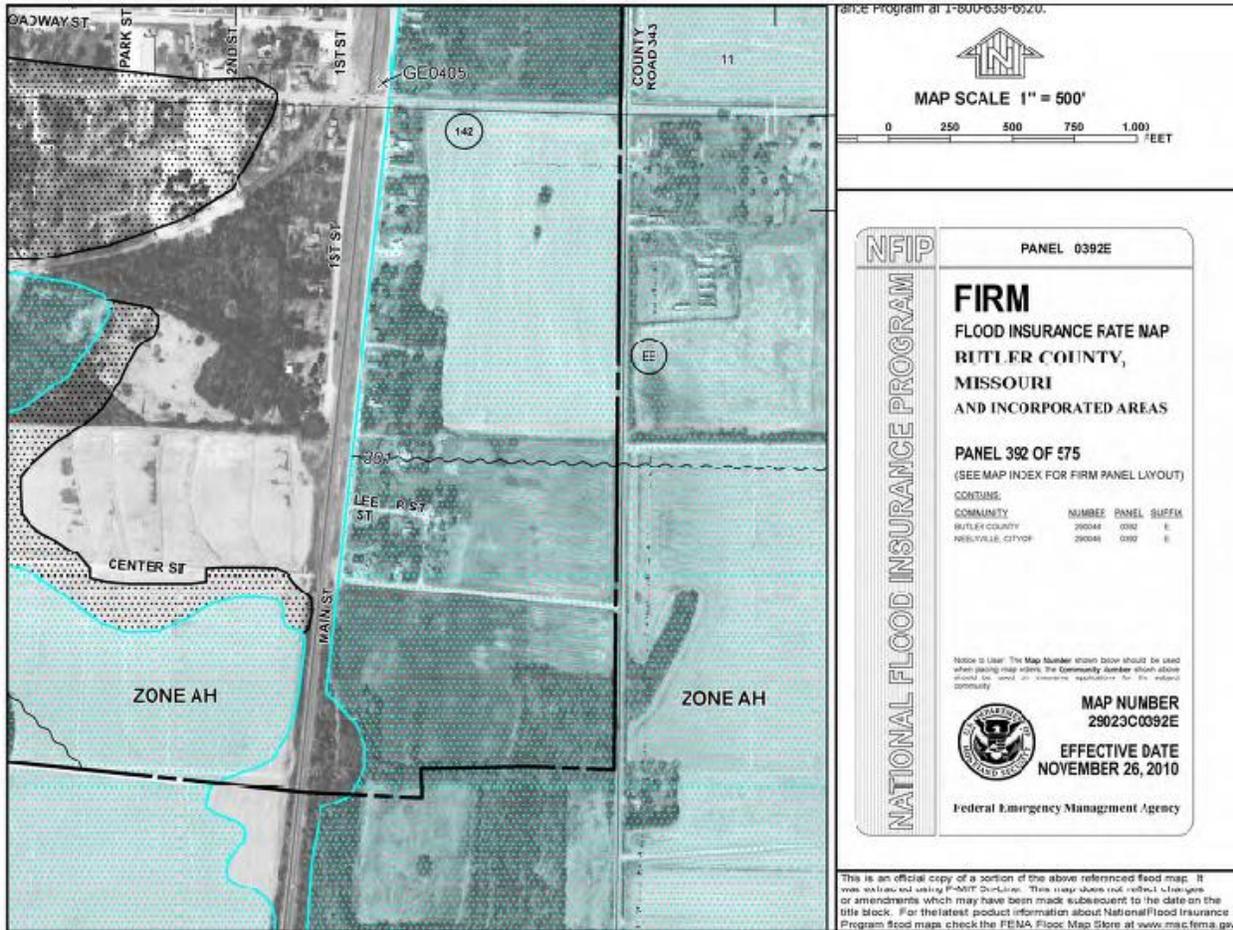
- Ditch cleanout and new ditch construction
- Flood buyouts
- Maps and established evacuation routes
- Enhancements to the City of Poplar Bluff water supply and treatment
- Review and update floodplain management plans
- Continue NFIP participation for all jurisdictions and pursue CFM certification for designated floodplain managers
- Inventory all low-water crossings and prioritize those that need improvements

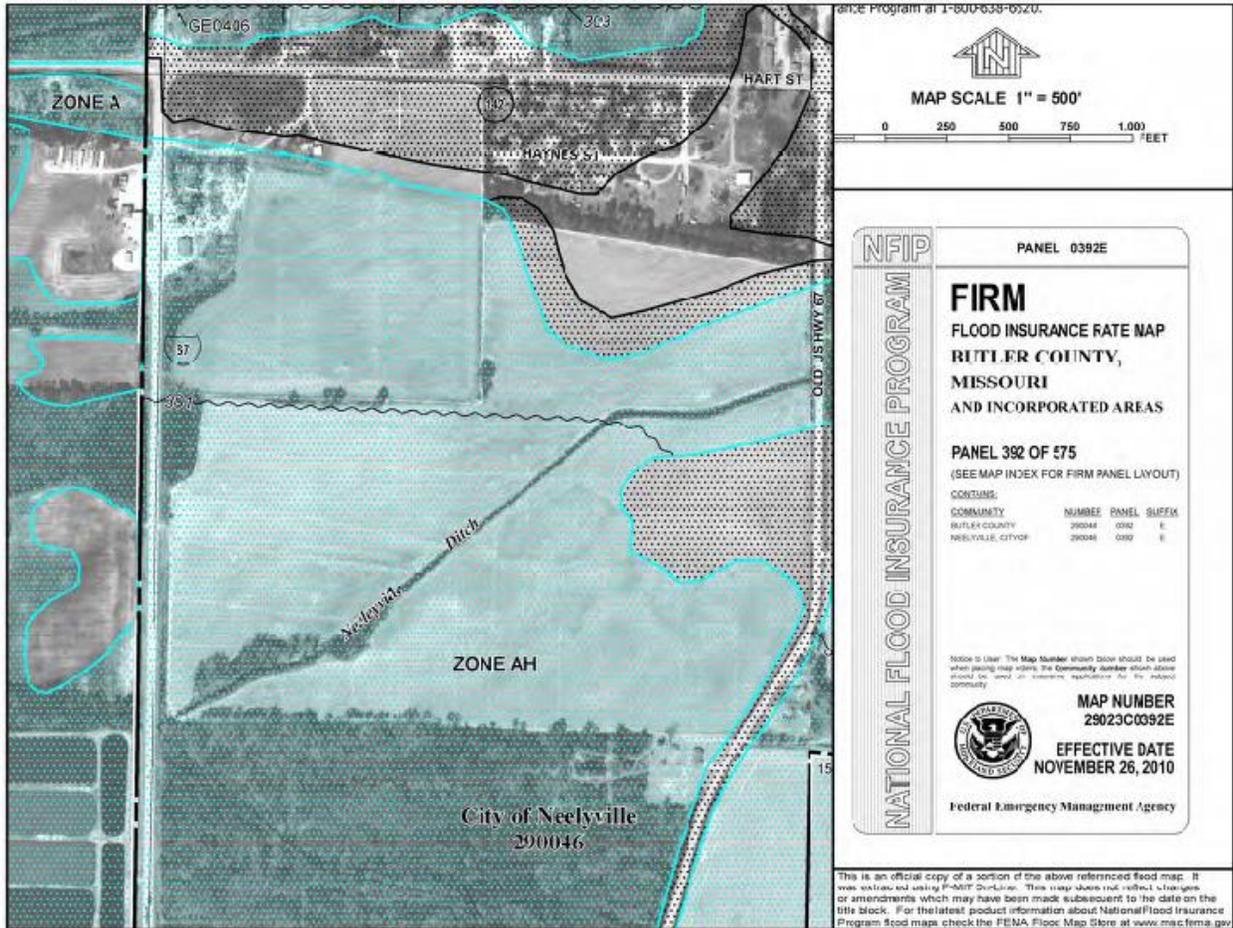
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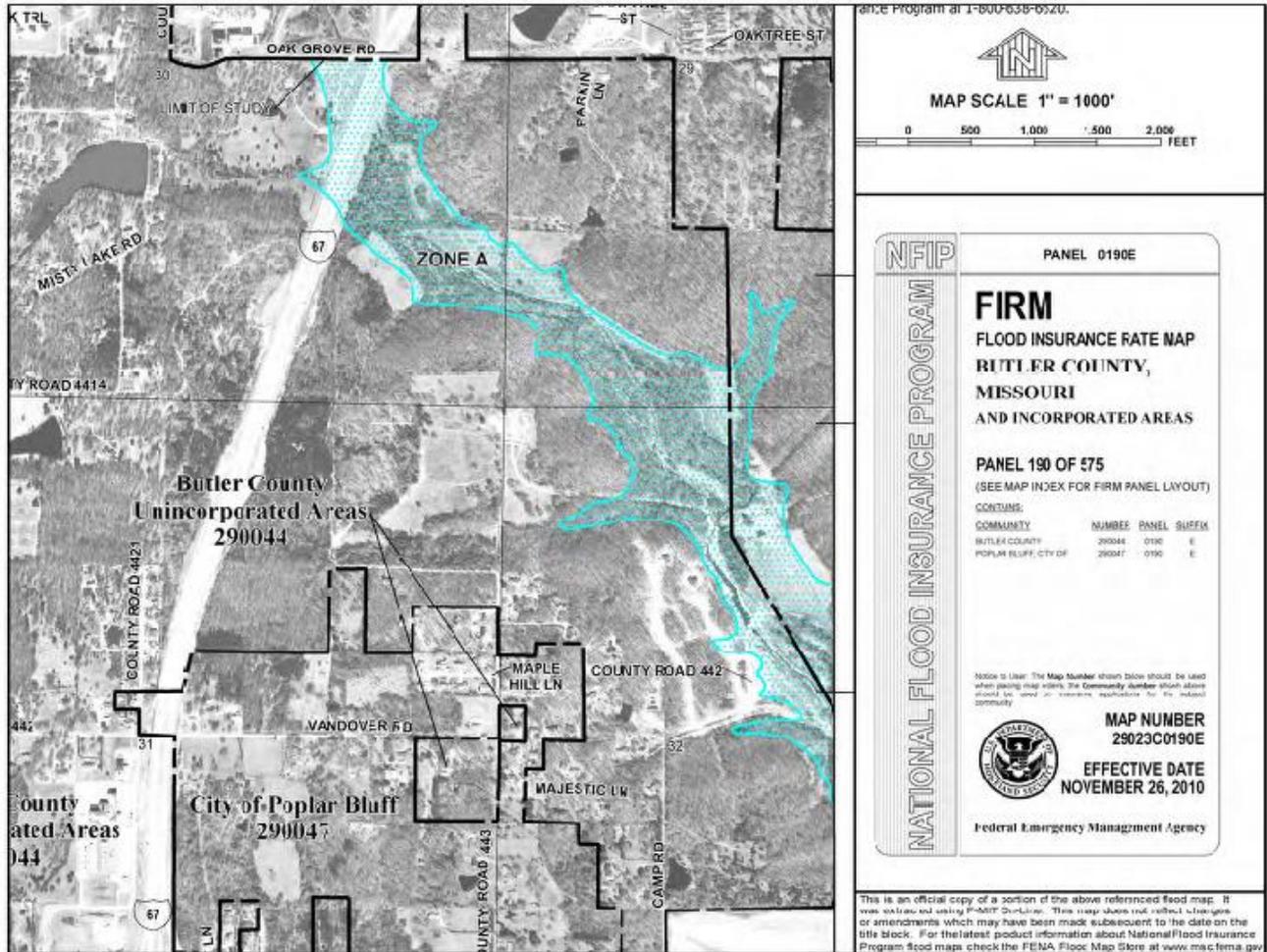
The following pages contain FIRMettes for each incorporated community in Butler County that includes a Special flood Hazard Area. The complete set of FIRMs for Butler County can be found at: <https://msc.fema.gov/portal/advanceSearch>.

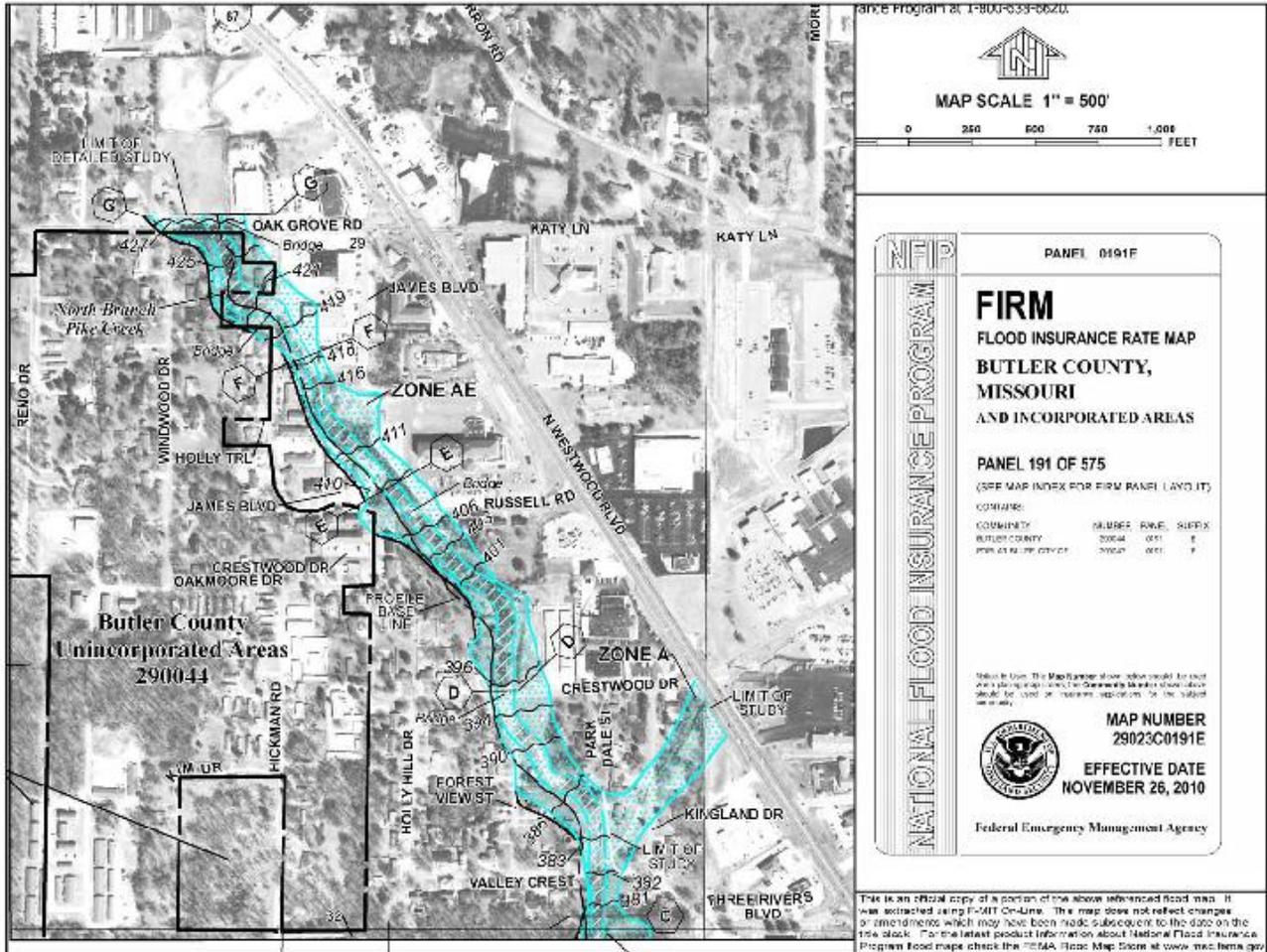


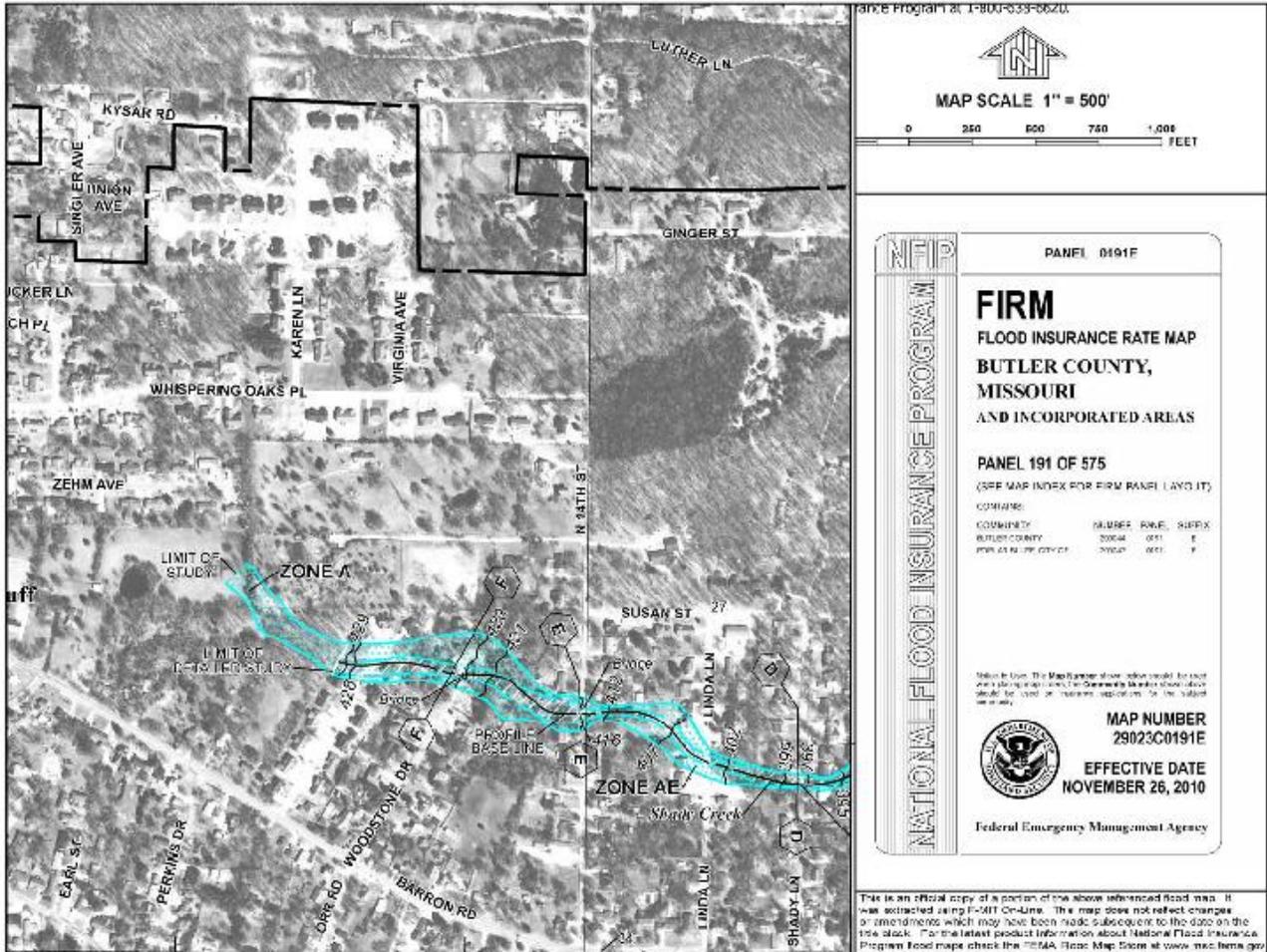












Panel Program 1 of 1: 1-800-633-8620



MAP SCALE 1" = 500'

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**NATIONAL FLOOD INSURANCE PROGRAM**

PANEL 0191F

**FIRM**  
FLOOD INSURANCE RATE MAP  
BUTLER COUNTY,  
MISSOURI  
AND INCORPORATED AREAS

PANEL 191 OF 575  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	ZONE	SUFFIX
BUTLER COUNTY	29024	001	F
SPRINGFIELD SERVICE	29024	001	F

Note to User: The Map (greater than 1:5000 scale) should be used for all planning purposes. The Generalized Map (less than 1:5000 scale) should be used for insurance applications for the subject area only.



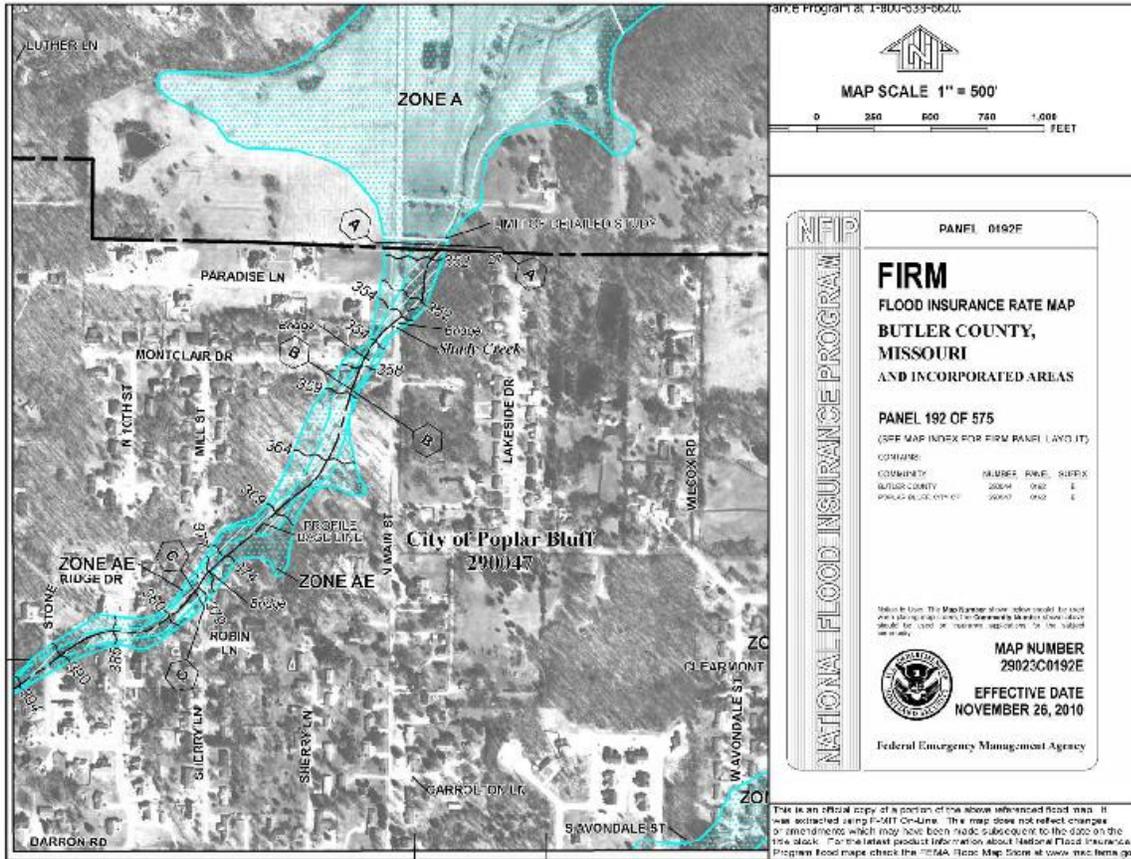
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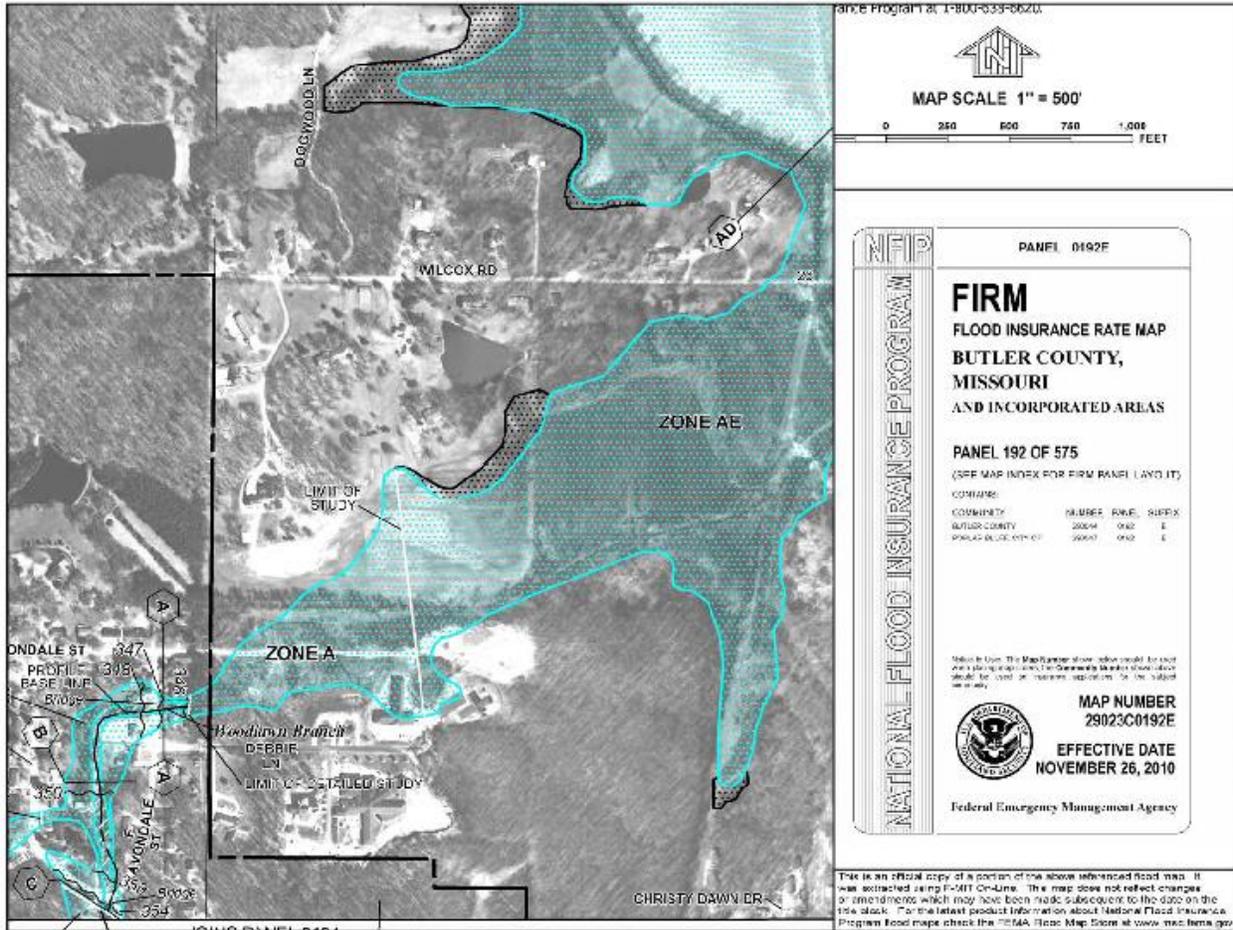
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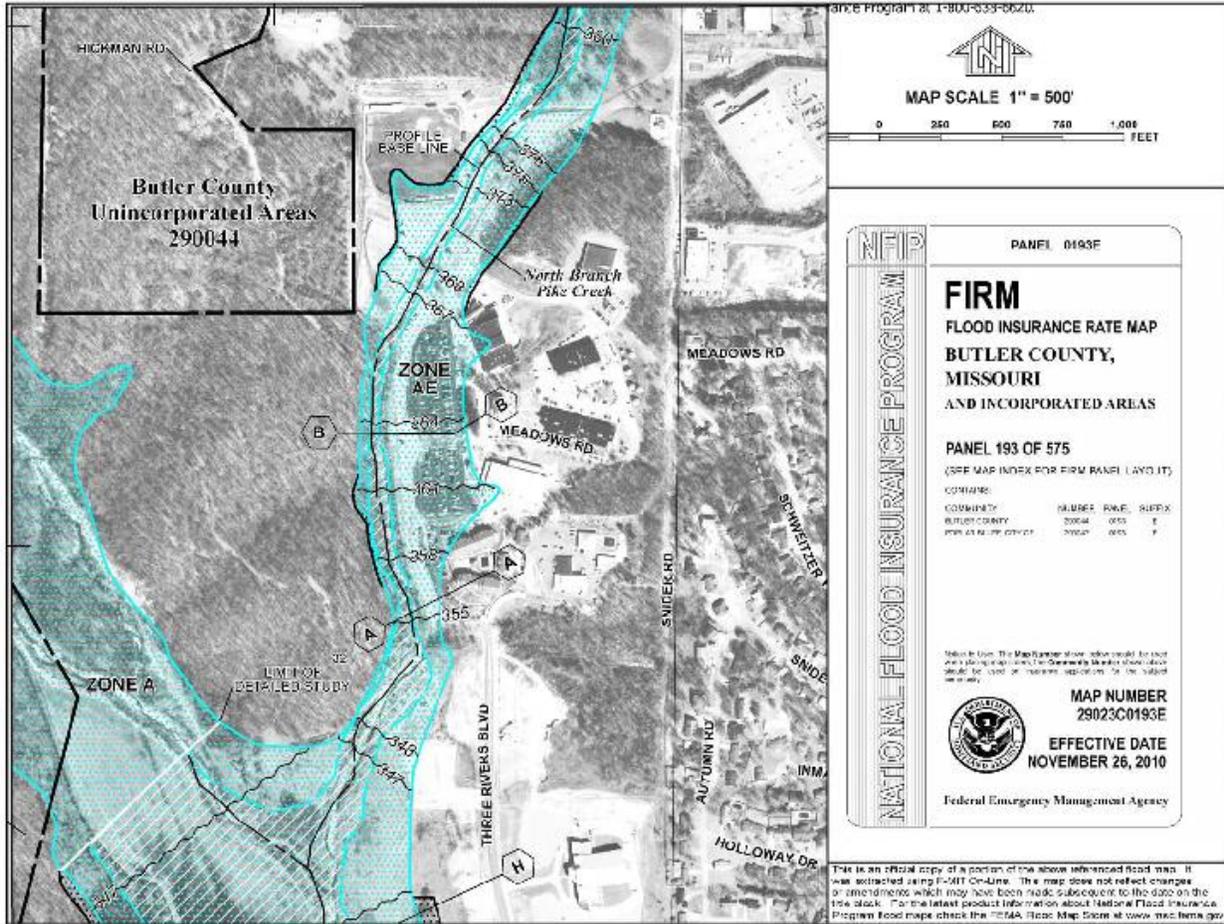
Federal Emergency Management Agency

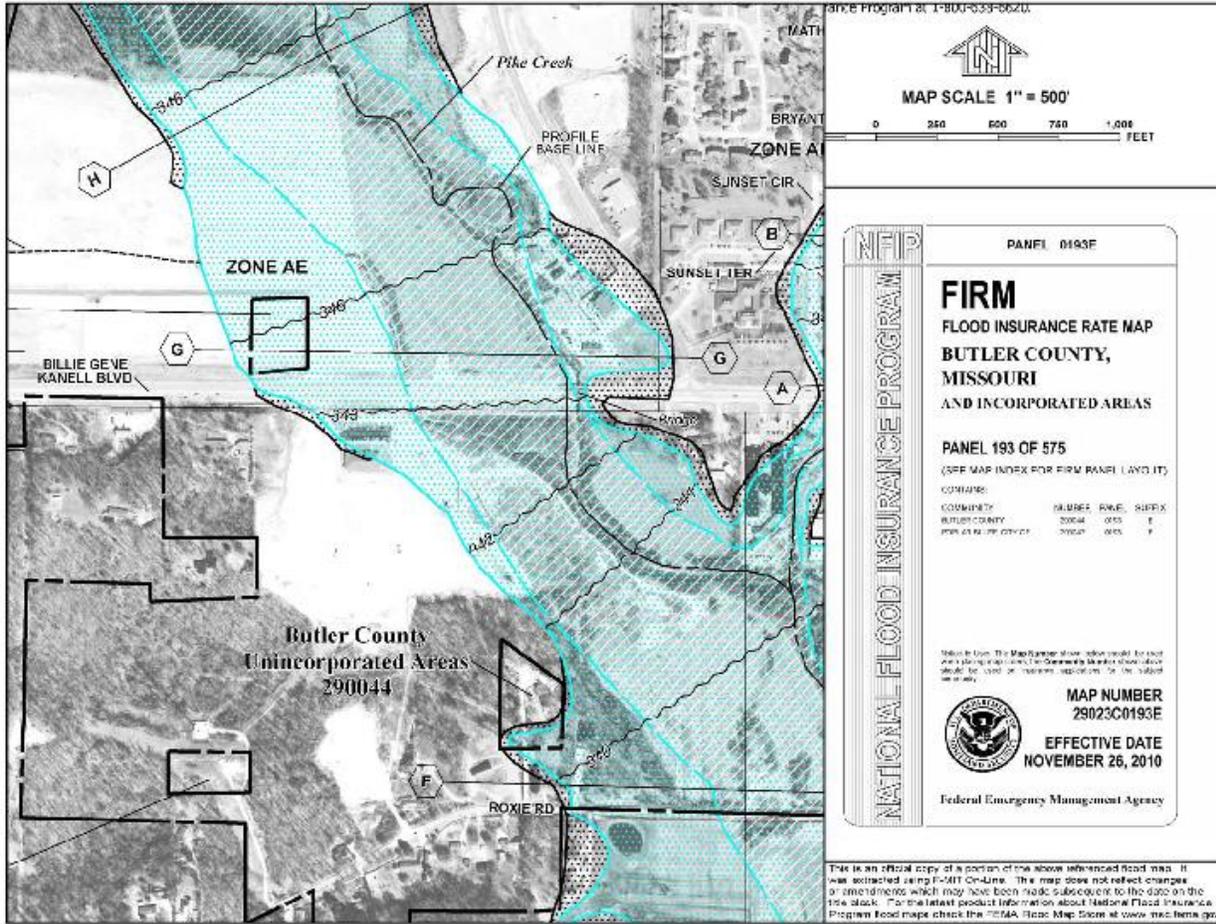
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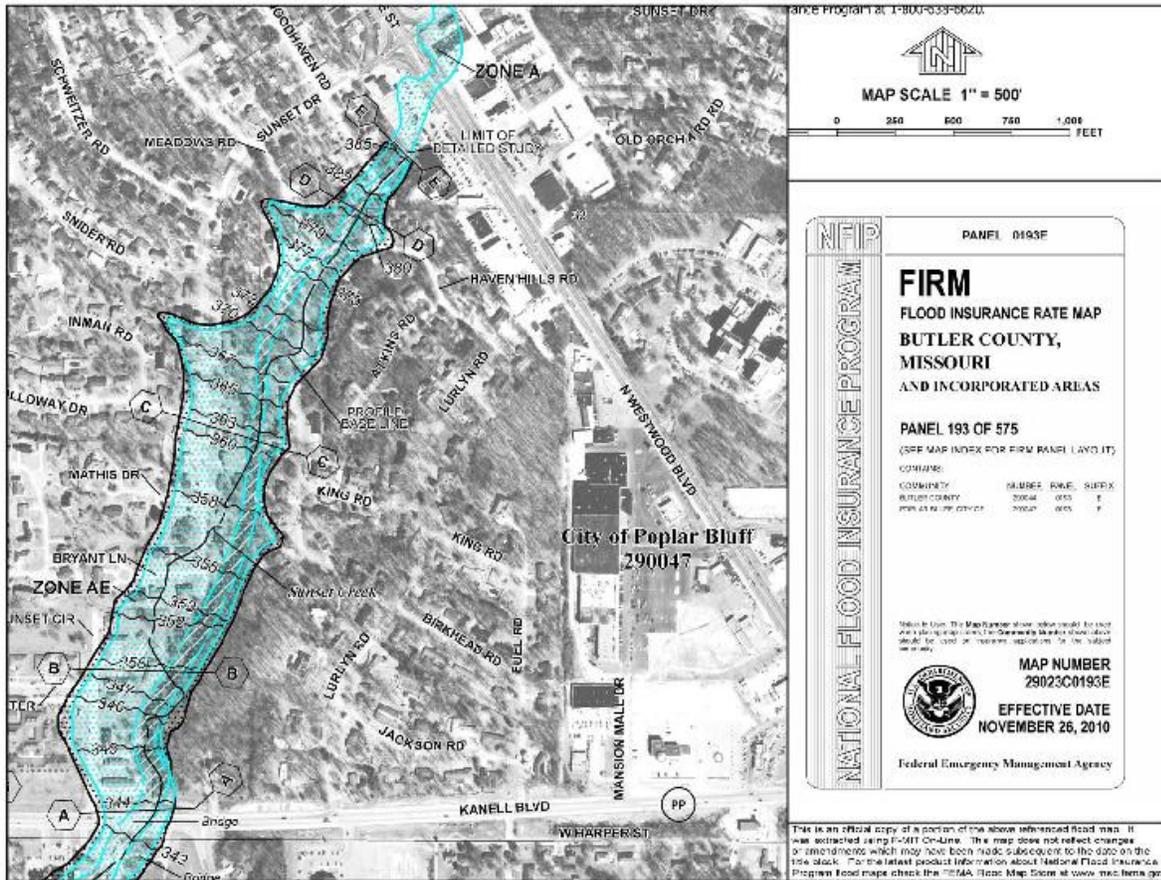
# 2017 Butler County Hazard Mitigation Plan

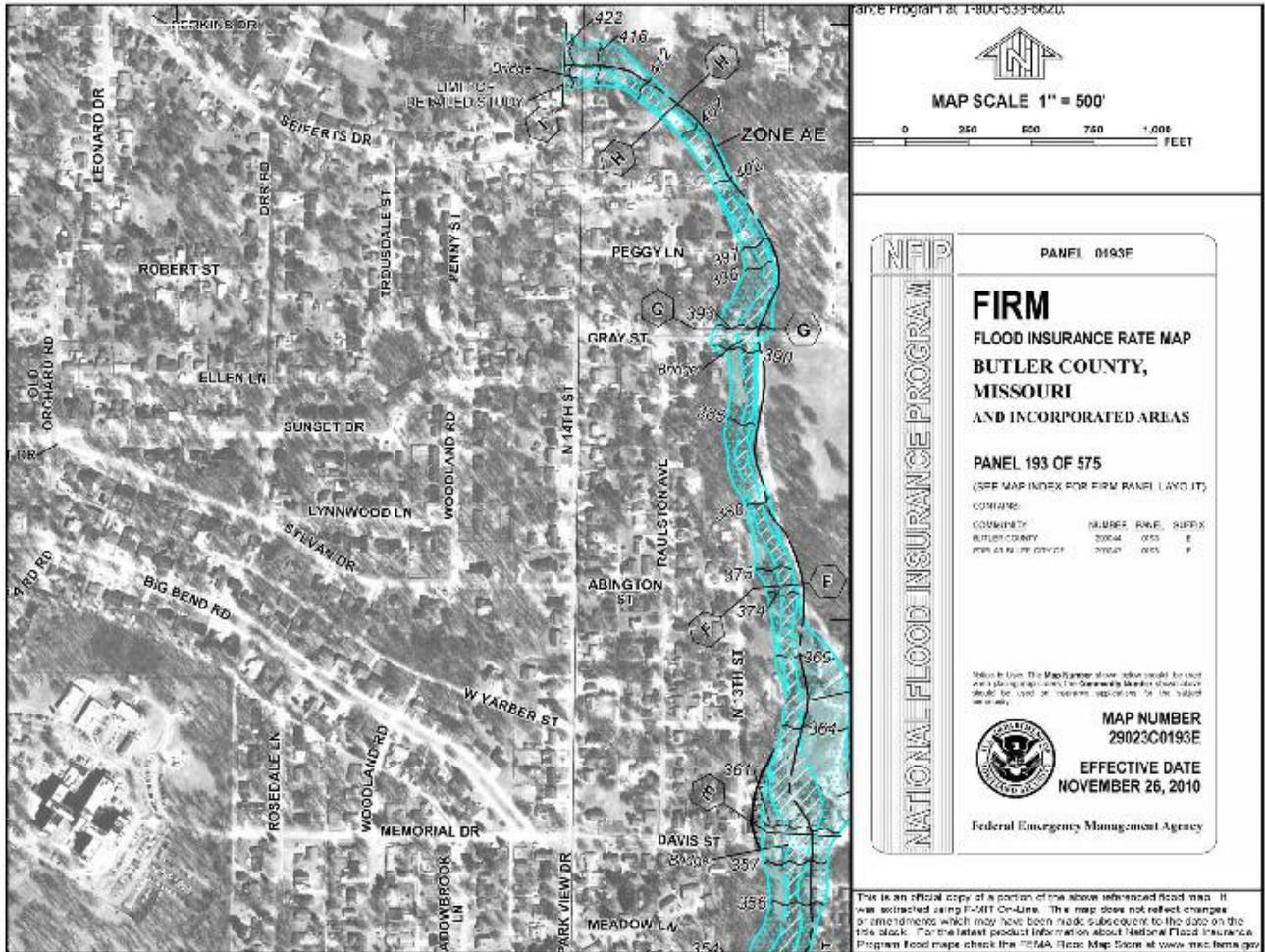




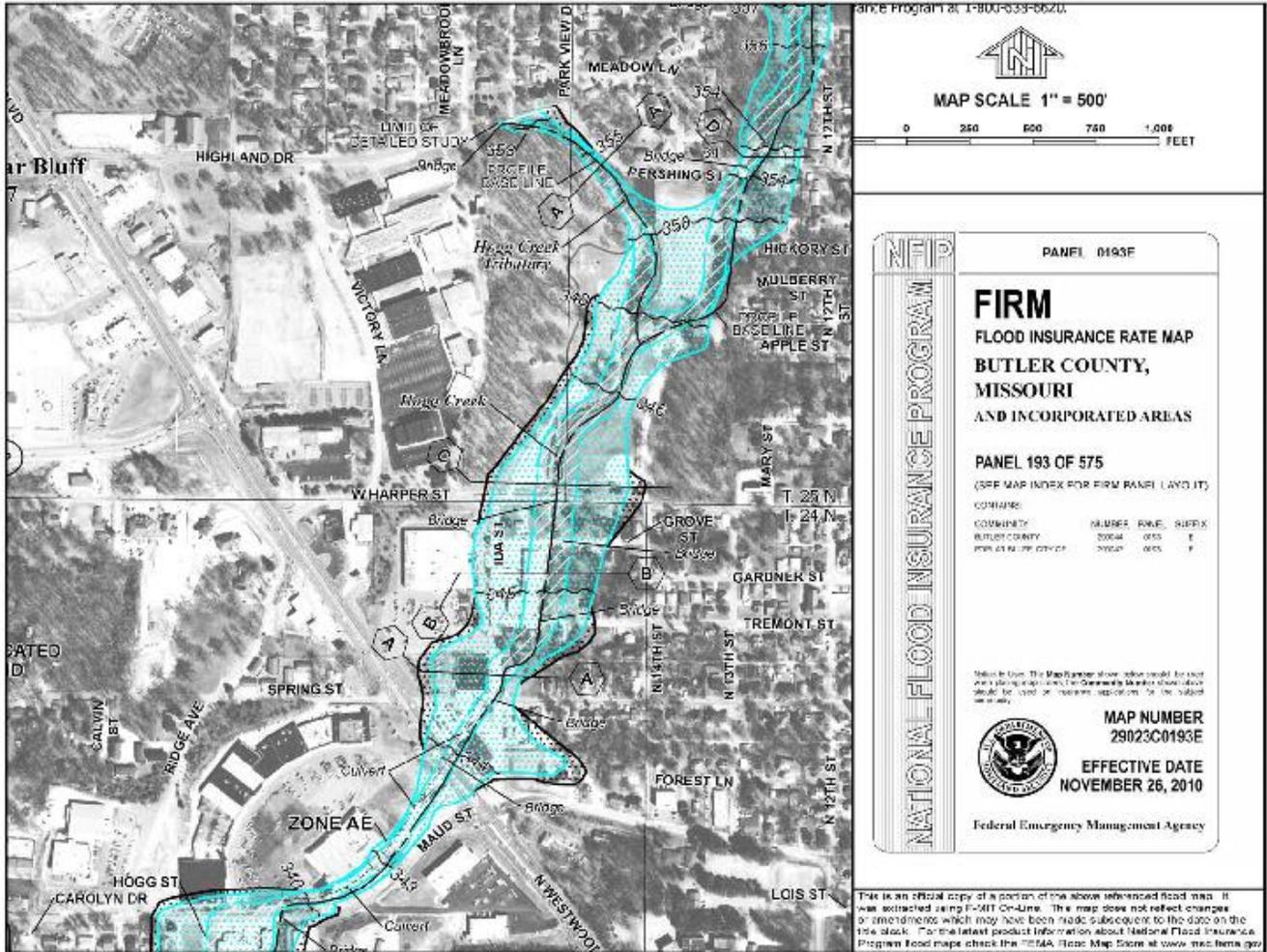


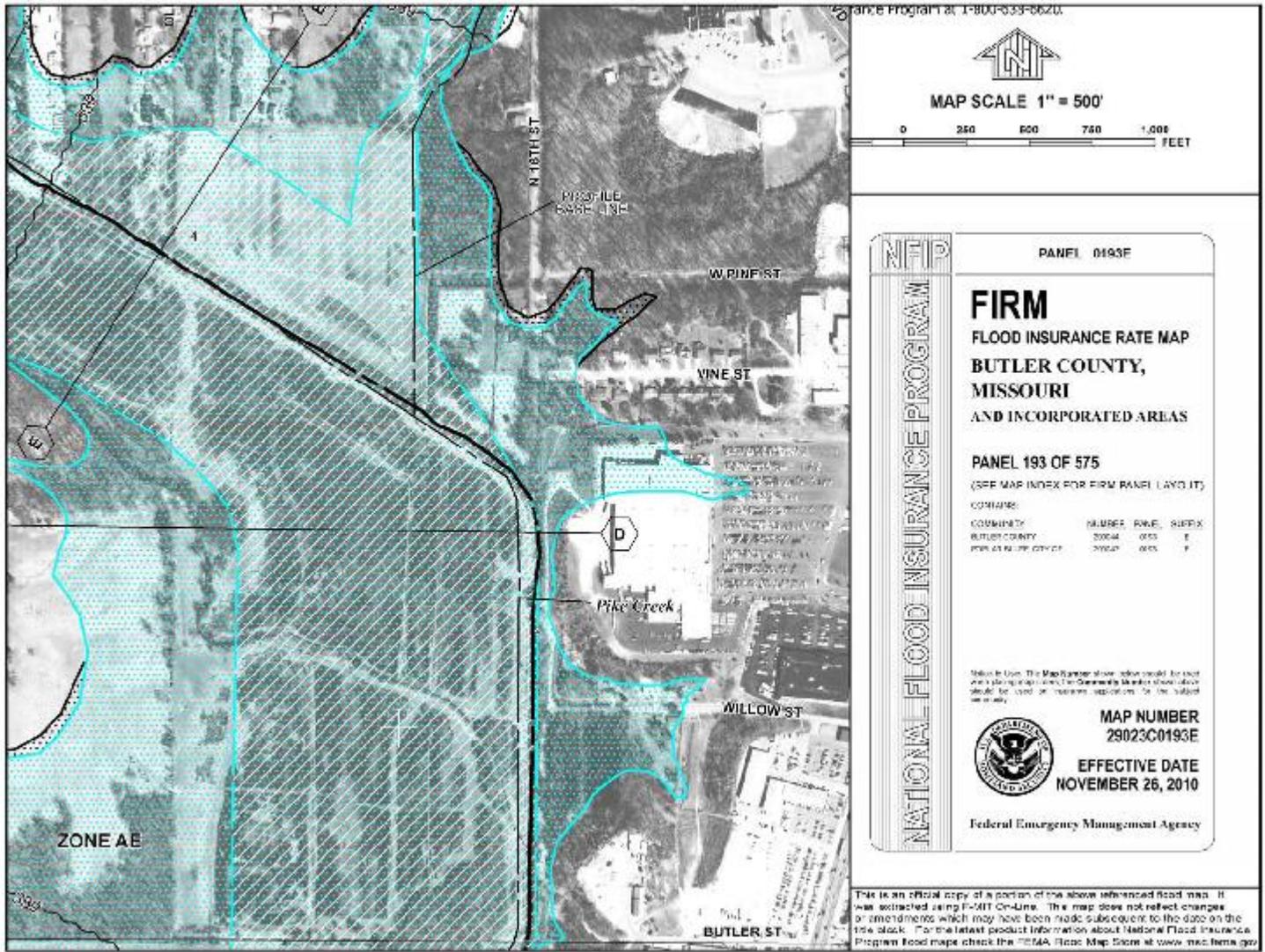






# 2017 Butler County Hazard Mitigation Plan





Insurance Program at 1-800-633-6620.



**MAP SCALE 1" = 500'**

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FEET

**NATIONAL FLOOD INSURANCE PROGRAM**

PANEL 0193F

**FIRM**  
FLOOD INSURANCE RATE MAP  
BUTLER COUNTY,  
MISSOURI  
AND INCORPORATED AREAS

PANEL 193 OF 575  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	SUBRE	RWLE	SUFFIX
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WPA AS 12.00 CITY OF	30004	0001	F

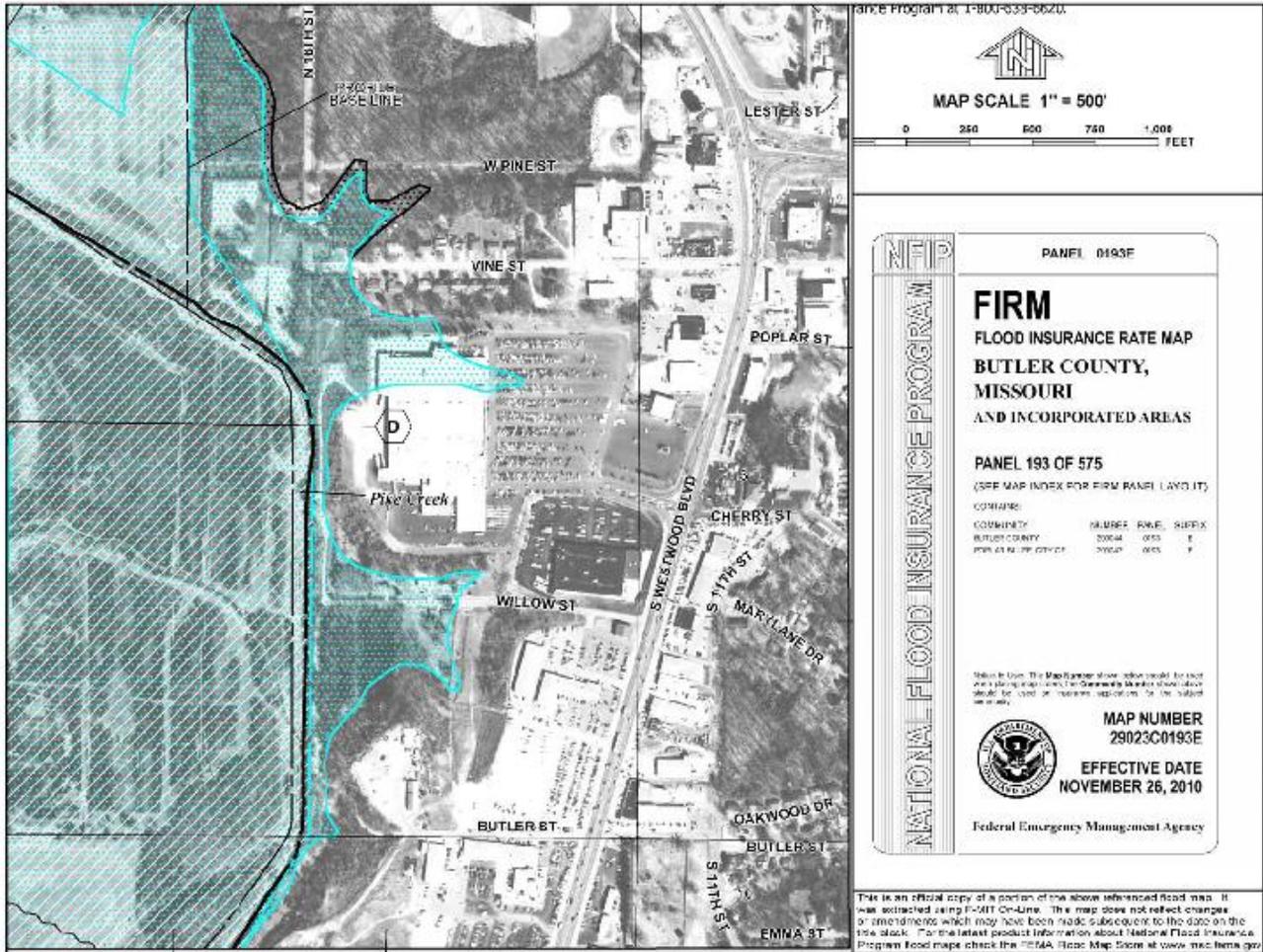
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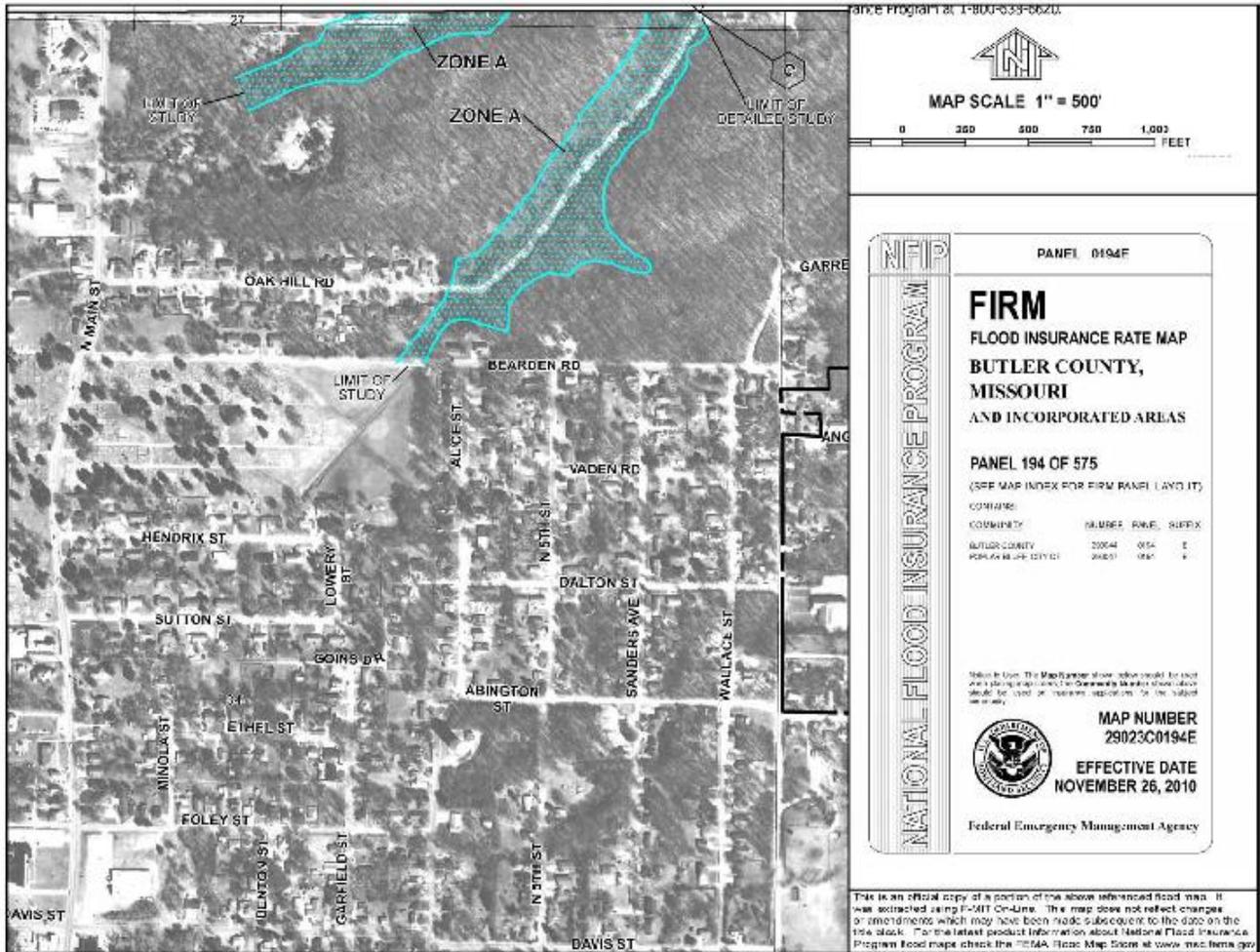
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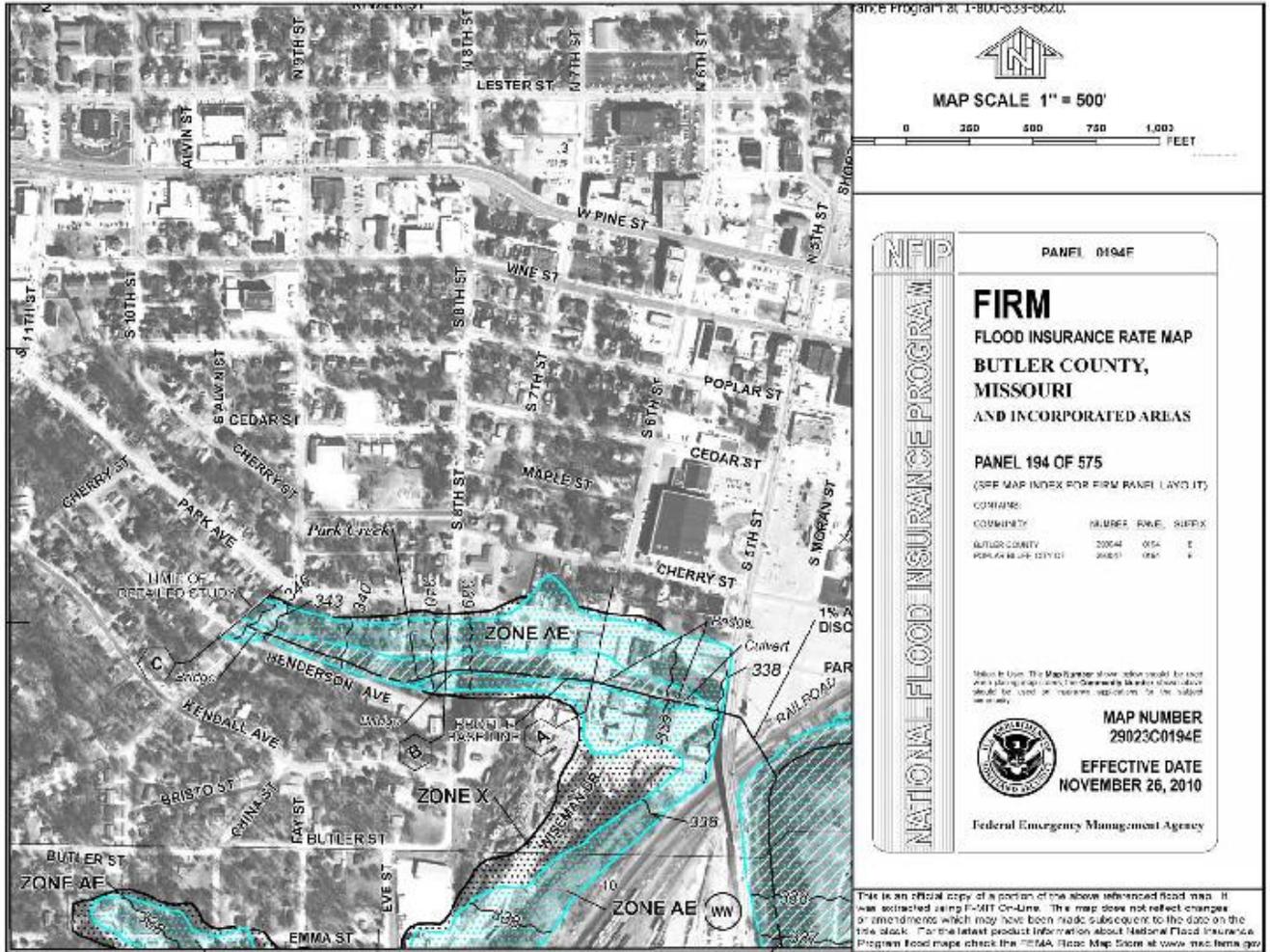
Federal Emergency Management Agency

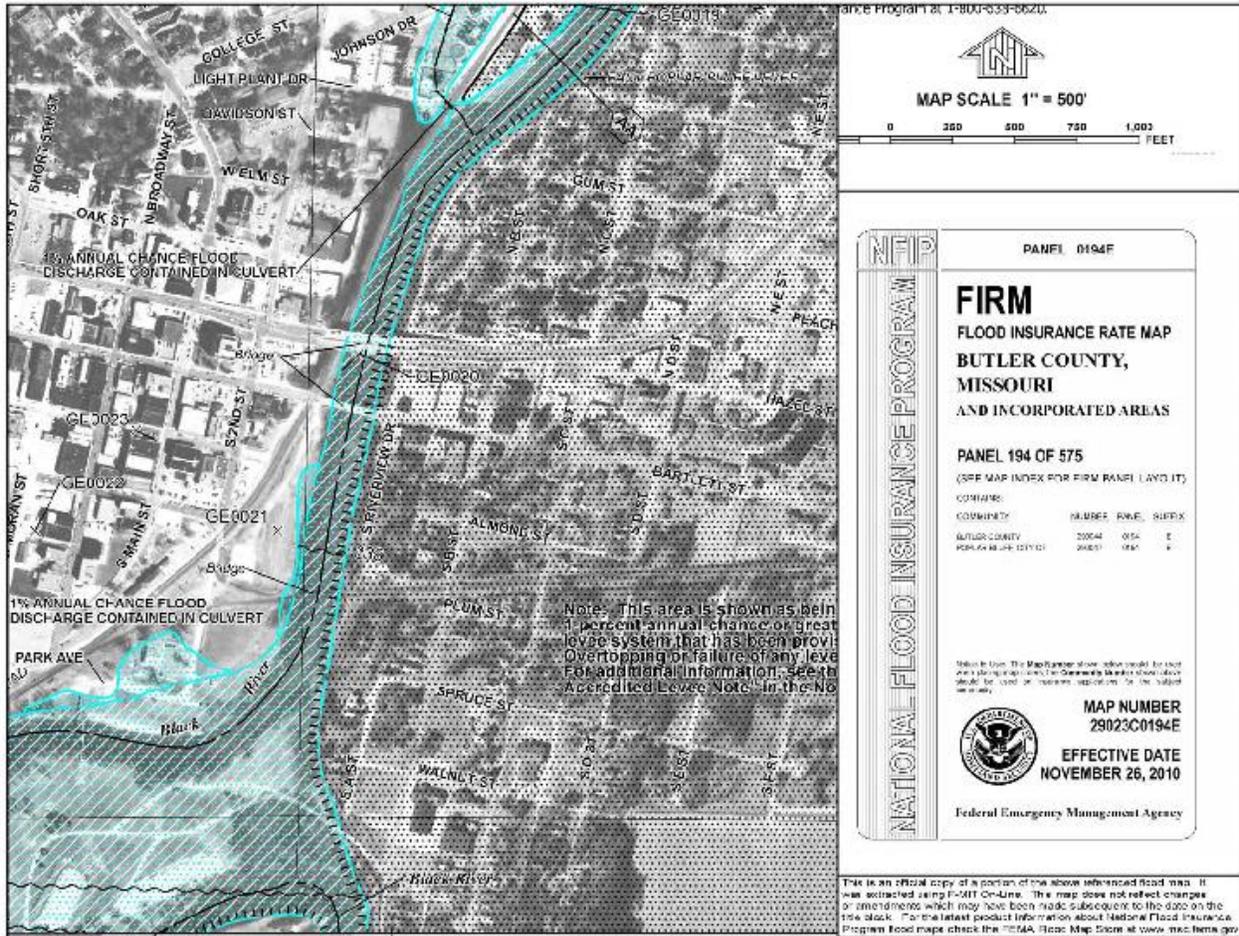
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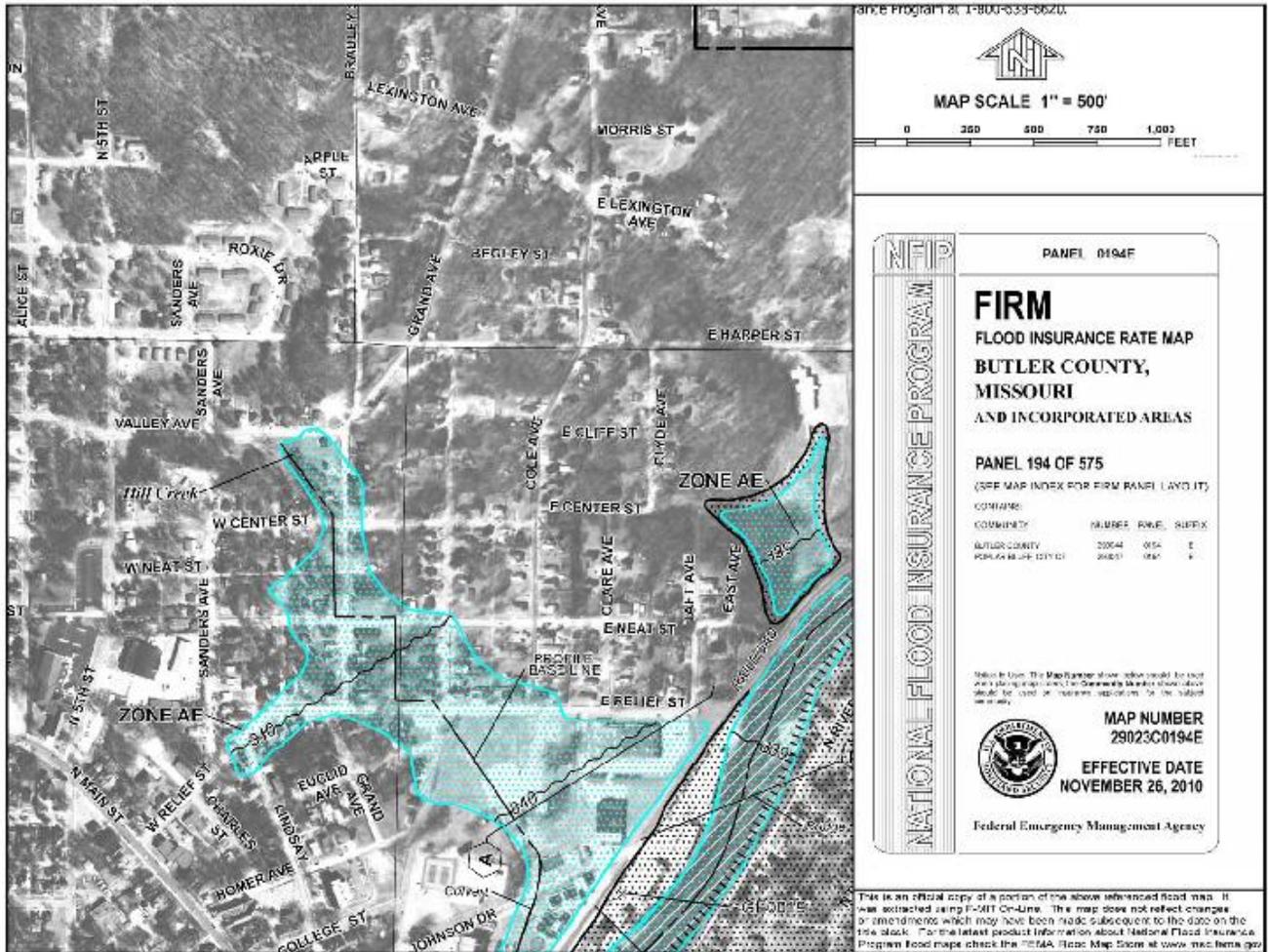


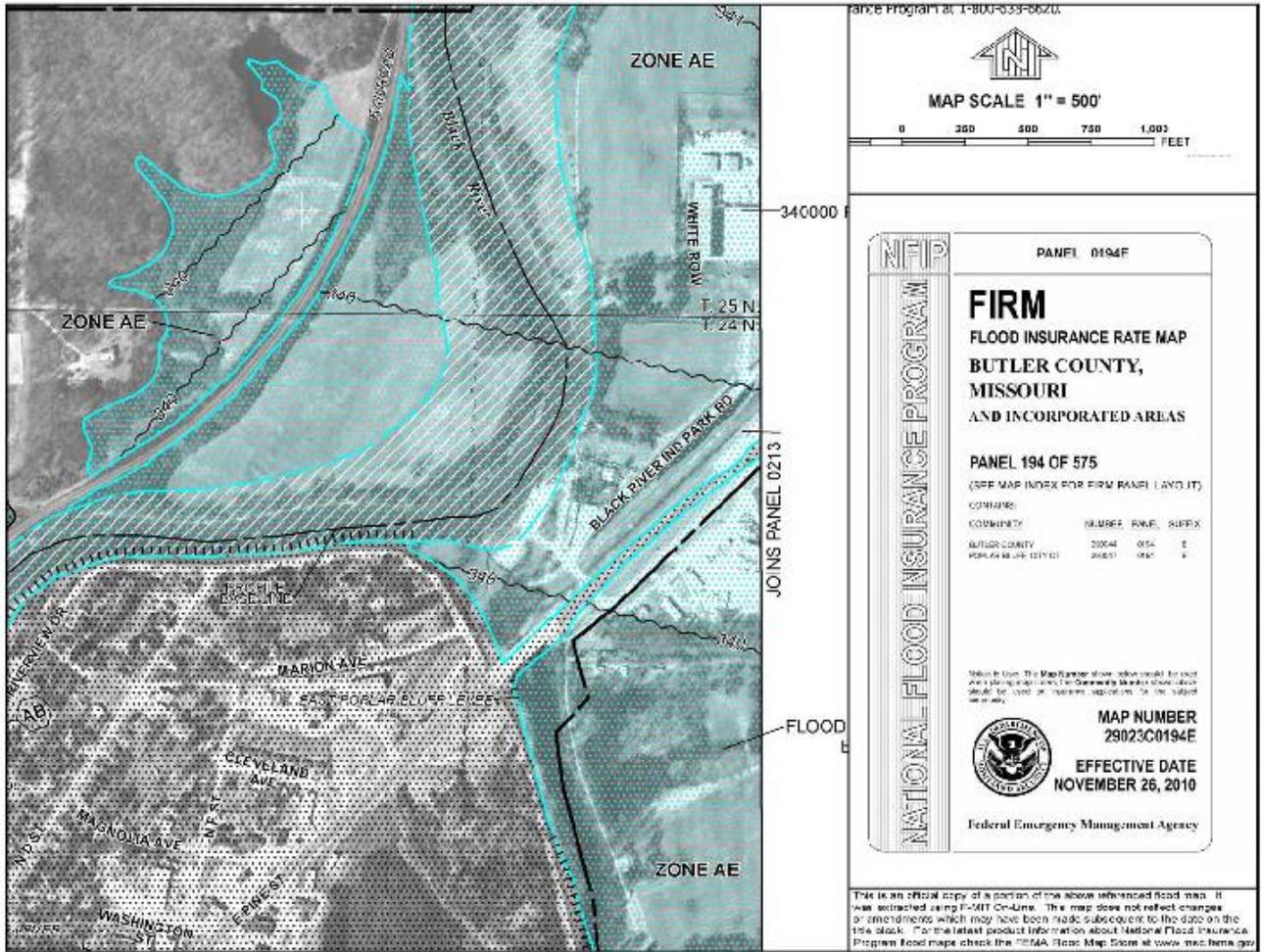
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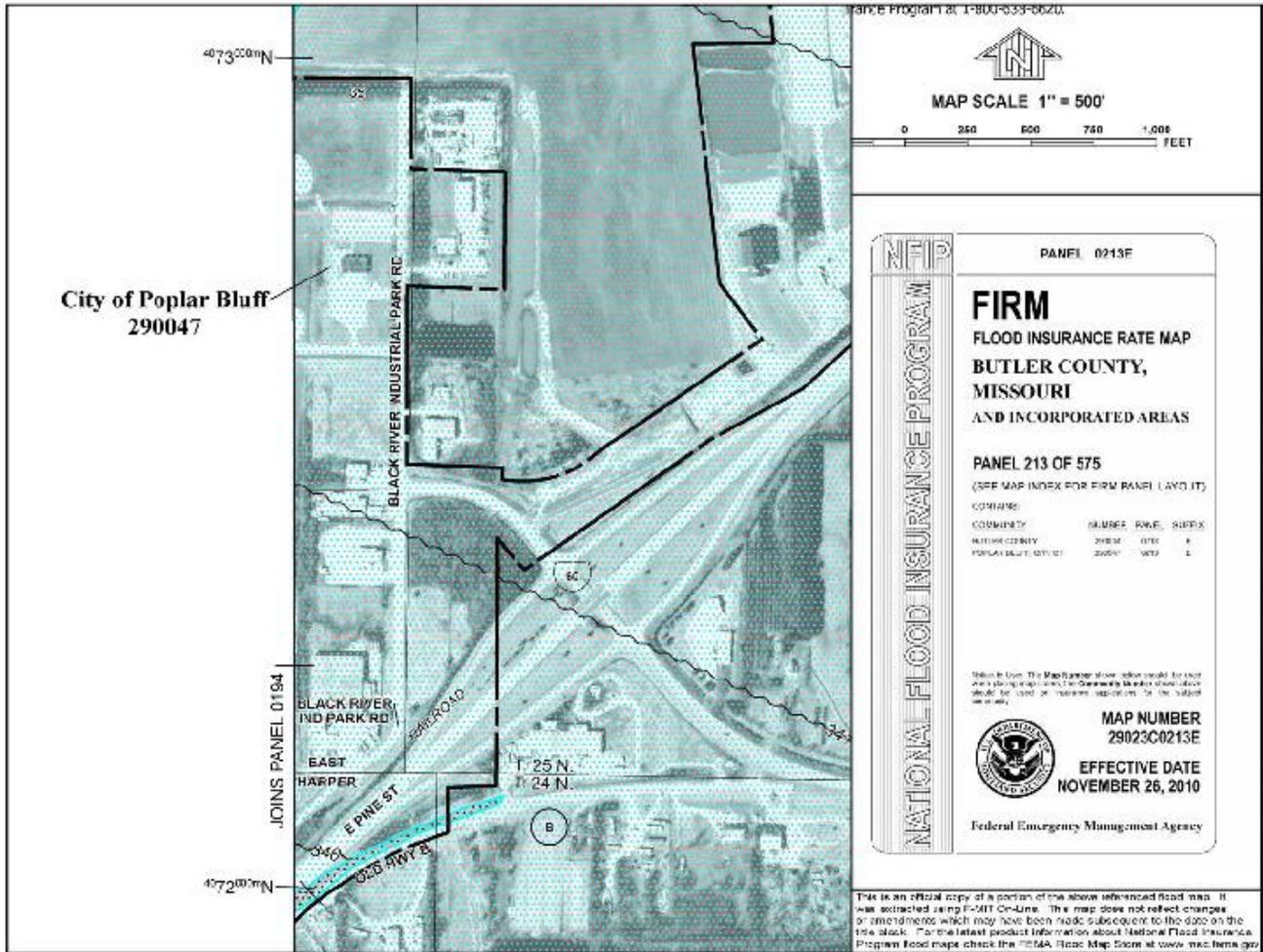




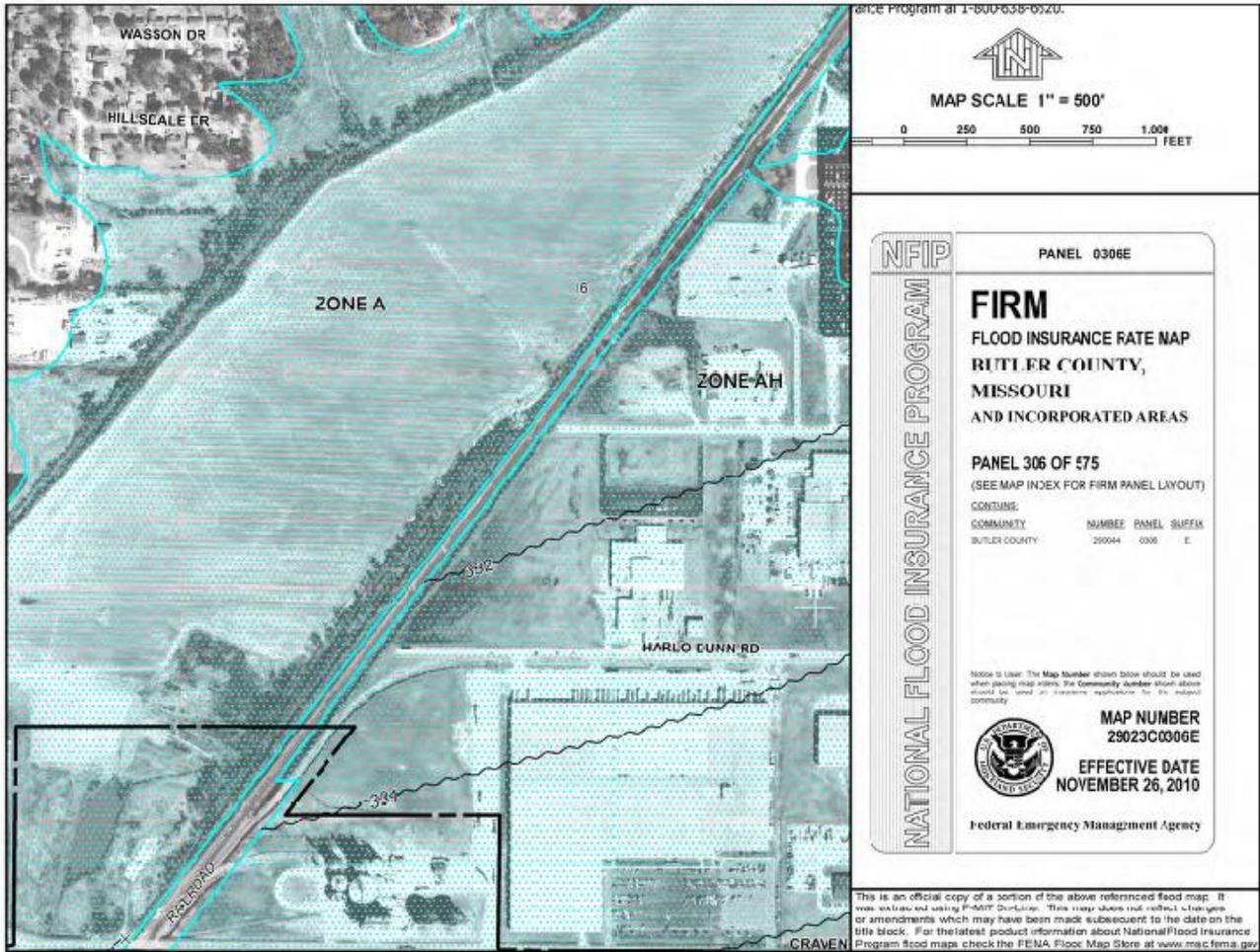
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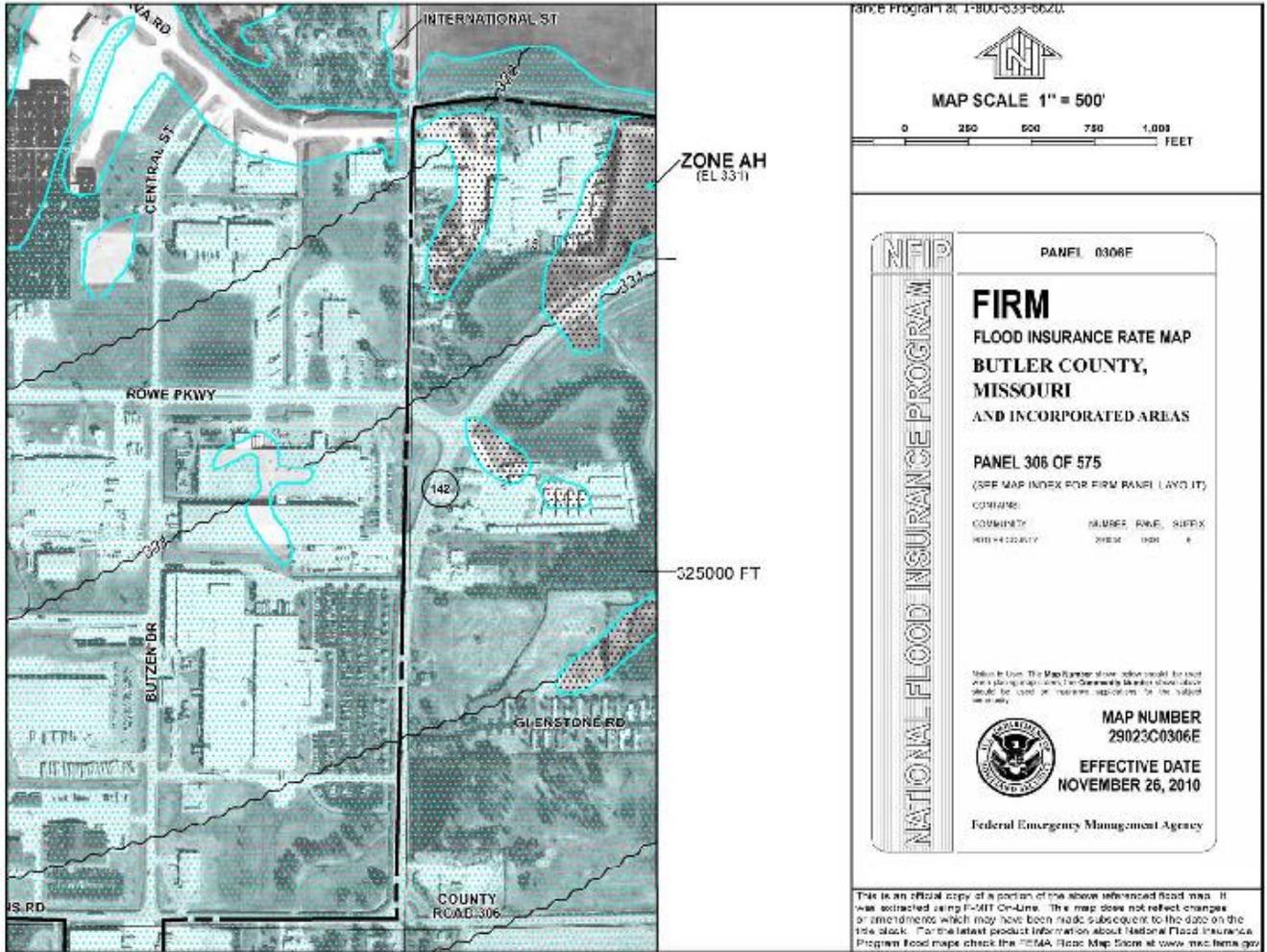


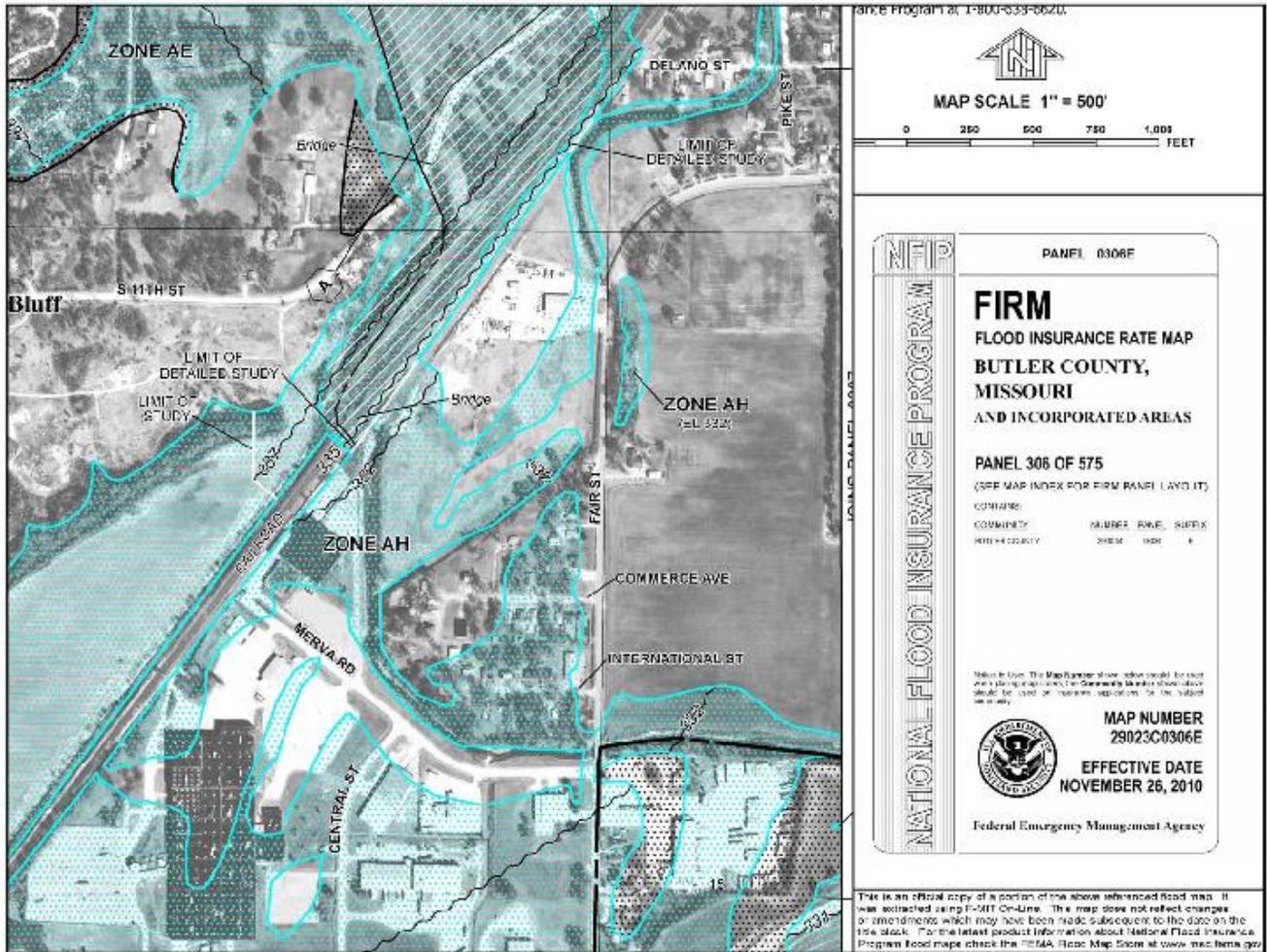


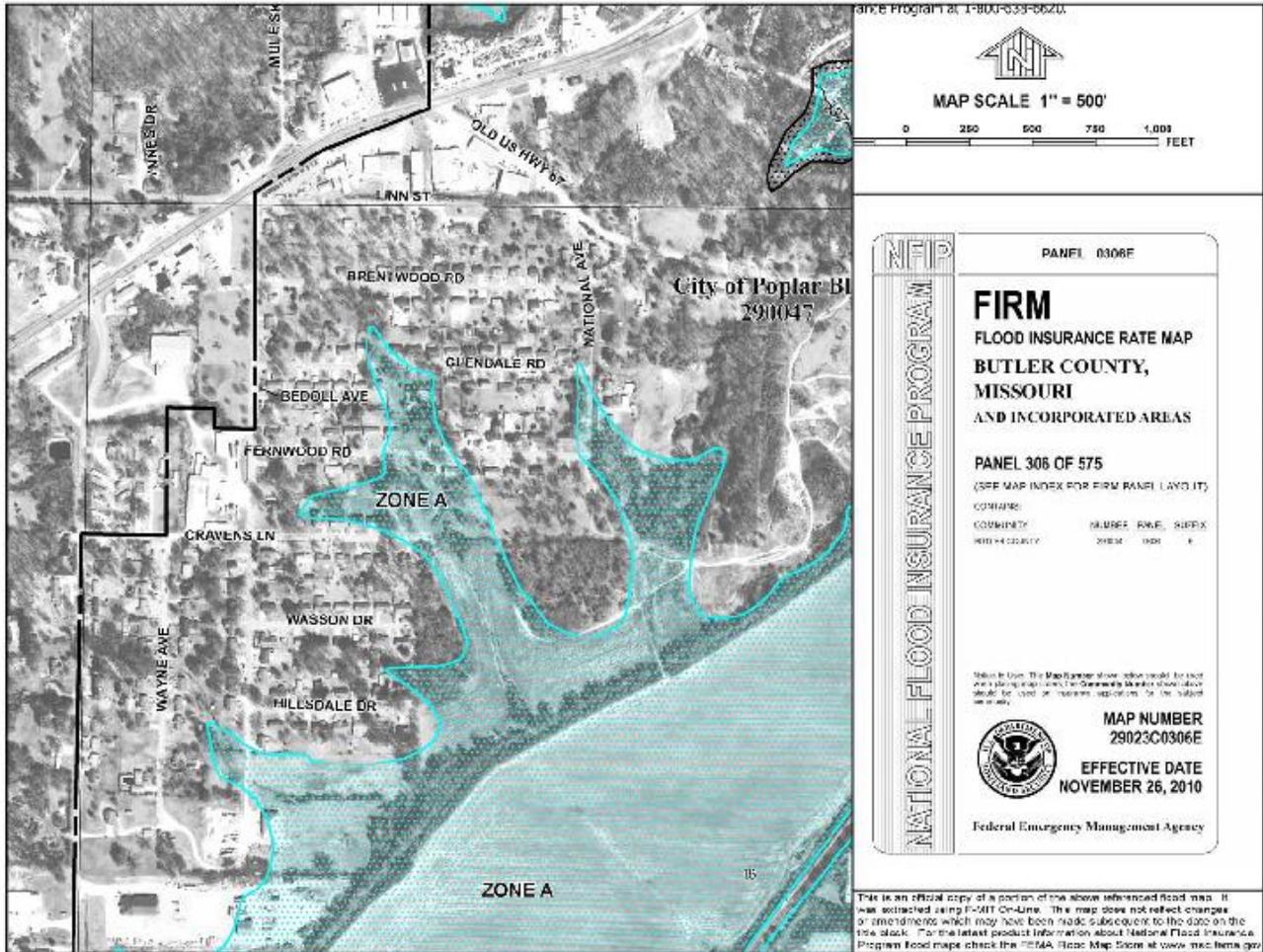












Service Program at 1-800-633-6620



**MAP SCALE 1" = 500'**

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**NATIONAL FLOOD INSURANCE PROGRAM**

PANEL 0306E

**FIRM**  
FLOOD INSURANCE RATE MAP  
BUTLER COUNTY,  
MISSOURI  
AND INCORPORATED AREAS

PANEL 306 OF 575  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:  
COMMUNITY NUMBER PANEL NUMBER SURFIX  
90044 0306E 0 0

Note to User: This Map/Panel shows information for use in planning and construction. Community Master Information should be used for insurance applications for the subject community.

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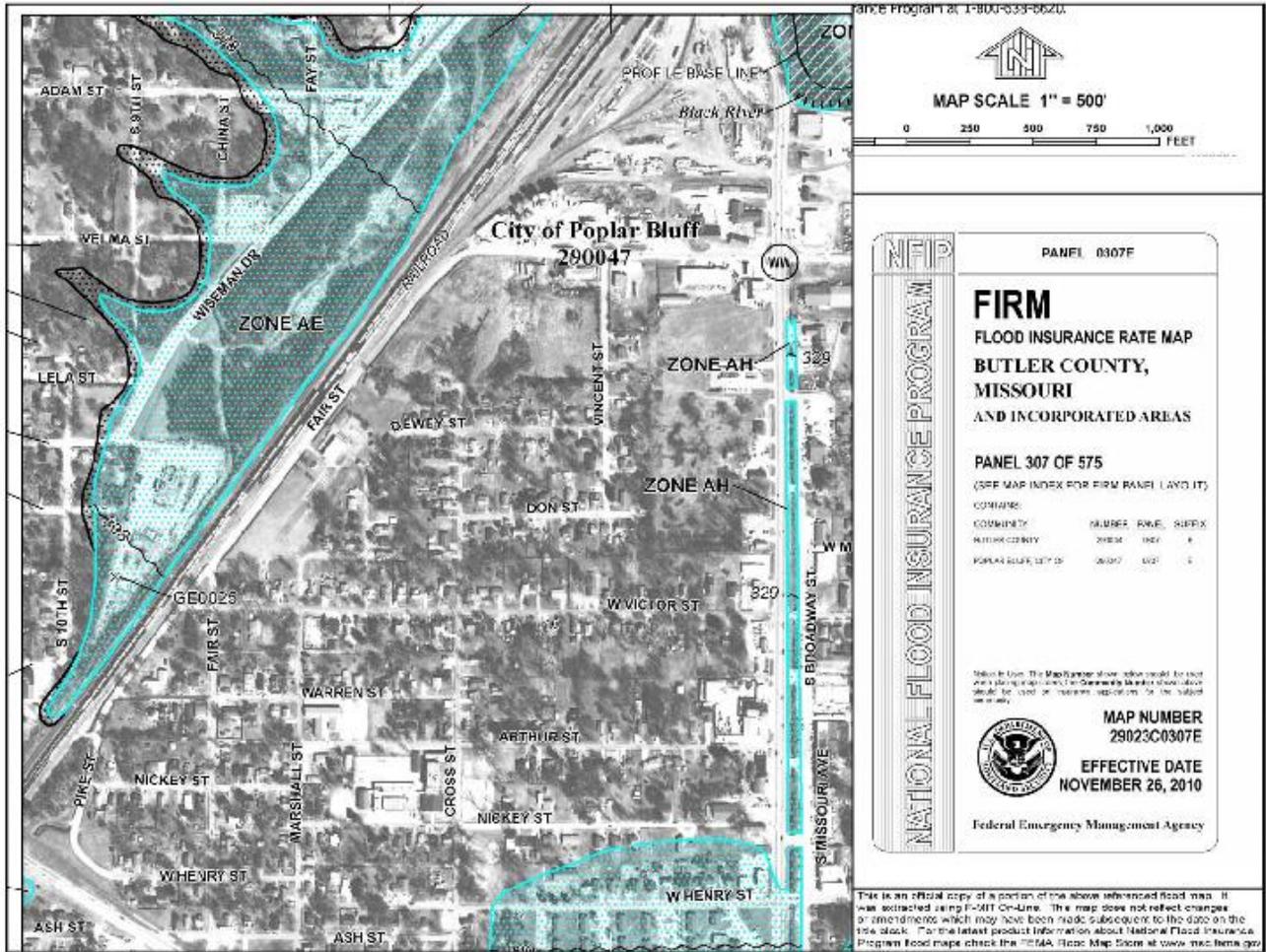
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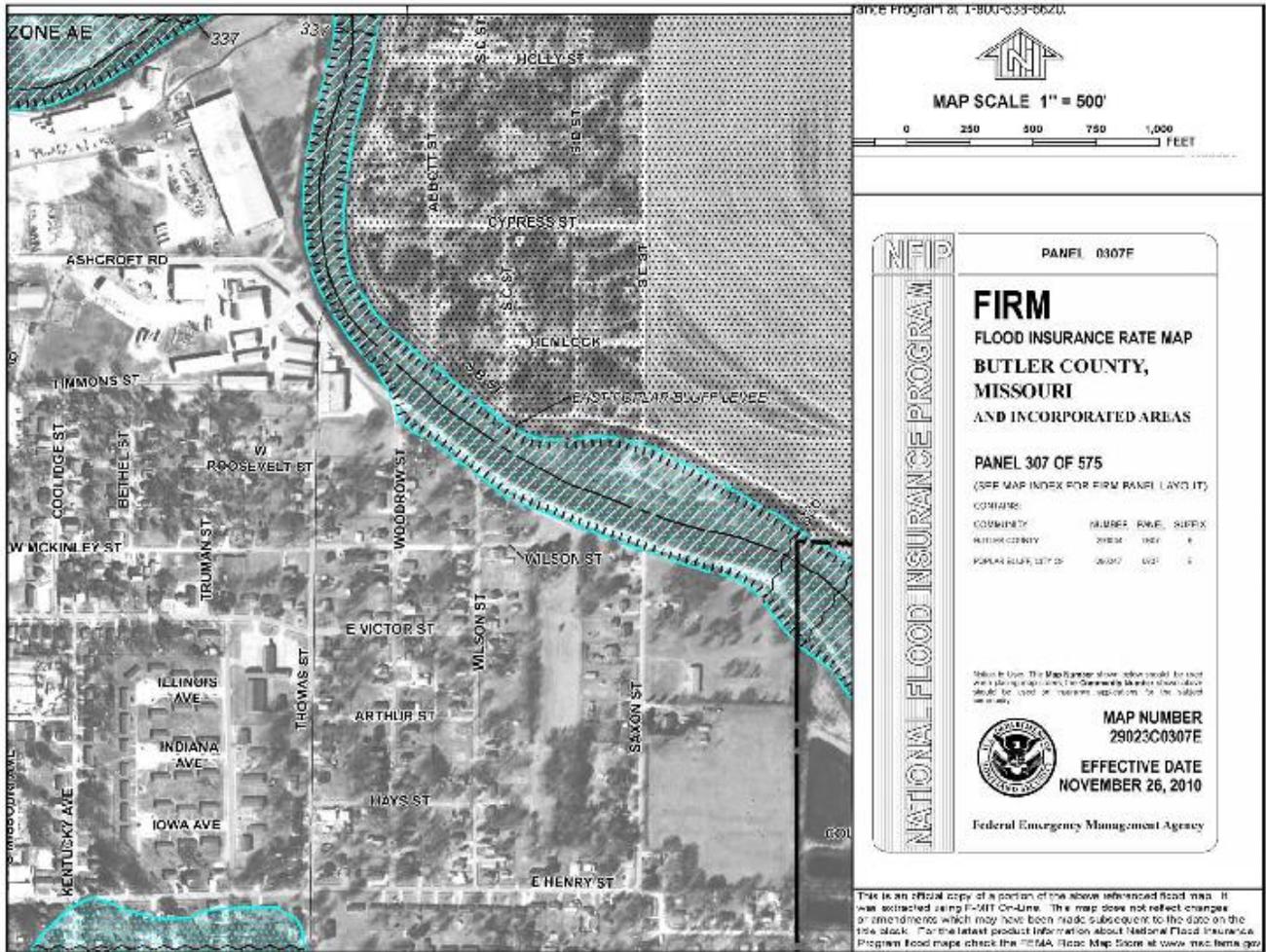
Federal Emergency Management Agency

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# 2017 Butler County Hazard Mitigation Plan





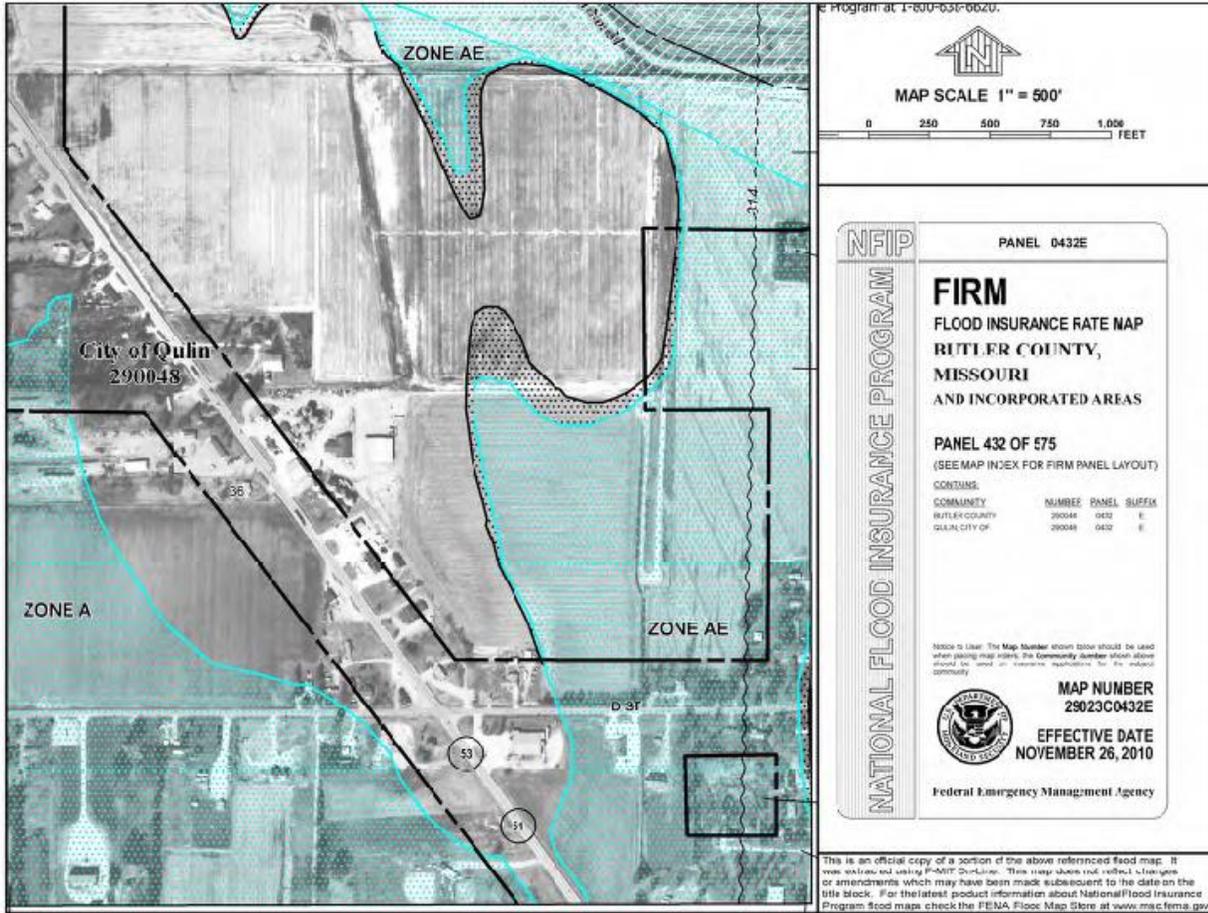
# 2017 Butler County Hazard Mitigation Plan





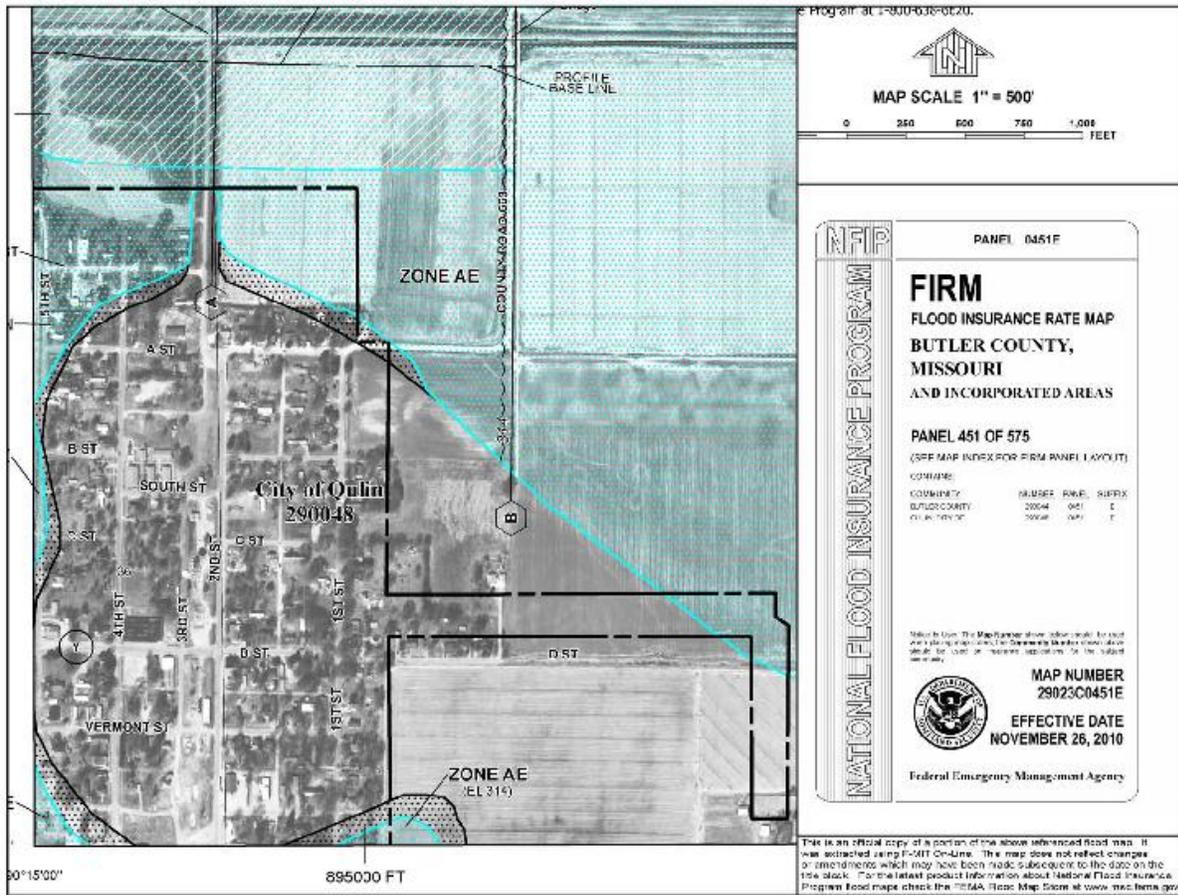
# 2017 Butler County Hazard Mitigation Plan

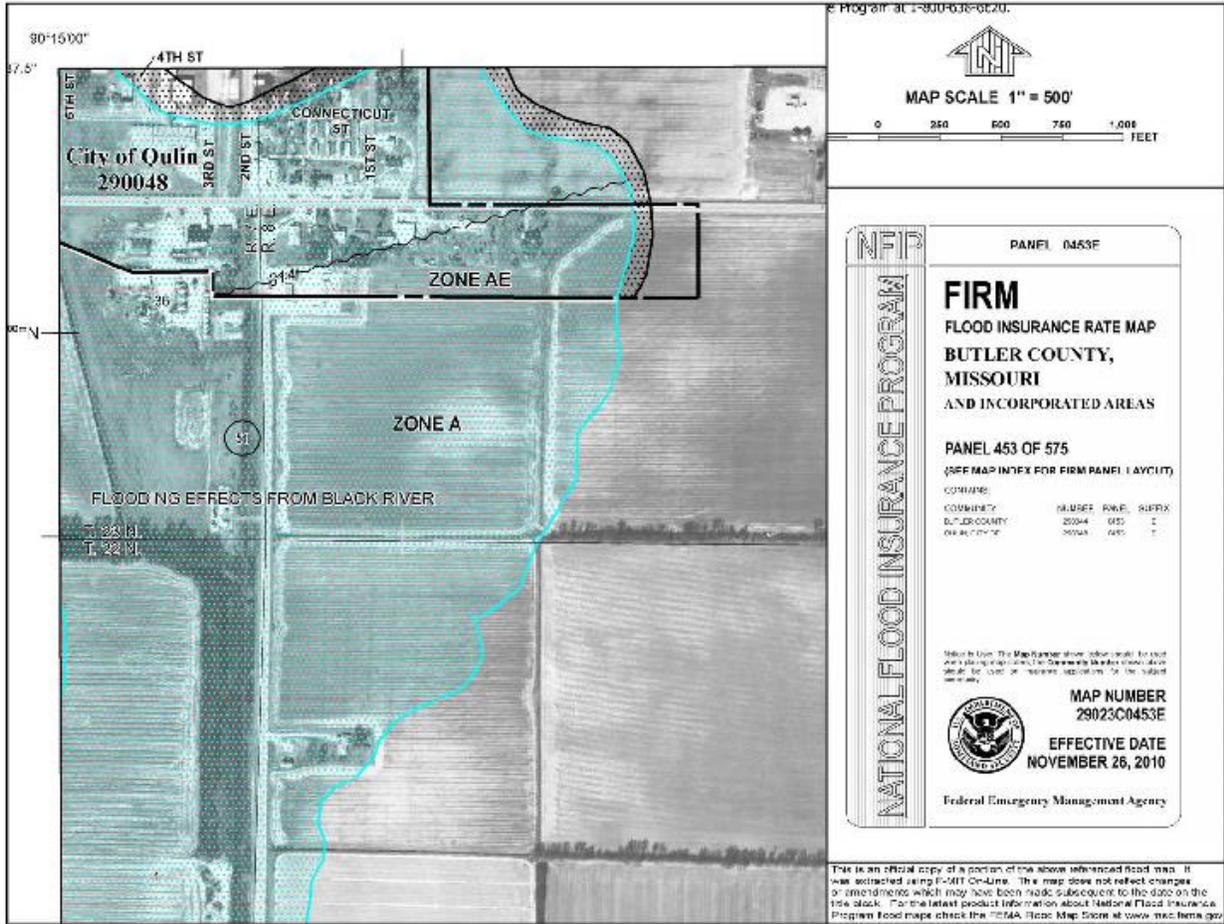




# 2017 Butler County Hazard Mitigation Plan







### 3.4.7 Land Subsidence/Sinkholes

#### **Hazard Profile**

##### ***Hazard Description***

Sinkholes are common where the rock below the land surface is limestone, carbonate rock, salt beds, or rocks that naturally can be dissolved by ground water circulating through them. As the rock dissolves, spaces and caverns develop underground. The sudden collapse of the land surface above them can be dramatic and range in size from broad, regional lowering of the land surface to localized collapse. However, the primary causes of most subsidence are human activities: underground mining of coal, groundwater or petroleum withdrawal, and drainage of organic soils. In addition, sinkholes can develop as a result of subsurface void spaces created over time due to the erosion of subsurface limestone (karst).

Land subsidence occurs slowly and continuously over time, as a general rule. On occasion, it can occur abruptly, as in the sudden formation of sinkholes. Sinkhole formation can be aggravated by flooding.

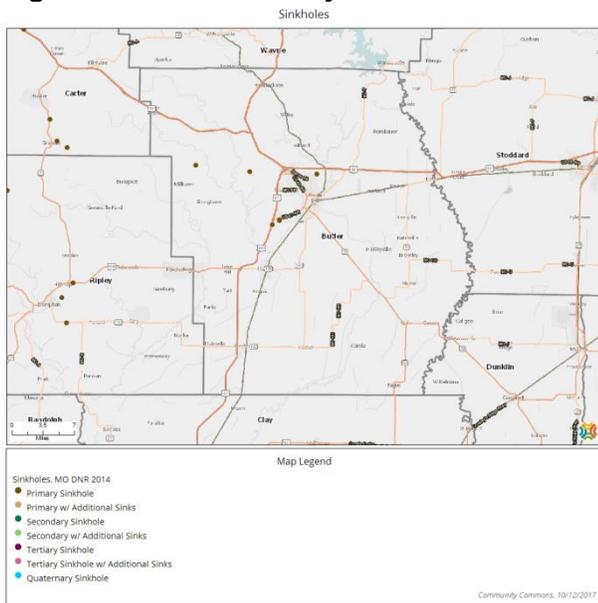
In the case of sinkholes, the rock below the surface is rock that has been dissolving by circulating groundwater. As the rock dissolves, spaces and caverns form, and ultimately the land above the spaces collapse. In Missouri, sinkhole problems are usually a result of surface materials above openings into bedrock caves eroding and collapsing into the cave opening. These collapses are called “cover collapses” and geologic information can be applied to predict the general regions where collapse will occur. Sinkholes range in size from several square yards to hundreds of acres and may be quite shallow or hundreds of feet deep.

According to the U.S. Geological Survey (USGS), the most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Fifty-nine percent of Missouri is underlain by thick, carbonate rock that makes Missouri vulnerable to sinkholes. Sinkholes occur in Missouri on a fairly frequent basis. Most of Missouri’s sinkholes occur naturally in the State’s karst regions (areas with soluble bedrock). They are a common geologic hazard in southern Missouri, but also occur in the central and northeastern parts of the State. Missouri sinkholes have varied from a few feet to hundreds of acres and from less than one to more than 100 feet deep. The largest known sinkhole in Missouri encompasses about 700 acres in western Boone County southeast of where Interstate 70 crosses the Missouri River. Sinkholes can also vary in shape like shallow bowls or saucers whereas other have vertical walls. Some hold water and form natural ponds.

##### ***Geographic Location***

According to the 2013 Missouri State Hazard Mitigation Plan there are six (6) documented sinkholes in Butler County. As can be seen from the following maps, the majority of these sinkholes are located in the northwest corner of the county, in parts of the Mark Twain National Forest. Figure 3.8 below provides a map of the locations in Butler County.

**Figure 3.8 Butler County Sinkholes**



**Severity/Magnitude/Extent**

Sinkholes vary in size and location, and these variances will determine the impact of the hazard. A sinkhole could result in the loss of a personal vehicle, a building collapse, or damage to infrastructure such as roads, water, or sewer lines. Groundwater contamination is also possible from a sinkhole. Because of the relationship of sinkholes to groundwater, pollutants captured or dumped in sinkholes could affect a community’s groundwater system. Sinkhole collapse could be triggered by large earthquakes. Sinkholes located in floodplains can absorb floodwaters but make detailed flood hazard studies difficult to model.

The 2013 State Plan included only seven documented sinkhole “notable events”. The plan stated that sinkholes are common to Missouri and the probability is high that they will occur in the future. To date, Missouri sinkholes have historically not had major impacts on development nor have they caused serious damage. Thus, the severity of future events is likely to be low.

**Previous Occurrences**

According to the 2013 State Plan sinkholes are a regular occurrence in Missouri, but that they are rarely are the events of any significance. There have been no damage reports resulting from sinkholes in Butler County and few from around the State of Missouri. In the 2013 State Plan on page 3.104 three recent events are described from around the state. The first event occurred in 2012 when a sinkhole caused a road to collapse near the Springfield-Branson National Airport. A water main broke as a result of the collapsed roadway, and the sinkhole likely formed as a result of heavy rains.

**Probability of Future Occurrence**

The probability of future occurrences of sinkholes is high; however the severity is likely low. The

map above depicts the general location of sinkholes that are known in the county. Other sinkholes may be found later that are not currently identified. The MPC felt like a more accurate map of sinkholes in the county could prevent future development near the sites and help mitigate future damages.

### **Vulnerability**

#### ***Vulnerability Overview***

Sinkholes are a common feature in Missouri, however in Butler County there are only six (6) documented sinkholes. The northeastern area of the county is the most vulnerable area due to the karst topography of that part of the county. This area is mainly covered in Mark Twain National Forest and will not be developed in the foreseeable future. The vulnerability to Butler County is low due to these factors.

#### ***Potential Losses to Existing Development***

All known sinkholes are in remote and very rural areas of the county, there have been no reported sinkholes near populations or developments. Therefore, the potential loss to existing development is very low and not expected.

#### ***Impact of Future Development***

All known sinkholes are in remote and very rural areas that are at risk of sinkhole formation are in extremely rural areas that are not anticipated for any type of future development. Many of the areas of sinkholes and areas at risk for sinkholes are in the Mark Twain National Forest, which is restricted from future development as a national forest. Therefore, there is not expected to be any impacts on future development from sinkholes.

#### ***Hazard Summary by Jurisdiction***

The only area of Butler County that is at a higher risk for sinkholes to form is the northeastern corner of the county. This area is mostly undeveloped, being home to a large portion of the Mark Twain National Forest.

There are two sinkholes that are noted to be just to the south of the city limits of Poplar Bluff; however these are isolated and not close to developed areas. There are no critical facilities or school district assets in the vicinity of any sinkholes.

### **Problem Statement**

The risk for damages due to sinkholes is limited and unlikely. However, the MPC felt that having more accurate mapping of existing sinkholes could help mitigate against future damages if the county and city officials were more aware of the locations.

### 3.4.8 Levee Failure

#### Hazard Profile

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##### Hazard Description

Levees are earth embankments constructed along rivers and coastlines to protect adjacent lands from flooding. Floodwalls are concrete structures, often components of levee systems, designed for urban areas where there is insufficient room for earthen levees. When levees and floodwalls and their appurtenant structures are stressed beyond their capabilities to withstand floods, levee failure can result in injuries and loss of life, as well as damages to property, the environment, and the economy.

Levees can be small agricultural levees that protect farmland from high-frequency flooding. Levees can also be larger, designed to protect people and property in larger urban areas from less frequent flooding events such as the 100-year and 500-year flood levels. For purposes of this discussion, levee failure will refer to both overtopping and breach as defined in FEMA's Publication "So You Live Behind a Levee" (<http://content.asce.org/ASCELeveeGuide.html> <http://mrcc.isws.illinois.edu/1913Flood/awareness/materials/SoYouLiveBehindLevee.pdf>). Following are the FEMA publication descriptions of different kinds of levee failure.

##### **Overtopping: When a Flood Is Too Big**

Overtopping occurs when floodwaters exceed the height of a levee and flow over its crown. As the water passes over the top, it may erode the levee, worsening the flooding and potentially causing an opening, or breach, in the levee.

##### **Breaching: When a Levee Gives Way**

A levee breach occurs when part of a levee gives way, creating an opening through which floodwaters may pass. A breach may occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. The resulting torrent can quickly swamp a large area behind the failed levee with little or no warning.

Earthen levees can be damaged in several ways. For instance, strong river currents and waves can erode the surface. Debris and ice carried by floodwaters—and even large objects such as boats or barges—can collide with and gouge the levee. Trees growing on a levee can blow over, leaving a hole where the root wad and soil used to be. Burrowing animals can create holes that enable water to pass through a levee. If severe enough, any of these situations can lead to a zone of weakness that could cause a levee breach. In seismically active areas, earthquakes and ground shaking can cause a loss of soil strength, weakening a levee and possibly resulting in failure. Seismic activity can also cause levees to slide or slump, both of which can lead to failure.

##### Geographic Location

Missouri is a state with many levees. Currently, there is no single comprehensive inventory of levee systems in the state. Levees have been constructed across the state by public entities and private entities with varying levels of protection, inspection oversight, and maintenance. The lack of a comprehensive levee inventory is not unique to Missouri.

There are two concurrent nation-wide levee inventory development efforts, one led by the United State Army Corps of Engineers (USACE) and one led by Federal Emergency Management Agency (FEMA). The National Levee Database (NLD), developed by USACE, captures all USACE related levee projects, regardless of design levels of protection. The Midterm Levee Inventory (MLI), developed by FEMA, captures all levee data (USACE and non-USACE) but primarily focuses on levees that provide 1% annual-chance flood protection on FEMA Flood Insurance Rate Maps (FIRMs).

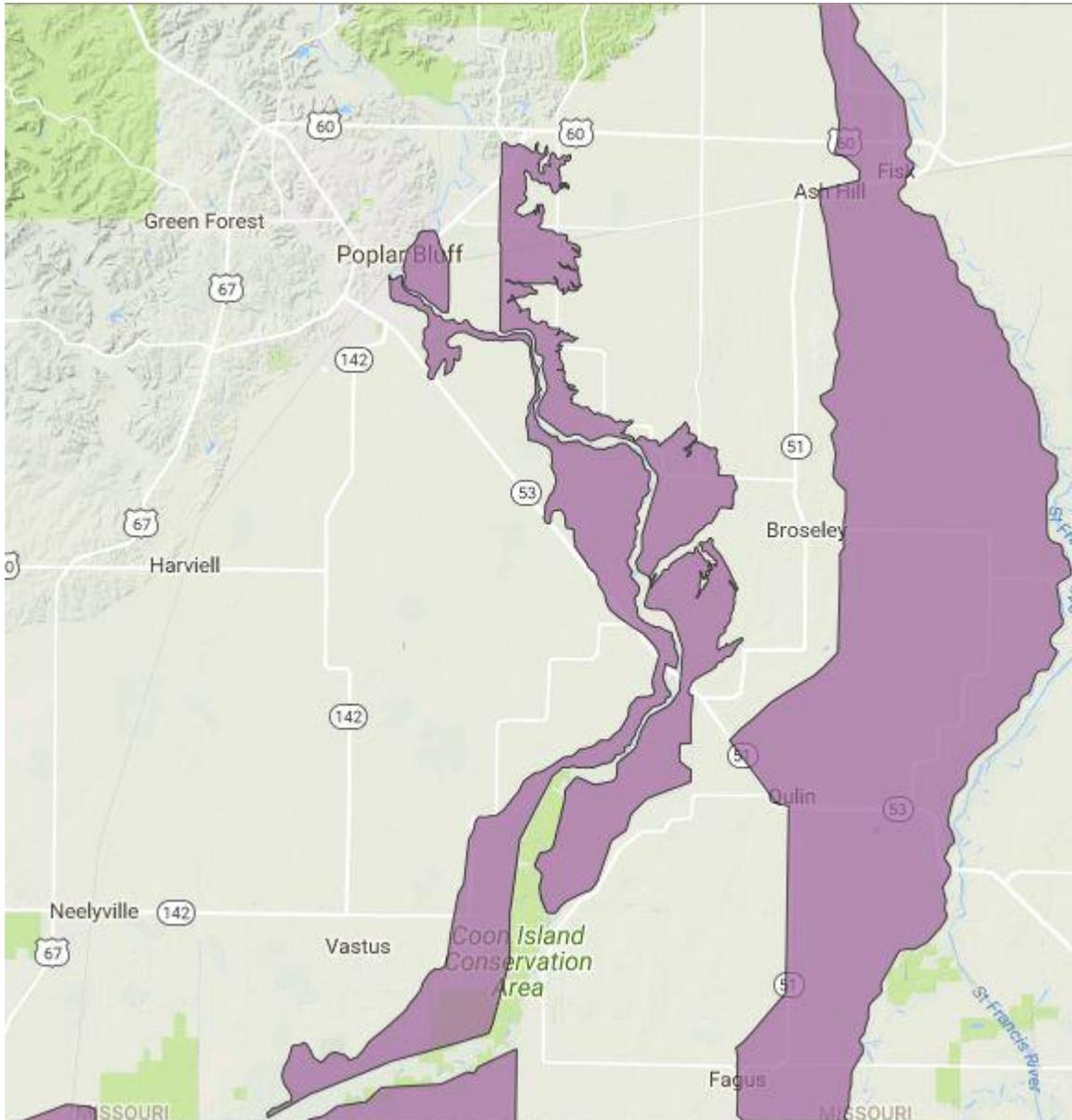
It is likely that agricultural levees and other non-regulated levees within the planning area exist that are not inventoried or inspected. These levees that are not designed to provide protection from the 1-percent annual chance flood would overtop or fail in the 1-percent annual chance flood scenario. Therefore, any associated losses would be taken into account in the loss estimates provided in the Flood Hazard Section.

In reviewing data from the 2013 Missouri State Hazard Mitigation Plan, the US Army Corps of Engineers, FEMA, and local community leaders, the following levees have been identified in Butler County:

- Reorganized Butler County Drainage District No. 7
- Butler County Drainage District No. 12
- 6 Privately owned levees

According to the 2013 Missouri State Hazard Mitigation Plan there are 159 levee systems in the USACE Levee Safety Program and there are four levee systems that received an unacceptable rating from routine maintenance inspections. One of those levee systems is the Reorganized Butler County Drainage District No. 7 that was built to protect unincorporated areas of southern Butler County from the Black River. This unacceptable rating means that the levee one or more deficient conditions that can be reasonably foreseen to prevent the levee from functioning as designed. The eastern side of the City of Poplar Bluff is the only incorporated community protected by a levee, the remaining areas that are provided protection by levees are unincorporated areas of Butler County. The levees are located along both the Black River that bisects the county, and the St. Francis River that forms the eastern border of the county. Figure 3.9 was created using the USACE's National Levee Database online mapping tool. The shaded areas are the areas that are protected by levees.

Figure 3.9 – Areas Protected by levees



Source: USACE, National Levee Database

## Severity/Magnitude/Extent

Levee failure is typically an additional or secondary impact of another disaster such as flooding or earthquake. The main difference between levee failure and losses associated with riverine flooding is magnitude. Levee failure often occurs during a flood event, causing destruction in addition to what would have been caused by flooding alone. In addition, there would be an increased potential for loss of life due to the speed of onset and greater depth, extent, and velocity of flooding due to levee breach.

As previously mentioned, agricultural levees and levees that are not designed to provide flood protection from at least the 1-percent annual chance flood likely do exist in the planning area. However, none of these levees are shown on the Preliminary DFIRM, nor are they enrolled in the USACE Levee Safety Program. As a result, an inventory of these types of levees is not available for analysis. Additionally, since these types of levees do not provide protection from the 1-percent annual chance flood, losses associated with overtopping or failure are captured in the Flood Section of this plan.

The USACE regularly inspects levees within its Levee Safety Program to monitor their overall condition, identify deficiencies, verify that maintenance is taking place, determine eligibility for federal rehabilitation assistance (in accordance with P.L. 84-99), and provide information about the levees on which the public relies. Inspection information also contributes to effective risk assessments and supports levee accreditation decisions for the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA).

The USACE now conducts two types of levee inspections. Routine Inspection is a visual inspection to verify and rate levee system operation and maintenance. It is typically conducted each year for all levees in the USACE Levee Safety Program. Periodic Inspection is a comprehensive inspection led by a professional engineer and conducted by a USACE multidisciplinary team that includes the levee sponsor. The USACE typically conducts this inspection every five years on the federally authorized levees in the USACE Levee Safety Program.

Both Routine and Periodic Inspections result in a rating for operation and maintenance. Each levee segment receives an overall segment inspection rating of Acceptable, Minimally Acceptable, or Unacceptable. Figure 3.10 below defines the three ratings.

**Figure 3.1. Definitions of the Three Levee System Ratings**

<b>Levee System Inspection Ratings</b>	
<b>Acceptable</b>	All inspection items are rated as Acceptable.
<b>Minimally Acceptable</b>	One or more levee segment inspection items are rated as Minimally Acceptable or one or more items are rated as Unacceptable and an engineering determination concludes that the Unacceptable inspection items would not prevent the segment/system from performing as intended during the next flood event.
<b>Unacceptable</b>	One or more levee segment inspection items are rated as Unacceptable and would prevent the segment/system from performing as intended, or a serious deficiency noted in past inspections (previous Unacceptable items in a Minimally Acceptable overall rating) has not been corrected within the established timeframe, not to exceed two years.

## **Previous Occurrences**

In researching data from the 2013 Missouri State Hazard Mitigation Plan and the National Climatic Data Center (NCDC), there have been four occurrences of levee failure, breaches or overtopping from 2007-2017. The first incident during this time period occurred in March 2008. According to the NCDC, record flooding occurred on the Black River with the gage measured a crest of 22.15 feet on March 19, breaking the previous record of 21.68 feet recorded in December 1982. At least five levee breaches were reported in Butler County along the Black River.

The next reported incident occurred in April of 2011 as the Black River crested at 21.41 feet at Poplar Bluff, the third highest crest on record. The levee from Poplar Bluff to Qulin was overtopped in more than three dozen places and at least one breach was reported just outside of the Poplar Bluff city limits.

The third reported incident occurred in August 2016 as heavy rains led to 10 to 17 inches of rainfall over the area. A levee breach was reported near Butler County Road 202 near Qulin, Missouri. The Black River crest was recorded as 20.28 feet at Poplar Bluff, the flood stage is 16 feet.

The most recent levee failure occurred in May 2017 along the Black River. On May 1, 2018 the river crested at 21.96 feet, only inches below the record crest of 22.15 feet. One levee breach was reported near Butler County Road 608, requiring eight houses to be evacuated. The levee from Poplar Bluff to the Qulin area was overtopped more than a dozen locations and the levee protecting Poplar Bluff residents and the downtown area was overtopped in a couple locations. Two deaths were also reported resulting from flood waters during this event.

## **Probability of Future Occurrence**

Flooding is the most common hazard experienced by residents of Butler County, this hazard results in increased pressures on the levee systems of the Black River that extend from Poplar Bluff southward to the Arkansas state line along the banks of the Black River. During the ten year time period of 2007-2017 there were four documented incidents when flood waters led to breaks and overtopping of the levees systems. Using this data, four incidents in ten years, the probability of a future levee break or overtop incident is calculated as 40% in any given year of a levee incident (4 events/10 years). Certain data limitations exist within Missouri that limit the reliability of forecasting future events such as the lack of a centralized levee database in the state. Another limitation is the number of private levees within Butler County.

## **Vulnerability**

### **Vulnerability Overview**

In reviewing the 2013 Missouri State Hazard Mitigation Plan, page 3.605, Table 3.7.3b lists that there is one state-owned facility in Levee Protected Areas in Butler County, the replacement cost of this facility is listed as \$60,912.

In reviewing mapping data of the county, it is determined that there are no school district owned facilities located in the areas protected by levees. Through reviewing map data and speaking with local officials, it is also determined that there are no structures owned by local county or city governments that are in areas protected by levees. The only exception would be some county roads and city streets in Poplar Bluff, Qulin, and Fisk.

## **Potential Losses to Existing Development**

If a DFIRM is available depicting any Zone X, Protected by levee areas, this can be overlaid on census block data or parcel data to determine structures, values, and estimated population at risk. If other GIS data is available of other levee protected areas, this can be used in the same way.

## **Impact of Previous and Future Development**

Due to floodplain ordinances and the recognized dangers of flooding in Butler County, there are no anticipated future developments in areas protected by levees. The majority of the area protected by levees is utilized as farmland at this time.

## **Hazard Summary by Jurisdiction**

The communities with areas protected by levees include unincorporated Butler County, the eastside of Poplar Bluff, portions of the Cities of Qulin and Fisk. There are no school district or special district assets located in levee protected areas.

## **Problem Statement**

The local struggle related to levees has been a failure to properly and adequately maintain the levee and the main channel of the Black River. Butler County has begun working with the local levee districts that are responsible for the levee system, along with the US Army Corps of Engineers to improve the levees in the County. This includes removing debris from the Black River that is leading to increased pressure on the levee systems during flooding events.

### 3.4.9 Thunderstorm/High Winds/Lightning/Hail

#### **Hazard Profile**

##### ***Hazard Description***

##### ***Thunderstorms***

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, as well as in clusters or lines. The National Weather Service defines a thunderstorm as "severe" if it includes hail that is one inch or more, or wind gusts that are at 58 miles per hour or higher. At any given moment across the world, there are about 1,800 thunderstorms occurring. Severe thunderstorms most often occur in Missouri in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms are heavy rains resulting in flooding (discussed separately in **Section 3.4.6**) and tornadoes (discussed separately in **Section 3.4.10**).

##### ***High Winds***

A severe thunderstorm can produce winds causing as much damage as a weak tornado. The damaging winds of thunderstorms include downbursts, microbursts, and straight-line winds. Downbursts are localized currents of air blasting down from a thunderstorm, which induce an outward burst of damaging wind on or near the ground. Microbursts are minimized downbursts covering an area of less than 2.5 miles across. They include a strong wind shear (a rapid change in the direction of wind over a short distance) near the surface. Microbursts may or may not include precipitation and can produce winds at speeds of more than 150 miles per hour. Damaging straight-line winds are high winds across a wide area that can reach speeds of 140 miles per hour.

##### ***Lightning***

All thunderstorms produce lightning which can strike outside of the area where it is raining and is has been known to fall more than 10 miles away from the rainfall area. Thunder is simply the sound that lightning makes. Lightning is a huge discharge of electricity that shoots through the air causing vibrations and creating the sound of thunder.

##### ***Hail***

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when thunderstorm updrafts carry raindrops upward into extremely cold atmosphere causing them to freeze. The raindrops form into small frozen droplets. They continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain

droplet. This frozen droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow before it hits the earth.

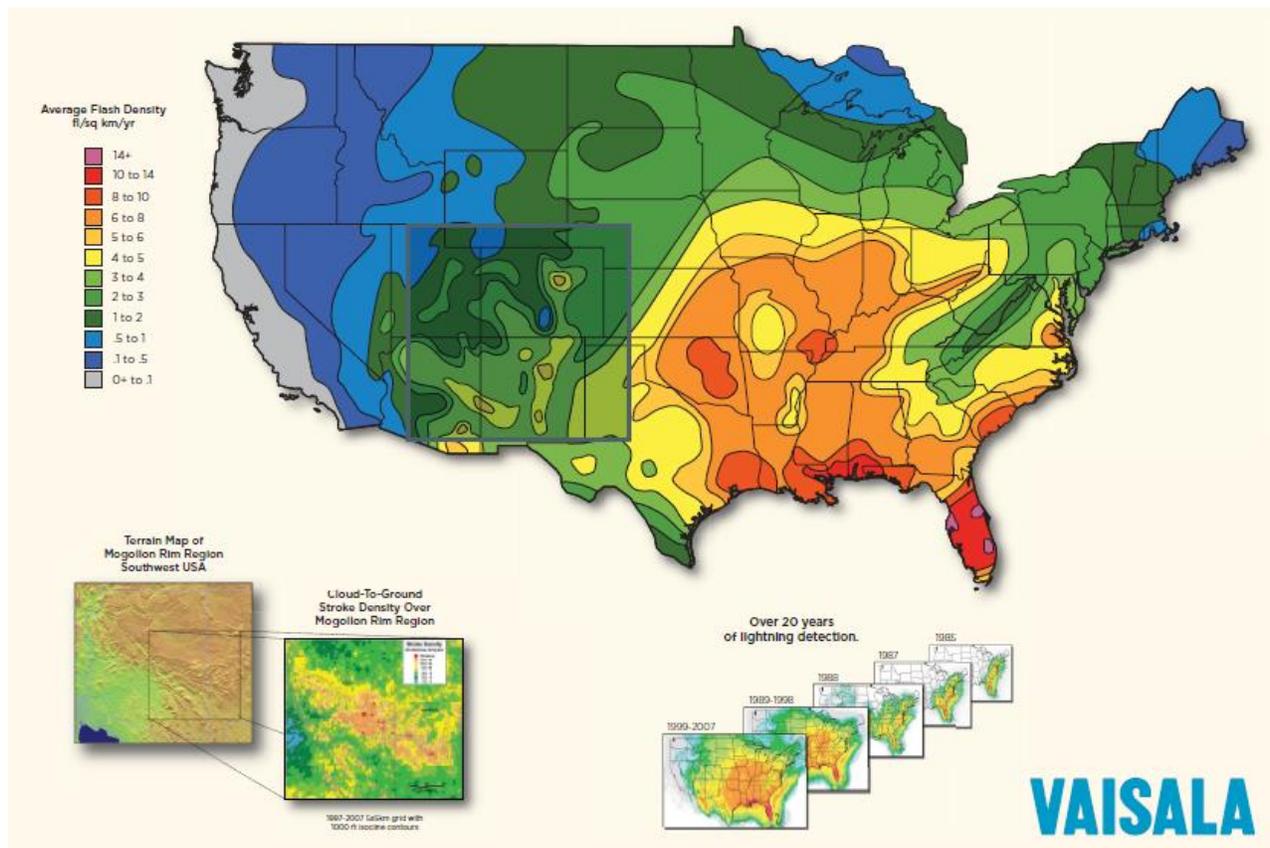
At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼” diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾” diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest hailstone in diameter recorded in the United States was found in Vivian, South Dakota on July 23, 2010. It was eight inches in diameter, almost the size of a soccer ball. Soccer-ball-sized hail is the exception, but even small pea-sized hail can do damage.

**Geographic Location**

Thunderstorms/high winds/hail/lightning events are an area-wide hazard that can happen anywhere in the county. Although these events occur similarly throughout the planning area, they are more frequently reported in more urbanized areas. In addition, damages are more likely to occur in more densely developed urban areas.

The map below (**Figure 3.9**) shows lightning frequency in the country. From viewing the map and legend, to can be determined that the average flash density for Butler County is 6-8 ft/sq km/yr. This indicates the number of lightning flashes to ground per kilometer squared per year.

**Figure 3.9 Location and Frequency of Lightning in Missouri**



Source: National Weather Service, [http://www.lightningsafety.noaa.gov/stats/08\\_Vaisala\\_NLDN\\_Poster.pdf](http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf). Note: indicate location of planning area with a colored square or arrow.

The map below (**Figure 3.10**) depicts wind zones in the United States.  
**Figure 3.10 Wind Zones in the United States**



Source: FEMA 320, Taking Shelter from the Storm, 3rd edition, [http://www.weather.gov/media/bis/FEMA\\_SafeRoom.pdf](http://www.weather.gov/media/bis/FEMA_SafeRoom.pdf)

## Severity/Magnitude/Extent

Severe thunderstorm losses are usually attributed to the associated hazards of hail, downburst winds, lightning and heavy rains. Losses due to hail and high wind are typically insured losses that are localized and do not result in presidential disaster declarations. However, in some cases, impacts are severe and widespread and assistance outside state capabilities is necessary. Hail and wind also can have devastating impacts on crops. Severe thunderstorms/heavy rains that lead to flooding are discussed in the flooding hazard profile. Hailstorms cause damage to property, crops, and the environment, and can injure and even kill livestock. In the United States, hail causes more than \$1 billion in damage to property and crops each year. Even relatively small hail can shred plants to ribbons in a matter of minutes. Vehicles, roofs of buildings and homes, and landscaping are also commonly damaged by hail. Hail has been known to cause injury to humans, occasionally fatal injury.

In general, assets in the County vulnerable to thunderstorms with lightning, high winds, and hail include people, crops, vehicles, and built structures. Although this hazard results in high annual losses, private property insurance and crop insurance usually cover the majority of losses. Considering insurance coverage as a recovery capability, the overall impact on jurisdictions is reduced.

Most lightning damages occur to electronic equipment located inside buildings. But structural damage can also occur when a lightning strike causes a building fire. In addition, lightning strikes can cause damages to crops if fields or forested lands are set on fire. Communications equipment and warning transmitters and receivers can also be knocked out by lightning strikes.

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.28** below describes typical damage impacts of the various sizes of hail.

**Table 3.28 Tornado and Storm Research Organization Hailstorm Intensity Scale**

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
Hard Hail	5-9	0.2-0.4	Pea	No damage
Potentially Damaging	10-15	0.4-0.6	Mothball	Slight general damage to plants, crops
Significant	16-20	0.6-0.8	Marble, grape	Significant damage to fruit, crops, vegetation
Severe	21-30	0.8-1.2	Walnut	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
Severe	31-40	1.2-1.6	Pigeon's egg > squash ball	Widespread glass damage, vehicle bodywork damage
Destructive	41-50	1.6-2.0	Golf ball > Pullet's egg	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
Destructive	51-60	2.0-2.4	Hen's egg	Bodywork of grounded aircraft dented, brick walls pitted
Destructive	61-75	2.4-3.0	Tennis ball > cricket ball	Severe roof damage, risk of serious injuries
Destructive	76-90	3.0-3.5	Large orange > Soft ball	Severe damage to aircraft bodywork
Super Hailstorms	91-100	3.6-3.9	Grapefruit	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
Super Hailstorms	>100	4.0+	Melon	Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Source: Tornado and Storm Research Organization (TORRO), Department of Geography, Oxford Brookes University

Notes: In addition to hail diameter, factors including number and density of hailstones, hail fall speed and surface wind speeds affect severity. <http://www.torro.org.uk/site/hyscale.php>

Straight-line winds are defined as any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 miles per hour, which represent the most common type of severe weather. They are responsible for most wind damage related to thunderstorms. Since thunderstorms do not have narrow tracks like tornadoes, the associated wind damage can be extensive and affect entire (and multiple) counties. Objects like trees, barns, outbuildings, high-profile vehicles, and power lines/poles can be toppled or destroyed, and roofs, windows, and homes can be damaged as wind speeds increase.

The tables below (**Tables 3.29** through **Table 3.30**) summarize past crop damages as indicated by

crop insurance claims. The tables illustrate the magnitude of the impact on the planning area's agricultural economy.

**Table 3.29 Crop Insurance Claims Paid in Butler County from Thunderstorms, 01/01/2012-12/31/2016.**

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
			0
<b>Total</b>			0

Source: USDA Risk Management Agency, Insurance Claims, <http://www.rma.usda.gov/data/cause.htm>

**Table 3.30 Crop Insurance Claims Paid in Butler County from high Winds, 01/01/2012-12/31/2016**

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2012	Corn	Hot Wind	460
2012	Soybeans	Hot Wind	6150
2013	Soybeans	Hot Wind	16,085
2014	Rice	Wind/Excess Wind	11,454
2015	Rice	Wind/Excess Wind	6,989
2016	Rice	Wind/Excess Wind	143,975
<b>Total</b>			<b>\$185,113</b>

Source: USDA Risk Management Agency, Insurance Claims, <http://www.rma.usda.gov/data/cause.htm>

**Table 3.31 Crop Insurance Claims Paid in Butler County from Lightning, 01/01/2012-12/31/2016.**

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
0	0	0	0
<b>Total</b>			0

USDA Risk Management Agency, Insurance Claims, <http://www.rma.usda.gov/data/cause.htm>

**Table 3.32 Crop Insurance Claims Paid in Butler County from Hail, 01/01/2012-12/31/2016.**

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
			\$0
<b>Total</b>			

USDA Risk Management Agency, Insurance Claims, <http://www.rma.usda.gov/data/cause.htm>

The onset of thunderstorms with lightning, high wind, and hail is generally rapid. Duration is less than six hours and warning time is generally six to twelve hours. Nationwide, lightning kills 75 to

100 people each year. Lightning strikes can also start structural and wildland fires, as well as damage electrical systems and equipment.

### ***Previous Occurrences***

The tables following (**Table 3.32 and Table 3.33**) provide previous occurrences for May 1, 2006-May 31, 2016 based on data from the NDCD. The high wind events include all wind events with winds reported above 50 knots during this time period. Hail events listed below include hail events in which hail of 1” or greater was reported. “Limitations to the use of NDCD reported lightning events include the fact that only lightning events that result in fatality, injury and/or property and crop damage are in the NDCD.

**Table 3.33 High Winds, Greater than 50 knots – May 1, 2006-May 31, 2016**

Date	Location	Knots	Property Damage
08/16/2007	Poplar Bluff	56	0
10/18/2007	Poplar Bluff	56	9,000
01/29/2008	Butler County	70	150,000
06/20/2008	Poplar Bluff	56	50,000
07/29/2008	Lone Hill	50	10,000
09/14/2008	Butler County	57	8,500,000
12/27/2008	Poplar Bluff	61	25,000
04/09/2009	Neelyville	52	5,000
04/09/2009	Poplar Bluff	50	0
05/08/2009	Poplar Bluff	61	45,000
05/14/2009	Neelyville	56	10,000
06/08/2009	Poplar Bluff	52	15,000
08/04/2009	Poplar Bluff	50	0
03/10/2010	Hendrickson	52	10,000
04/30/2010	Poplar Bluff	52	0
6/15/2010	Lone Hill	61	25,000
04/23/2011	Broseley	61	20,000
04/27/2011	Hendrickson	52	5,000
05/23/2011	Fisk	70	75,000
05/25/2011	Poplar Bluff	56	20,000
05/25/2011	Neelyville	56	20,000
06/11/2011	Qulin	70	450,000
06/15/2011	Neelyville	61	50,000
08/7/2011	Poplar Bluff	53	5,000
08/7/2011	Poplar Bluff	56	100,000
08/7/2011	Harviell	56	10,000
08/7/2011	Fagus	56	20,000
08/23/2011	Poplar Bluff	61	20,000
06/11/2012	Poplar Bluff	61	0

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06/11/2012	Poplar Bluff	56	5,000
07/27/2012	Poplar Bluff	61	20,000
01/29/2013	Poplar Bluff	65	60,000
01/29/2013	Broseley	70	30,000
04/10/2013	Poplar Bluff	52	0
04/10/2013	Batesville	65	25,000
10/31/2013	Poplar Bluff	52	40,000
04/3/2014	Poplar Bluff	52	10,000
07/1/2014	Poplar Bluff	52	0
07/1/2014	Qulin	52	5,000
07/23/2014	Poplar Bluff	61	80,000
07/20/2015	Poplar Bluff	52	3,000
04/26/2016	Poplar Bluff	52	5,000
05/9/2016	Poplar Bluff	61	27,000
07/6/2016	Poplar Bluff	70	30,000
07/28/2016	Fisk	52	3,000
03/1/2017	Poplar Bluff	54	0
04/20/2017	Neelyville	52	10,000
05/20/2017	Poplar Bluff	65	35,000
Total	48 events		\$10,037,000

Source: NOAA, National Climatic Data Center

The most significant of these thunderstorm wind events occurred on September 14, 2008. This was a large storm that impacted a large portion of southeast Missouri from Butler County all the way to Perry County. As presented in the table above, the property damage just in Butler County is estimated at \$8,500,000 with total property damage from the storm at \$47.9 million. One injury was reported in rural Butler County when a large Oak tree fell into a house, injuring an occupant.

Table 3.34 Hail Events, Diameter 1” or greater – June 1, 2007-June 30, 2017

Date	Location	Size (inches)	Property Damage
2/5/2008	POPLAR BLUFF	0.75	0.00
6/20/2008	POPLAR BLUFF	1.25	3,000.00
4/9/2009	NEELYVILLE	0.75	0.00
6/9/2009	NEELYVILLE	0.75	0.00
6/30/2009	QULIN	1	0.00
3/10/2010	LONE HILL	1.5	100,000.00
4/15/2011	HENDRICKSON	0.88	0.00
4/24/2011	NEELYVILLE	1	0.00
4/27/2011	POPLAR BLUFF	1.75	750,000.00
4/27/2011	HARVIELL	1	0.00
6/17/2011	HENDRICKSON	1	0.00
6/17/2011	BROSELEY	1	0.00

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8/3/2011	POPLAR BLUFF	1	0.00
11/14/2011	POPLAR BLUFF	1	0.00
2/29/2012	NEELYVILLE	1.75	0.00
3/2/2012	POPLAR BLUFF	0.75	0.00
3/23/2012	POPLAR BLUFF	0.75	0.00
4/5/2012	POPLAR BLUFF	1	0.00
6/11/2012	HENDRICKSON	1	0.00
7/8/2012	POPLAR BLUFF	0.75	0.00
7/27/2012	POPLAR BLUFF	1	0.00
8/16/2012	HENDRICKSON	1.25	0.00
8/16/2012	POPLAR BLUFF	0.75	0.00
9/26/2012	POPLAR BLUFF	0.75	0.00
9/26/2012	BROSELEY	1.25	0.00
12/9/2012	ROMBAUER	0.75	0.00
8/6/2014	POPLAR BLUFF	0.75	0.00
8/6/2014	POPLAR BLUFF	0.75	0.00
3/31/2015	POPLAR BLUFF	1.25	0.00
5/27/2017	POPLAR BLUFF	1.75	0.00
Total	30 Events		\$853,000.00

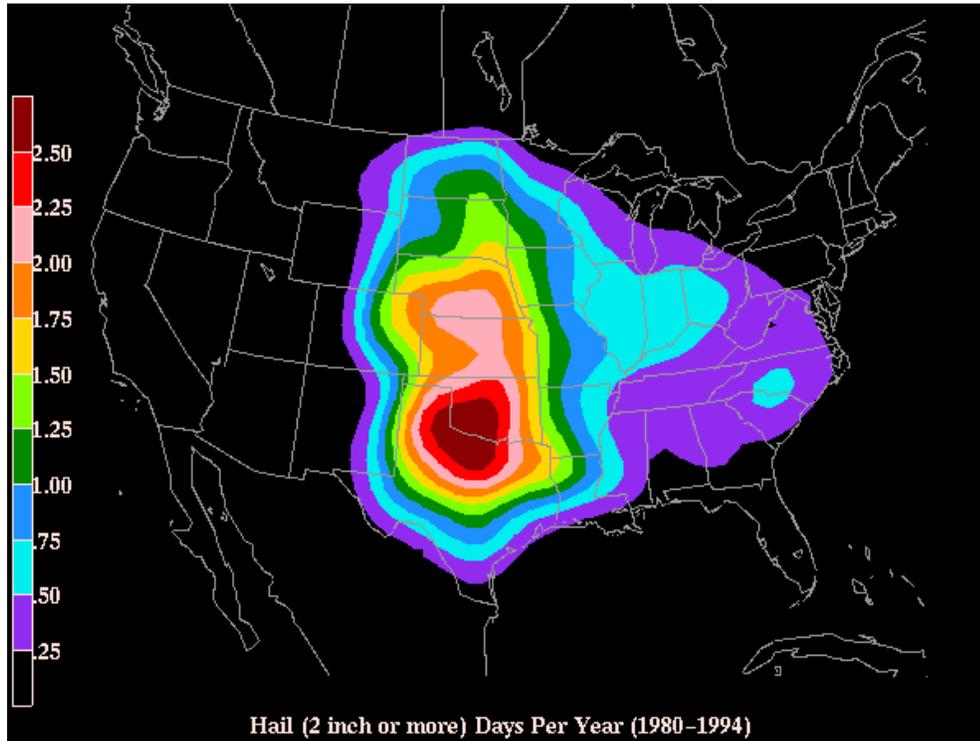
Source: NOAA, National Climatic Data Center

*Probability of Future Occurrence*

In reviewing the ten (10) year history presented above, the probability of a high wind event with winds greater than 50 knots is 100% in the planning area in any given year. In fact, a review of this data of 48 high wind events during the 10 year period illustrates that there are more than four (4) high wind events each year somewhere in the county.

Table 3.24 provided a list of hail events. There were thirty (30) of these events reported for the ten (10) year period, leading to a 100% chance that a hail event will occur in the county in any given year. It can also be concluded from this data that more than two (2) events of hail can be expected annually.

**Annual Hailstorm Probability (2" diameter or larger), U 1980- 1994**



Source: NSSL, [http://www.nssl.noaa.gov/users/brooks/public\\_html/big hail.gif](http://www.nssl.noaa.gov/users/brooks/public_html/big hail.gif) Note:

**Vulnerability**

***Vulnerability Overview***

Severe thunderstorms are common in Missouri and in Butler County. These events include winds, hail, and lightning, which are all contributing elements of severe thunderstorms. The MPC has included wind speeds over 50 knots and hail events 1" and larger in diameter. In reviewing the 2013 State Plan, data was gathered from several sources including the National Climatic Data Center, USDA Crop Insurance Claims, the US Census, and the calculated Social Vulnerability Index from the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina. The table below (**Table 3.28**) provides the housing density, building exposure, crop exposure and social vulnerability index for Butler County as reported in Table 3.5.6a of the 2013 State Plan. These are the common elements for the analysis of wind, hail, and lightning with one exception; the lightning analysis did not consider crop exposure as crop loss is an unlikely result of lightning events.

**Table 3.35 Housing Density, Building Exposure, Crop Exposure and Social Vulnerability**

Housing units/sq mile	Total Building Exposure \$	Crop Exposure (2007 Census of Ag)	Social Vulnerability Index (1-5)
28.4	\$3,682,173,000	\$86,624,000	4

The following table (**Table 3.34**) provides additional data obtained to complete the overall vulnerability

analysis, this data is from Table 3.5.6b of the Missouri State Hazard Mitigation Plan, 2013.

**Table 3.36 Data for Vulnerability Analysis**

Total Hail Incidents	Total Hail Property Loss (4)	Total Crop Ins. Paid for Hail (4)	Total Wind Incidents	Total Wind Property Loss (\$)	Total Crop Ins. Paid for Wind (4)	Total Lightning Incidents	Total Lightning Property Loss (4)
87	\$1,406,000	\$4,381	78	\$1,838,500	\$12,714	1	\$10,000

From this statistical data collected, five factors were considered in determining overall vulnerability to lightning as follows, housing density, likelihood of occurrence, building exposure, average annual property loss ratio, and social vulnerability. For hail and wind, the two additional factors of crop exposure and average annual crop insurance claims as a result of these hazards were considered.

To complete the vulnerability analysis utilizing the factors described above, a rating value of 1-5 was assigned to the data obtained for each factor. These values correspond to the following descriptive terms:

1. Low
2. Medium-low
3. Medium
4. Medium-high
5. High

The rating values of all factors were then combined to determine the overall vulnerability rating. The table below (**Table 3.37**) provides the factors considered and the ranges for the rating values assigned.

**Table 3.37 Factors Considered to Determine Vulnerability**

Factors Considered	Low (1)	Medium-Low (2)	Medium (3)	Medium-High (4)	High (5)
<b>Common Factors</b>					
Housing density (# per sq mile)	<50	50-99	100-299	300-499	>500
Crop exposure(\$ in millions) hail & wind only	<\$10,000	\$10,000-\$24,999	\$25,000-\$49,999	\$50,000-\$99,999	>\$100,000
Social Vulnerability	1	2	3	4	5
<b>Wind</b>					
Likelihood of Occurrence	0-2.15	2.16-3.73	3.74-5.68	5.60-10.10	10.11-15.95
Average Annual Property loss ratio (annual loss/exposure)	0.00-0.000027	0.000028-0.000092	0.000093-0.000231	0.000232-0.000489	0.000490-0.001273
Wind crop loss ratio	0-0.000084	0.000085-0.000250	0.000251-0.000714	0.000715-0.001398	0.001399-0.003574
<b>Hail</b>					
Likelihood of	0.78-3.10	3.11-5.26	5.27-7.89	7.90-12.10	12.11-18.48

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occurrence					
Average Annual Property loss ratio (annual loss/exposure)	0-0.000034	0.000035-0.000149	0.000150-0.000269	0.000270-0.000460	0.000461-0.001090
Hail Crop Loss Ratio	0-0.000270	0.000271-0.000974	0.000975-0.002304	0.002305-0.003698	0.003699-0.007516
<b>Lightning</b>					
Likelihood of Occurrence	0-0.05	0.06-0.15	0.16-0.26	0.27-0.42	0.43-0.74
Average Annual Property Loss Ratio	0-0.000001	0.000002-0.000003	0.000004-0.000006	0.000007-0.000015	0.000016-0.000037

Utilizing this method as presented in the 2013 Missouri State Hazard Mitigation Plan, the table (**Table 3.38**) following assigns the vulnerability to Butler County for the thunderstorm hazard and its associated hazards.

**Table 3.38 Assigned Vulnerability**

Housing Density Rating	Wind Likelihood Rating	Annualized Wind Prop Loss	Annualized Wind Crop Loss	Hail Likelihood Rating	Annualized Hail Prop Loss	Annualized Hail Crop Loss	Lightning Likelihood Rating	Annualized Lightning Prop Loss	Annualized Thunderstorm Vulnerability	Combined Vulnerability
1	3	1	1	2	1	1	1	1	12	Medium-Low

### ***Potential Losses to Existing Development***

Based on prior events and the vulnerability assessment, it can be determined that the potential losses to existing development will be, and has been, minimal when compared to the potential exposure. The annualized property loss for all components of the thunderstorm hazard has been \$1,406,000 compared to the total exposure of \$3,682,173,000. The total annualized crop loss has been \$27,367 compared to the total crop exposure of \$86,624,000.

### ***Future Development***

With little future development expected in Butler County, the exposure and losses associated with thunderstorm events are not expected to change.

### ***Hazard Summary by Jurisdiction***

Although thunderstorms/high winds/lightning/hail events are area-wide, there are demographics indicating higher losses in one jurisdiction as compared to another. The primary factor for differences in the higher losses in one jurisdiction than another is population density. The population density for Butler County is 61.8 persons per square mile. The population density for Poplar Bluff is the highest of incorporated communities in the county at 1,319.6 persons per square mile, the density of Fisk is 1,036.4, the density of Neelyville is 420 persons per square mile and

Qulin has a population density of 1,017.8 persons per square mile. The damages resulting from a thunderstorm have the potential to be greater in the more concentrated towns than in the sparsely populated unincorporated areas of the county.

### **Problem Statement**

Thunderstorms and the associated risks of high winds, lightning, and hail can result in property and crop damage and have the potential to cause injuries and death to residents. These storms are common occurrences in the county; however, due in large part to the sparse population density of the county, the damages resulting from these events is relatively limited. Some of the recommendations of the MPC were to seek out funding for emergency generators for critical facilities that are not equipped with generators. Also to ensure that critical facilities were equipped with some form of lightning protection for assets located at the facility such as communication equipment.

### 3.4.10 Tornado

#### Hazard Profile

##### *Hazard Description*

The NWS defines a tornado as “a violently rotating column of air extending from a thunderstorm to the ground.” It is usually spawned by a thunderstorm and produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Often, vortices remain suspended in the atmosphere as funnel clouds. When the lower tip of a vortex touches the ground, it becomes a tornado.

High winds not associated with tornadoes are profiled separately in this document in **Section 3.4.9, Thunderstorm/High Wind/Hail/Lightning.**

Essentially, tornadoes are a vortex storm with two components of winds. The first is the rotational winds that can measure up to 500 miles per hour, and the second is an uplifting current of great strength. The dynamic strength of both these currents can cause vacuums that can overpressure structures from the inside.

Although tornadoes have been documented in all 50 states, most of them occur in the central United States due to its unique geography and presence of the jet stream. The jet stream is a high-velocity stream of air that separates the cold air of the north from the warm air of the south. During the winter, the jet stream flows west to east from Texas to the Carolina coast. As the sun moves north, so does the jet stream, which at summer solstice flows from Canada across Lake Superior to Maine. During its move northward in the spring and its recession south during the fall, the jet stream crosses Missouri, causing the large thunderstorms that breed tornadoes.

A typical tornado can be described as a funnel-shaped cloud in contact with the earth’s surface that is “anchored” to a cloud, usually a cumulonimbus. This contact on average lasts 30 minutes and covers an average distance of 15 miles. The width of the tornado (and its path of destruction) is usually about 300 yards. However, tornadoes can stay on the ground for upward of 300 miles and can be up to a mile wide. The National Weather Service, in reviewing tornadoes occurring in Missouri between 1950 and 1996, calculated the mean path length at 2.27 miles and the mean path area at 0.14 square mile.

The average forward speed of a tornado is 30 miles per hour but may vary from nearly stationary to 70 miles per hour. The average tornado moves from southwest to northeast, but tornadoes have been known to move in any direction. Tornadoes are most likely to occur in the afternoon and evening, but have been known to occur at all hours of the day and night.

##### *Geographic Location*

As with the previous hazard of thunderstorms, tornadoes can occur anywhere in Butler County and impact all jurisdictions in the county.

**Severity/Magnitude/Extent**

Tornadoes are the most violent of all atmospheric storms and are capable of tremendous destruction. Wind speeds can exceed 250 miles per hour and damage paths can be more than one mile wide and 50 miles long. Tornadoes have been known to lift and move objects weighing more than 300 tons a distance of 30 feet, toss homes more than 300 feet from their foundations, and siphon millions of tons of water from water bodies. Tornadoes also can generate a tremendous amount of flying debris or “missiles,” which often become airborne shrapnel that causes additional damage. If wind speeds are high enough, missiles can be thrown at a building with enough force to penetrate windows, roofs, and walls. However, the less spectacular damage is much more common.

Tornado magnitude is classified according to the EF- Scale (or the Enhanced Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF- Scale (see **Table 3.39**) attempts to rank tornadoes according to wind speed based on the damage caused. This update to the original F Scale was implemented in the U.S. on February 1, 2007.

**Table 3.39 Enhanced F Scale for Tornado Damage**

FUJITA SCALE			DERIVED EF SCALE		OPERATIONAL EF SCALE		
F Number	Fastest ¼-mile (mph)	3 Second Gust (mph)	E F Number	3 Second Gust (mph)	EF Number	3 Second Gust (mph)	
0	40-72	45-78	0	65-85	0	65-85	
1	73-112	79-117	1	86-109	1	86-110	
2	113-157	118-161	2	110-137	2	111-135	
3	158-207	162-209	3	138-167	3	136-165	
4	208-260	210-261	4	168-199	4	166-200	
5	261-318	262-317	5	200-234	5	Over 200	

Source: The National Weather Service, [www.spc.noaa.gov/faq/tornado/ef-scale.html](http://www.spc.noaa.gov/faq/tornado/ef-scale.html)

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.40**. The damage descriptions are summaries. For the actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale’s damage indicators and degrees of damage is located online at [www.spc.noaa.gov/efscale/ef-scale.html](http://www.spc.noaa.gov/efscale/ef-scale.html).

**Table 3.40 Enhanced Fujita Scale with Potential Damage**

Enhanced Fujita Scale			
Scale	Wind Speed (mph)	Relative Frequency	Potential Damage

		ncy	
EF0	65-85	53.5 %	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0).
EF1	86-110	31.6 %	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.
EF2	111-135	10.7 %	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4 %	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some distance.
EF4	166-200	0.7 %	Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown and small missiles generated.
EF5	>200	<0.1 %	Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

Source: NOAA Storm Prediction Center, <http://www.spc.noaa.gov/efscale/ef-scale.html>

Enhanced weather forecasting has provided the ability to predict severe weather likely to produce tornadoes days in advance. Tornado watches can be delivered to those in the path of these storms several hours in advance. Lead time for actual tornado warnings is about 30 minutes. Tornadoes have been known to change paths very rapidly, thus limiting the time in which to take shelter. Tornadoes may not be visible on the ground if they occur after sundown or due to blowing dust or driving rain and hail.

**Previous Occurrences**

Table (Table 3.41) includes NCDC reported tornado events and damages since 1993 in the planning area. Prior to that date, only really destructive tornadoes were recorded. It is necessary to go back as far as possible because of the random and intermittent nature of tornado events.

There are limitations to the use of NCDC tornado data that must be noted. For example, one tornado may contain multiple segments as it moves geographically. A tornado that crosses a county line or state line is considered a separate segment for the purposes of reporting to the NCDC. Also, a tornado that lifts off the ground for less than 5 minutes or 2.5 miles is considered a separate segment. If the tornado lifts off the ground for greater than 5 minutes or

2.5 miles, it is considered a separate tornado. Tornadoes reported in Storm Data and the Storm Events Database are in segments.

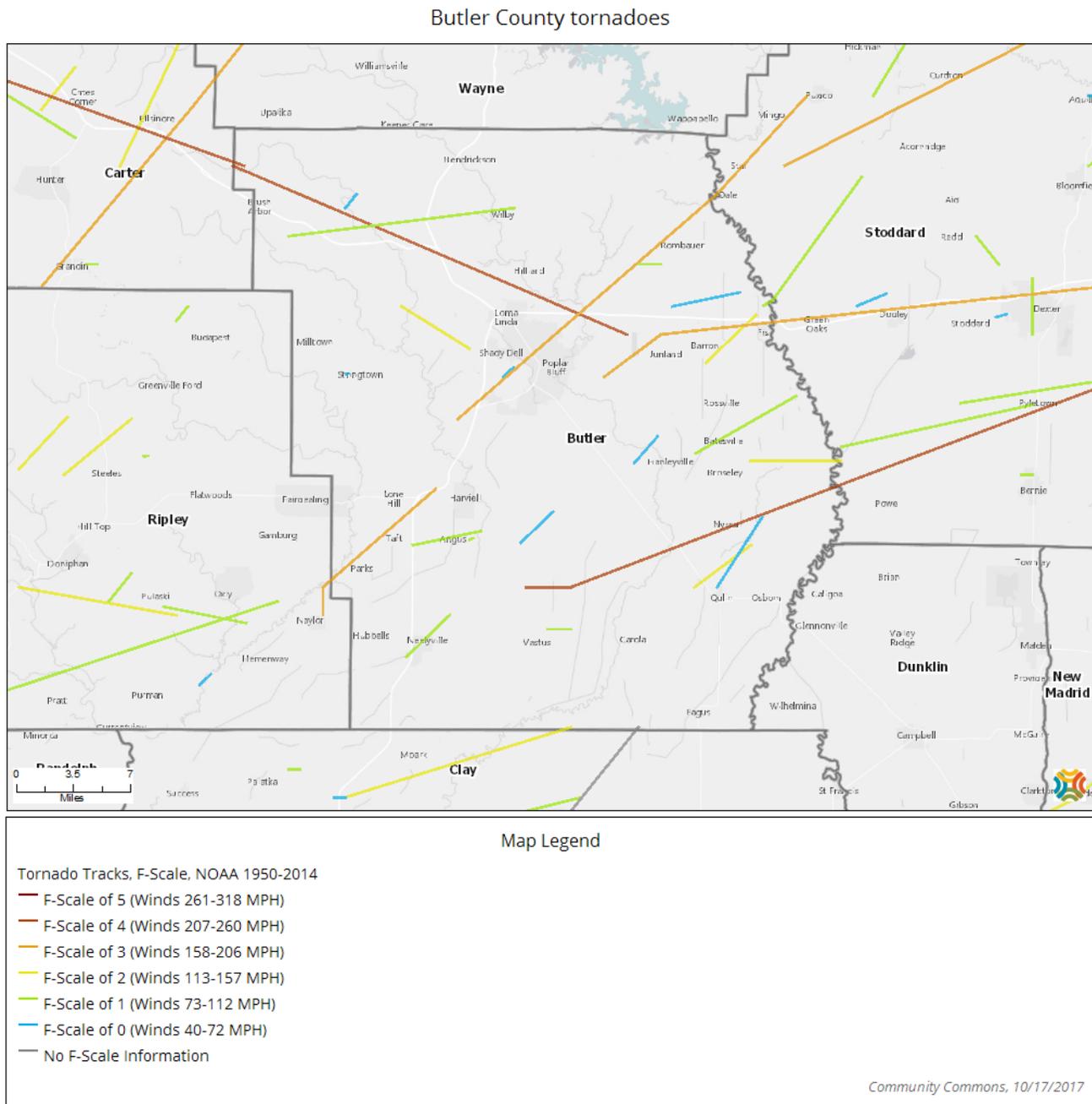
**Table 3.41 Recorded Tornadoes in Butler County, January 2002-August 2017**

Date	BEGIN LOCATION	END LOCATION	F/EF Rating	Deaths	Injuries	Property Damage	Length	Width
4/24/02	HENDRICKSON	POPLAR BLUFF	F4	0	14	\$30,000,000	20	650
4/24/02	ROMBAUER	ROMBAUER	F1	0	0	\$2,000	1	40
9/22/06	NEELYVILLE	NEELYVILLE	F1	0	0	\$4,000	0.3	50
2/5/08	HARVIELL	HARVIELL	EF1	0	0	\$100,000	3.38	300
2/5/08	FISK	BROSELEY	EF2	0	0	\$150,000	4.27	200
5/1/10	HENDRICKSON	HENDRICKSON	EF0	0	0	\$1,000	0.47	175
12/31/10	STRINGTOWN	HILLARD	EF2	0	0	\$250,000	0.24	100
4/23/11	NEELYVILLE	NEELYVILLE	EF1	0	0	\$175,000	2.97	100
4/27/11	HARVIELL	NEELYVILLE	EF0	0	0	\$0	2.2	40
5/25/11	POPLAR BLUFF	POPLAR BLUFF	EF0	0	0	\$0	0.7	40
9/1/12	FISK	FISK	EF0	0	0	\$0	2.95	20
9/1/12	QULIN	QULIN	EF0	0	0	\$0	4.29	20
1/29/13	JUNLAND	FISK	EF2	0	0	\$60,000	3.39	100
4/10/13	POPLAR BLUFF	BATESVILLE	EF0	0	0	\$20,000	1.73	75
10/31/13	HARVIELL	HARVIELL	EF1	0	0	\$80,000	0.22	50
10/31/13	BROSELEY	BROSELEY	EF1	0	0	\$100,000	5.7	75
4/3/14	STRINGTOWN	STRINGTOWN	EF0	0	0	\$17,000	0.19	50
4/3/14	FISK	FISK	EF1	0	0	\$2,000	0.55	75
3/9/17	HENDRICKSON	HILLARD	EF1	0	0	\$25,000	6.35	100
3/9/17	BROSELEY	BROSELEY	EF1	0	0	\$500,000	2.73	200
5/27/17	STRINGTOWN	HILLARD	EF0	0	0	\$40,000	1.85	85
Total	21 Events			0	14	\$31,526,000		

Source: National Climatic Data Center, <http://www.ncdc.noaa.gov/stormevents/>

As can be seen from the table above, from January 2002 through August 31, 2017 there were a total of twenty-one (21) reported tornadoes in Butler County. The resulting property damage was \$31,526,000, fourteen (14) injuries and no reported deaths. The tornado that resulted in all of the injuries occurred on April 24, 2002, was twenty miles in length and 650 yards wide. The tornado destroyed fifty (50) homes in Butler County, caused major damage to an additional sixteen (16), and minor damage to thirty (30) homes. Figure 3.11 provides a map of tornadoes to strike Butler County and their associated paths.

Figure 3.11 Butler County Map of Historic Tornado Events



Source: Community Commons <https://maps.communitycommons.org>

**Probability of Future Occurrence**

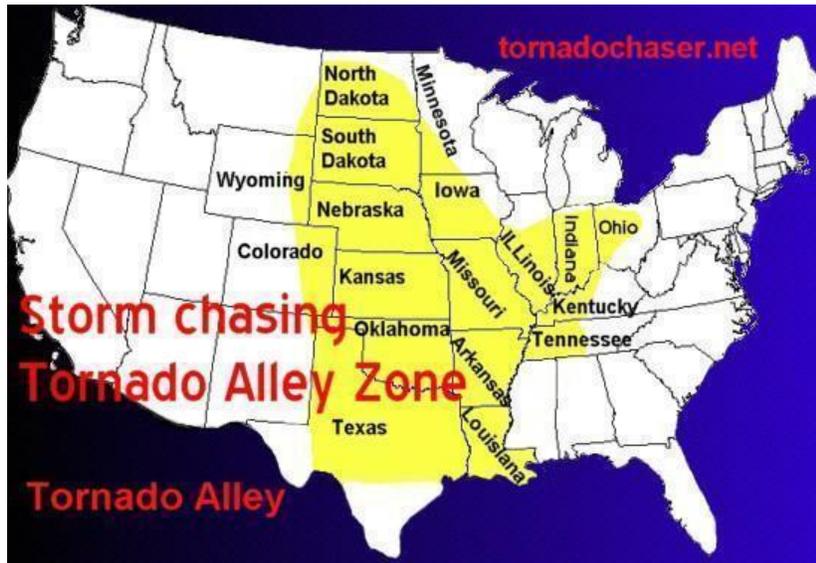
There is a 100% chance that a tornado could strike somewhere in the county in any given year – 21 tornadoes/15 years. Based on past occurrences from 2002 through 2017, there has been an average of more than one tornado every year.

**Vulnerability**

***Vulnerability Overview***

Missouri and Butler County are located in the “Tornado Alley” highlighted in yellow in the map below, **Figure 3.12**, illustrating areas where dangerous tornadoes historically have occurred. Tornado Alley outlined on this map is defined as the area where dangerous tornadoes and tornadoes in general are most likely going to take place in a given year. The area outlined on the map averages three tornadoes or more per year, per 10,000 square miles.

**Figure 3.12 Tornado Alley in the U.S.**



Source: <http://www.tornadochaser.net/tornalley.html>

The 2013 Missouri State Hazard Mitigation Plan was reviewed to determine further vulnerability of the county to tornadoes. The State looked at four factors to determine tornado vulnerability. The analysis measured the likelihood of future tornado impacts, average annual property loss ratio, population change, and housing change. Scales were created to rank these factors: likelihood (1-3), loss ratio with exposure as of 2012 (1-3), population change from 2000-2010 (1-3), and housing change from 2000-2010 (1-3). **Table 3.42** provides a listing of factors considered. These factors were added together for the county for the purposes of ranking total county vulnerability.

The data used for this analysis varies slightly from the historic data presented above. The data used in the State Plan and in the following vulnerability analysis provides information from 1950-July 31, 2012 from the National Climatic Data Center.

**Table 3.42 Factors Considered**

Factors considered	Moderate (1)	High (2)	Very High (3)
Likelihood of Occurrence (# of events/yrs of data)	6-24	25-49	50-68
Loss Ratio %	0-.113	0.114-0.226	0.227-0.340

Population % Change	Below 6%	7%-22%	23%-39%
Housing % Change	Below 12%	13%-25%	26%-39%
Overall Vulnerability Rating	4 and 5 Rating	6 and 7 Rating	7 and 8 Rating

The table below (Table 3.43), from the 2013 State Plan Table 3.5.7b looks at the rating factors for tornado vulnerability in Butler County.

**Table 3.43 Risk Factors for Tornado Vulnerability in Butler County**

# Of Tornadoes	Likelihood of Occurrence	Probability Rating	Total Exp (\$)	Annualized Historic Loss	Loss Ratio	Loss Ratio Rating	Population Growth % Change	Population Change	Housing % Change	Housing Ratio Rating	Total Vulnerability
28	45.53%	2	\$3,682,173,000	\$429,128	0.012%	1	4.7%	1	5.36%	1	Moderate

***Potential Losses to Existing Development***

In reviewing tornado history data provided from the NCDC covering the dates of January 1, 2002 through August 31, 2017, there were twenty-one (21) tornadoes, resulting in property damages of \$31,526,000. This amounts to \$1,501,238 of property damage per event, with a probability of more than one event every year – 21 events over 15 year history. It can be assumed that this trend will continue with a tornado occurring somewhere in the county every year with an average property damage of \$1,501,238.

***Future Development***

Future development, increase in population and growth will lead to an increase in vulnerability, particularly in an around the City of Poplar Bluff that is expected to see the most development and growth.

***Hazard Summary by Jurisdiction***

As with thunderstorm hazards, higher population concentration has the potential to result in greater risk and loss to individual jurisdictions. The Cities of Fisk, Neelyville, Poplar Bluff and Qulin have a higher concentration of people and housing than the rural areas in Butler County, therefore the risk for damages and injuries and deaths are higher. Poplar Bluff R-I School District and Three Rivers College have completed construction of tornado safe rooms on their respective campuses. Twin Rivers has a desire to construct a safe room on its high school campus located in the unincorporated community of Broseley. These safe rooms have reduced the risk to death and injury for those that seek shelter during a tornado.

**Problem Statement**

Tornadoes are destructive and can impact any area of the county with very short notice. Tornadoes are capable of causing injury, loss of life, damage to property and to crops. One of the priorities set forth by the MPC was to seek out possible funding to map the coverage area of the county's tornado sirens and upgrade those sirens and the coverage areas as funds become available.

### 3.4.11 Winter Weather/Snow/Ice/Severe Cold

#### Hazard Profile

##### *Hazard Description*

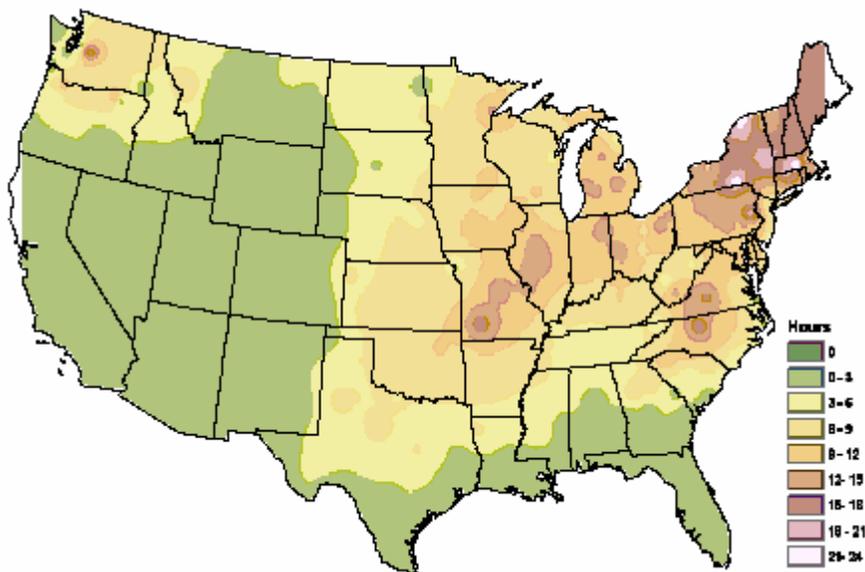
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows.

- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than  $\frac{1}{4}$  mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers**—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain**—Measurable rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet**—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

##### *Geographic Location*

All jurisdictions within the county are at risk for severe winter weather including heavy snow, ice, extreme cold temperatures, and freezing rain. According to the map below, **Figure 3.12**, Butler County is on the border of the area that receives 8-9 and 9-12 hours of freezing rain per year.

**Figure 3.12 NWS Statewide Average Number of Hours per Year with Freezing Rain**



Source: American Meteorological Society. "Freezing Rain Events in the United States." <http://ams.confex.com/ams/pdfpapers/71872.pdf>

### **Severity/Magnitude/Extent**

Severe winter storms include extreme cold, heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in the planning area. Heavy snow can bring a community to a standstill by inhibiting transportation (in whiteout conditions), weighing down utility lines, and by causing structural collapse in buildings not designed to withstand the weight of the snow. Repair and snow removal costs can be significant. Ice buildup can collapse utility lines and communication towers, as well as make transportation difficult and hazardous. Ice can also become a problem on roadways if the air temperature is high enough that precipitation falls as freezing rain rather than snow.

Extreme cold often accompanies severe winter storms and can lead to hypothermia and frostbite in people without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and supply lines, stopping electric generators. Cold temperatures can also overpower a building's heating system and cause water and sewer pipes to freeze and rupture. Extreme cold also increases the likelihood for ice jams on flat rivers or streams. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is hazardous to health and safety.

The National Institute on Aging estimates that more than 2.5 million Americans are elderly and especially vulnerable to hypothermia, with the isolated elders being most at risk. About 10 percent of people over the age of 65 have some kind of bodily temperature-regulating defect, and 3-4 percent of all hospital patients over 65 are hypothermic.

Also at risk are those without shelter, those who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or

death from a lack of oxygen) from toxic fumes from emergency heaters; household fires, which can be caused by fireplaces and emergency heaters; and frozen/burst pipes.

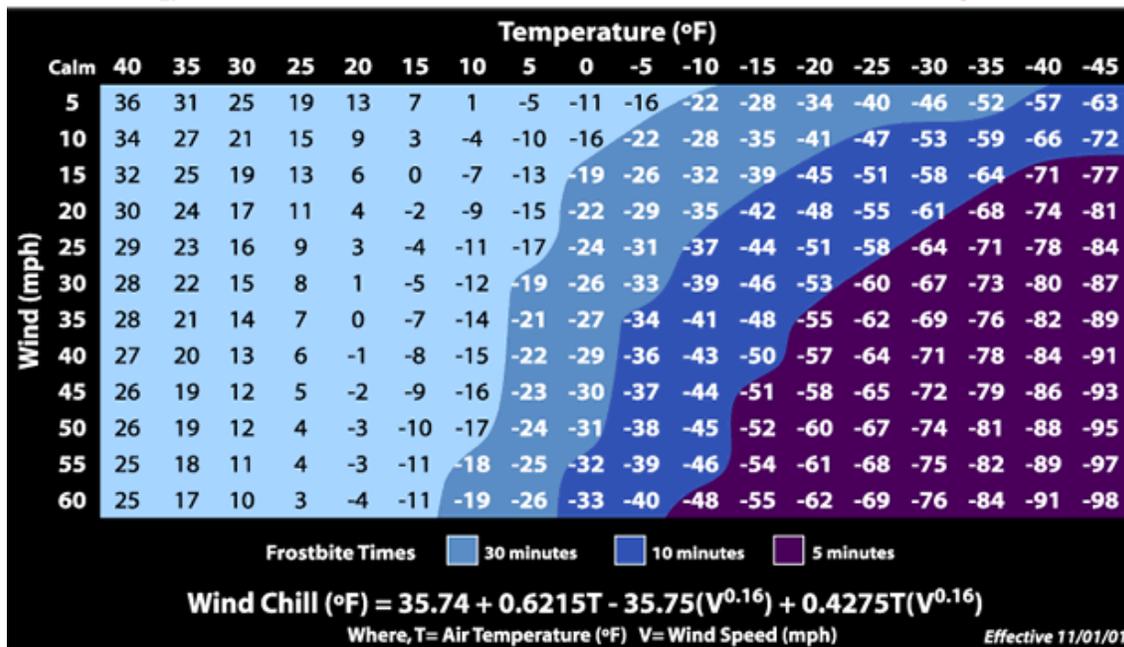
Buildings with overhanging tree limbs are more vulnerable to damage during winter storms when limbs fall. Businesses experience loss of income as a result of closure during power outages. In general heavy winter storms increase wear and tear on roadways though the cost of such damages is difficult to determine. Businesses can experience loss of income as a result of closure during winter storms.

Overhead power lines and infrastructure are also vulnerable to damages from winter storms. In particular ice accumulation during winter storm events damage to power lines due to the ice weight on the lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could include cost of repair or replacement of damaged facilities, and lost economic opportunities for businesses.

Secondary effects from loss of power could include burst water pipes in homes without electricity during winter storms. Public safety hazards include risk of electrocution from downed power lines. Specific amounts of estimated losses are not available due to the complexity and multiple variables associated with this hazard. Standard values for loss of service for utilities reported in FEMA's 2009 BCA Reference Guide, the economic impact as a result of loss of power is \$126 per person per day of lost service.

Wind can greatly amplify the impact of cold ambient air temperatures. Provided by the National Weather Service, **Figure 3.13**, below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Figure 3.13 Wind Chill Chart



Source: National Weather Service, <http://www.nws.noaa.gov/om/winter/windchill.shtml>

Winter storms, cold, frost and freeze take a toll on crop production in the planning area. The table below (**Table 3.44**) lists the USDA’s Risk Management Agency payments for insured crop losses in the planning area as a result of cold conditions and snow 2010-2015.

**Table 3.44 Crop Insurance Claims Paid in Butler County as a Result of Cold Conditions and Snow 01/01/2012-12/31/2016**

COMMODITY YEAR	COMMODITY NAME	DAMAGE CAUSE DESCRIPTION	DETERMINED ACRES	INDEMNITY AMOUNT
2012	RICE	COLD WET WEATHER	150.0000	\$8,820
2013	SOYBEANS	COLD WET WEATHER	21.2800	\$4,382
2014	WHEAT	COLD WINTER	22.0625	\$1,165
2014	WHEAT	COLD WET WEATHER	21.8776	\$368
2014	WHEAT	COLD WET WEATHER	31.5000	\$8,950
2014	WHEAT	COLD WET WEATHER	79.6000	\$21,086
2014	RICE	COLD WET	221.1841	\$26,574

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			WEATHER		
2014		RICE	COLD WET WEATHER	274.8000	\$15,279
2014		RICE	COLD WET WEATHER	616.8000	\$251,411
2014		CORN	COLD WET WEATHER	75.2000	\$22,375
2015		RICE	COLD WET WEATHER	181.5000	\$63,184
2015		CORN	COLD WET WEATHER	438.8000	\$129,835
2016		RICE	COLD WET WEATHER	64.4250	\$5,865
2016		RICE	COLD WET WEATHER	46.6533	\$9,462
2016		CORN	COLD WET WEATHER	16.9320	\$522
2016		CORN	COLD WET WEATHER	34.0680	\$1,052
2016		SOYBEANS	COLD WET WEATHER	117.7740	\$3,127
Total	17 events			2,414.4565	\$573,457

Source: USDA Risk Management Agency, <http://www.rma.usda.gov/data/cause.htm>

### ***Previous Occurrences***

**Table 3.45** below provides previous occurrences and damages as reported by the NCDC for January 1, 2006 through August 31, 2017. These events and damages are for blizzard, cold/wind chill, extreme cold/wind chill, heavy snow, ice storm, sleet, winter storm, and winter weather.

**Table 3.45 NCDC Butler County Winter Weather Events Summary, January 1, 2006-August 31, 2017**

Date	Event Type	Deaths	Injuries	Property Damage	Crop Damage
2/18/2006	Winter Weather	0	0	\$0.00	\$0.00
2/19/2006	Winter Weather	0	0	\$0.00	\$0.00
1/31/2007	Winter Weather	0	0	\$0.00	\$0.00
2/1/2007	Winter Weather	0	0	\$0.00	\$0.00
2/3/2007	Winter Weather	0	0	\$0.00	\$0.00
2/11/2008	Winter Storm	0	0	\$1,000,000.00	\$0.00
2/21/2008	Ice Storm	0	0	\$0.00	\$0.00
12/15/2008	Winter Storm	0	0	\$0.00	\$0.00
12/16/2008	Winter Weather	0	0	\$0.00	\$0.00
12/18/2008	Winter Weather	0	0	\$0.00	\$0.00

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12/23/2008	Winter Weather	0	0	\$0.00	\$0.00
1/5/2009	Winter Weather	0	0	\$0.00	\$0.00
1/15/2009	Extreme Cold/Wind Chill	0	0	\$0.00	\$0.00
1/26/2009	Winter Storm	0	0	\$19,700,000.00	\$0.00
2/28/2009	Heavy Snow	0	0	\$0.00	\$0.00
1/6/2010	Winter Weather	0	0	\$0.00	\$0.00
1/29/2010	Heavy Snow	0	0	\$0.00	\$0.00
2/8/2010	Winter Weather	0	0	\$0.00	\$0.00
12/15/2010	Winter Weather	0	0	\$0.00	\$0.00
1/17/2011	Winter Weather	0	0	\$0.00	\$0.00
1/20/2011	Winter Storm	0	0	\$0.00	\$0.00
2/4/2011	Winter Weather	0	0	\$0.00	\$0.00
2/7/2011	Winter Weather	0	0	\$0.00	\$0.00
2/9/2011	Winter Weather	0	0	\$0.00	\$0.00
11/28/2011	Winter Weather	0	0	\$0.00	\$0.00
2/13/2012	Winter Weather	0	0	\$0.00	\$0.00
12/25/2012	Winter Storm	0	0	\$0.00	\$0.00
12/28/2012	Winter Weather	0	0	\$0.00	\$0.00
2/21/2013	Ice Storm	0	0	\$100,000.00	\$0.00
3/21/2013	Winter Weather	0	0	\$0.00	\$0.00
12/5/2013	Winter Storm	0	0	\$0.00	\$0.00
1/6/2014	Cold/Wind Chill	0	0	\$0.00	\$0.00
2/2/2014	Winter Storm	0	0	\$0.00	\$0.00
2/4/2014	Winter Storm	0	0	\$0.00	\$0.00
2/10/2014	Winter Weather	0	0	\$0.00	\$0.00
3/2/2014	Winter Storm	0	0	\$0.00	\$0.00
11/16/2014	Winter Weather	0	0	\$0.00	\$0.00
1/11/2015	Winter Weather	0	0	\$0.00	\$0.00
2/15/2015	Winter Storm	0	0	\$0.00	\$0.00
2/17/2015	Winter Weather	0	0	\$0.00	\$0.00
2/19/2015	Cold/Wind Chill	0	0	\$0.00	\$0.00
2/20/2015	Winter Storm	0	0	\$0.00	\$0.00
2/28/2015	Winter Weather	0	0	\$0.00	\$0.00
3/1/2015	Winter Weather	0	0	\$0.00	\$0.00
3/4/2015	Winter Storm	0	0	\$0.00	\$0.00
1/19/2016	Winter Weather	0	0	\$0.00	\$0.00
1/21/2016	Winter Weather	0	0	\$0.00	\$0.00
2/14/2016	Winter Weather	0	0	\$0.00	\$0.00

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1/5/2017	Winter Weather	0	0	\$0.00	\$0.00
1/13/2017	Winter Weather	0	0	\$0.00	\$0.00
Total	50 Events	0	0	\$20,800,000.00	\$0.00

Source: NCDC, data accessed August 31, 2017

The most significant winter weather event in recent memory is included in the table above as a Winter Storm on January 26, 2009. The storm resulted in \$19.7 million dollars in property damage in Butler County alone. Households were without electricity for days and remote households for weeks. It is reported that in southeast Missouri the property damages were \$120.450 million. The storm included heavy snow to the north however, the largest problem in Butler County was the ice that caused overhead power lines to fall as the weight of the ice broke utility poles, sometimes for miles in a stretch. It is reported that nearly 100% of all residents in Butler County were without power for some period of time.

### ***Probability of Future Occurrence***

The probability of a future occurrence of severe winter weather is greater than 100% chance to occur somewhere in the county in any given year. According to the 10 years of incidents reported above, the average year sees four winter weather events ranging from extreme cold temperatures to snow and ice.

### **Vulnerability**

#### **Vulnerability Overview**

In reviewing the 2013 Missouri State Hazard Mitigation Plan the vulnerability for winter storms to impact Butler County can be determined. The method used to determine this vulnerability in the 2013 State Plan was statistical analysis of data from several sources: the NCDC storm events database from 1993-December 2012, FEMA's Public Assistance funds from DR-1672, DR-1736, DR-1748, DR-1822, and DR-1961, Crop Insurance Claims data from the USDA Risk Management Agency (1998-2012), total building exposure from HAZUS, US Census Data, and the USDA Census of Agriculture.

Below, in **Table 3.46** is the housing density, building exposure, crop exposure, total incidents, total property loss, and total crop insurance paid for Butler County. These are common data elements for the analysis of severe winter weather. The total property loss column represents a combination of NCDC and FEMA PA funds. For declared events, the PA damage figures were used in lieu of NCDC data. NCDC damages represent early estimates and the FEMA PA funds represent actual expenditures.

This data is from Table 3.5.8a of the 2013 State Plan, compiled from the sources listed above.

**Table 3.47 Housing Density, Building Exposure, Crop Exposure, Incidents, Property Loss and Crop Loss**

Housing Units/sq mile	Total Building Exposure (\$)	Crop Exposure (2007) (\$)	Total Incidents	Total Property Loss (\$)	Total Crop Insurance Paid (\$)
28.4	\$3,682,173,000	\$86,624,000	53	\$13,090,241	\$94,016

From this statistical data collected, seven factors were considered in determining overall winter storm vulnerability: housing density, likelihood of occurrence, building exposure, crop exposure, average annual property loss ratio, average annual crop insurance claims, and social vulnerability.

To complete the vulnerability analysis utilizing the factors above, a rating value of 1-5 was assigned to the data obtained for each factor. These rating values correspond to the following descriptive terms:

1. Low
2. Medium-low
3. Medium
4. Medium-high
5. High

The rating values of all factors were then considered in determining overall vulnerability rating. The table below (**Table 3.48**) from the 2013 State Plan provides the factors considered and the rating values assigned.

**Table 3.48 Factors Considered**

Factors Considered	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
Housing Density (# per sq mile)	<50	50-99	100-299	300-499	>500
Crop exposure	<\$10M	\$10M-\$24M	\$25M-\$49M	\$50M-\$99M	>\$100M
Social Vulnerability	1	2	3	4	5
Likelihood of occurrence	1.000-1.473	1.473-1.842	1.842-2.473	2.473-3.684	3.684-4.631
Annualized Property Loss Ratio	0.0-0.000110	0.000111-0.000274	0.000275-0.000636	0.000637-0.001397	0.001398-0.003270

Once the ranges were determined and applied to all factors considered in the analysis for severe winter weather they were weighted equally and factored together to determine an overall vulnerability rating. The following table (**Table 3.49**) provides the calculated vulnerability rating for each factor considered in the vulnerability analysis of Butler County as provided in the 2013 Missouri State Hazard Mitigation Plan.

**Table 3.49 Calculated Vulnerability Rating**

Housing Density Rating	Likelihood Rating	Property Loss Ratio Rating	Crop Exposure Rating	Crop Loss Ratio Rating	Social Vulnerability Index	Total Score and Vulnerability	Vulnerability Rating
1	4	2	4	1	4	16	Medium-high

As determined through this vulnerability analysis, Butler County has a medium-high vulnerability to future winter weather events.

**Potential Losses to Existing Development**

In reviewing the loss data as presented by the NCDC for 1/12006-8/31/2017 there were fifty (50) events that resulted in \$20,800,000 of property damage. Therefore the potential future losses, based on this historic data would be an average of \$2,080,000 annually. However, without the large loss that came about due to the extreme event in 2009, the annualized losses would be much less. Without that one incident, future losses would be projected as \$110,000 per year. Many future property loss incidents occur as a result of utility failure or loss of power.

**Future Development**

Future development and growth is anticipated in and around the City of Poplar Bluff including the unincorporated areas surrounding Poplar Bluff. This anticipated growth could potentially increase the vulnerability to Severe Winter Weather and also increase the demand on utilities and exposure to infrastructure networks.

**Hazard Summary by Jurisdiction**

All jurisdictions within Butler County are equally vulnerable to winter weather events. However, the City of Fisk, Neelyville, Poplar Bluff, and Qulin have populations that are at higher risk from some of the damages resulting from winter weather. There are nursing homes and senior housing complexes in Poplar Bluff that house a large number of senior citizens that are more vulnerable to the effects of winter weather. There is also a senior housing complex located in the City of Qulin. The residents of these facilities are more prone to health concerns that result from extreme cold temperatures, are also typically less mobile which could lead to falls on icy surfaces. Finally, the facilities would be crippled and much needed medical equipment would not work in the event of a power outage caused by winter weather.

**Problem Statement**

Winter weather comes with a myriad of impacts that start with health concerns from extreme cold temperatures, to falling and motor vehicle accidents caused by icy surfaces, to power outages caused by ice accumulating on overhead powerlines. The MPC was concerned about the availability of emergency power generators at critical facilities and has proposed an action to seek funding for critical facilities that do not have generators. These facilities include water and wastewater treatment plants, nursing homes, schools, and police and fire stations.

## 4 MITIGATION STRATEGY

### 4 MITIGATION STRATEGY

#### 4.1 Goals

#### 4.2 Identification and Analysis of Mitigation Actions

#### 4.3 Implementation of Mitigation Actions

**44 CFR Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section presents the mitigation strategy updated by the Mitigation Planning Committee (MPC) based on the updated risk assessment. The mitigation strategy was developed through a collaborative group process. The process included review of updated general goal statements to guide the jurisdictions in lessening disaster impacts as well as specific mitigation actions to directly reduce vulnerability to hazards and losses. The following definitions are taken from FEMA's *Local Hazard Mitigation Review Guide (October 1, 2012)*.

- **Mitigation Goals** are general guidelines that explain what you want to achieve. Goals are long-term policy statements and global visions that support the mitigation strategy. The goals address the risk of hazards identified in the plan.
- **Mitigation Actions** are specific actions, projects, activities, or processes taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals.

### 4.1 Goals

**44 CFR Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.**

This planning effort is an update to Butler County's existing hazard mitigation plan approved by FEMA in August 2012. Therefore, the goals from the 2012 Butler County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. The MPC conducted a discussion session during their third meeting to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2013 State Hazard Mitigation Plan goals were reviewed. The MPC also reviewed the goals from current surrounding county plans.

The goals for the updated plan are as follows:

1. Implement mitigation actions that improve the protection of human life, health, and safety from the adverse effects of disasters.
2. Implement mitigation actions that improve the continuity of government and essential services from the adverse effects of disasters.
3. Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
4. Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.

In the planning meeting to set these goals, the MPC reviewed the goals included in the *2013 Missouri State Hazard Mitigation Plan* and decided that the best course of action was to mirror the goals from the statewide plan. The MPC felt that the four goals listed in the state plan conveyed the committee's goals for Butler County and all of the goals from the 2012 Butler County plan could be condensed and better defined by these four broader goals.

The 2012 Butler County plan included the following six goals:

1. Reduce loss of life and property
2. Increase public education and awareness
3. Improve warning systems and timing
4. Eliminate hazard prone areas
5. Promote strategies to protect against damages
6. Decrease negative impacts on business and industry

The MPC felt that several of these goals were duplicated such as goals #1 and #5 and that by reducing the number of goals and utilizing the goals of the state plan the updated plan would capture the needs of the community in a more concise manner.

## 4.2 Identification and Analysis of Mitigation Actions

During the second MPC meeting, the results of the risk assessment update were provided to the MPC members for review and the key issues were identified for specific hazards. Changes in risk since adoption of the previously approved plan were discussed. The second meeting concluded with the distribution of a list of possible mitigation actions to prompt discussions within and among the jurisdictions. The discussions occurred during jurisdictional break-out meetings. The list included possible new mitigation actions, as well as actions from the previously approved plan. Actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. The MPC discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

The MPC determined to include problem statements in the plan update at the end of each hazard profile, which had not been done in the previously approved plan. The problem statements summarize the risk to the planning area presented by each hazard, and include possible methods to reduce that risk. Use of the problem statements allowed the MPC to recognize new and innovative strategies for mitigate risks in the planning area.

The focus of Meeting #3 was update of the mitigation strategy. For a comprehensive range of mitigation actions to consider, the MPC reviewed the following information during Meeting #3:

- a list of actions proposed in the previous mitigation plan, the current State Plan, and approved plans in surrounding counties;
- key issues from the risk assessments, including the Problem Statements concluding each hazard profile and vulnerability analysis;
- state priorities established for Hazard Mitigation Assistance grants; and,
- public input during meetings, responses to Data Collection Questionnaires, and other efforts to involve the public in the plan development process.

For Meeting #3, individual jurisdictions, including school and special districts, developed final mitigation strategy for submission to the MPC. They were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction. They were also provided a link to the FEMA’s publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)*. This document was developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted, using worksheets included in Appendix C of this plan. Prior to Meeting #3, the list of actions for each jurisdiction was emailed to that jurisdiction’s MPC representative along with the worksheets. Each jurisdiction was instructed to provide information regarding the “Action Status” with one of the following status choices:

- Completed, with a description of the progress,
- Not Started/Continue in Plan Update, with a discussion of the reasons for lack of progress,
- In Progress/Continue in Plan Update, with a description of the progress made to date or
- Deleted, with a discussion of the reasons for deletion.

Based on the status updates, there were two (2) completed actions, five (5) deleted actions, and four (4) continuing actions.

**Table 4.1**, below, provides a summary of the action statuses for each jurisdiction:

<b>Table 4.1, Action Status Summary Jurisdiction</b>	<b>Completed Actions</b>	<b>Deleted Actions</b>	<b>Continuing Actions</b>
Butler County		Seek funding for a new Butler County Emergency Operations Center  Inundation data for dam failure  Gather GIS data for WUI	Flood plain managers attend CFM refresher trainings to maintain certifications  Seek funding for tornado saferooms  Provide educational

		<p>areas</p> <p>Fan collection drives</p> <p>Work with MoDOT to ensure most effective materials are used in road construction</p> <p>City and County issue burn bans as needed</p> <p>Maintain snow and ice removal equipment</p>	<p>information regarding the dangers of crossing flooded roadways</p> <p>Educate public on dangers of heat related illnesses</p> <p>Host Earthquake awareness event</p> <p>Tornado safety drills in schools</p> <p>Fire safety education to schools and public</p> <p>Copy of HMP available to public</p> <p>Promote EMA text service for weather alerts</p> <p>Provide training to EMA volunteers</p> <p>Weather spotter training</p> <p>Construct retention ponds for flood control</p> <p>Pursue flood buyout projects</p> <p>Gather inundation data for levee failures</p> <p>Equip school buses with 2-way radios</p>
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**Table 4.2**, below, provides a summary of the completed and deleted actions from the previous plan.

Although none of the actions are listed as “completed”, steps toward the completion of the actions are listed below. For example, the construction of tornado safe rooms is listed above as a continuing action, however, there have been safe rooms constructed since the completion of the 2012 Butler County HMP, but Twin Rivers RX, Poplar Bluff R-I and Three Rivers College are all still interested in construction more safe rooms on their respective campuses throughout the county.

**Table 4.2, Summary of Completed and Deleted Actions from the Previous Plan**

Completed Actions	Completion Details (date, amount, funding source)
Residential Buyout – City of Poplar Bluff	44 structures, \$1,647,669 total, \$1,235,752 FEMA share, 1/9/2003
Residential Buyout – City of Poplar Bluff	22 structures, \$599,557 total, \$449,667 FEMA share, 12/3/2013
Three Rivers College Tornado Saferoom	\$3,382,873 Total cost, \$2,537,155 FEMA Share, 6/17/2015
Poplar Bluff RI School District Saferoom	\$1,406,823 total cost, \$1,055,118 FEMA share, 12/2/2016
Three Rivers College Tornado Saferoom	\$2,500,000 total cost, \$1,875,000 FEMA share, 12/15/2014
Deleted Actions	Reason for Deletion
Seek funding for a new Butler County EOC	No longer a needed project
Inundation data for dam failure	No dams in the county are regulated
Fan collection drive	A local non profit specializes in fan distribution
Gather GIS data for WUI areas	Fire depts. Do not feel there is a need for this level of data
Create maintenance schedule to test snow/ice equipment	No longer relevant
Work with MoDOT to ensure most effective materials are used in road construction	No longer relevant
Burn Bans	Departments issue advisory but not bans

Source: Previously approved County Hazard Mitigation Plan; Data Collection Questionnaires.

The following actions were not completed since the 2012 County Plan was approved, along with the action, the status of the action or reason for not including in the update is below:

- Continuing to seek funding for a new Butler County Emergency Operations Center was deleted as an action as priorities within the county have shifted.
- Inundation data for dam failure was removed as there are no regulated or high hazard dams within the county.
- Gathering GIS data for WUI areas was deleted as an action.
- Fan collection drives were deleted as an action as a local nonprofit, not a local jurisdiction organizes that effort.
- Heat resistant road construction methods and materials used for construction was removed as an action. This action was removed as it is not a priority of MODOT or the Ozark Foothills Regional Transportation Advisory Committee that sets priorities for local road construction projects.
- City and county issue burn bans was removed as an action as the departments do not issue bans, however they do issue advisories as needed.

- Create maintenance schedule and testing of snow/ice removal equipment. The planning committee removed this action as the participating jurisdiction do not own snow and ice removal specific equipment that needs a separate maintenance schedule.

The following actions from the 2012 County Plan are carried forward into this plan update:

- Floodplain managers continue to attend CFM training to maintain certifications
- Seek funding for tornado saferooms was carried forward as the school districts and Three Rivers College are still interested in pursuing funding for future safe room projects.
- Provide educational information regarding the dangers of crossing flooded roadways.
- Educate public on dangers of heat related illnesses
- Provide earthquake awareness and education
- Provide tornado awareness and education
- Examine city ordinances regarding construction in floodplains
- Distribute fire safety information was kept, however this action was altered to include the installation of smoke detectors in residences also.
- The MPC will continue to meet the requirement of having a copy of the updated plan available to the public
- Inventory and assessment of outdoor warning sirens was continued to the updated plan as it was not completed.
- Increasing trainings for EMA volunteers was continued, added to this action was an action from the 2012 plan of training for weather spotters. The MPC felt that these two groups could be combined into one action as many times these are some of the same individuals.
- Ditch construction and cleanout was left in the updated plan as this action is effective and is an ongoing issue.
- Reinforcing vulnerable bridges and roadways was carried forward to the updated plan, as there are still many bridges in the planning area in need of reinforcement or in some cases replacement.
- Relocate residents from floodplains was also carried forward to the updated plan. Although the City of Poplar Bluff has completed two flood buyout projects since the last update, there are still more homes and commercial structures in Poplar Bluff and in unincorporated Butler County that would be eligible for future flood buyout projects.
- Establish alternate transportation routes for school buses and ambulances. Although many of the local residents know of alternate routes to take in times of flooding, a map of these routes, or signage could be useful in preventing accidents.
- Seeking funding for emergency generators for critical facilities was carried forward in the plan. There are still critical facilities that need emergency generators.

Included in the 2012 Butler County Plan there was a mitigation action to construct tornado safe rooms at school campuses in the county. Since that time, the two school districts participating in this update have secured funding to construct safe rooms and completed that construction. Poplar Bluff R-I Schools, Twin Rivers R-X Schools and Three Rivers College are still interested in pursuing funding for additional safe rooms at their various campuses in Butler County. Another action from the 2012 plan was equipping school buses with two-way radios. This action has also been completed in the two participating school districts, however this action is remaining as the districts will continue to provide the radios and equip and new buses that are purchased. Other mitigation projects that have been completed in the county are flood buyout projects that were funded through hazard mitigation grant program and completed by the City of Poplar Bluff. The action of removing structures from the flood prone areas was not removed from the updated plan as there are still

properties that would be eligible to participate in a flood buyout project.

The goals and actions of this updated plan were developed through review and discussions of the mitigation planning committee. All actions were found to be cost effective, environmentally sound and technically feasible. The following set of underlying operating principles will improve fiscal and operational efficiency, help maintain focus on the overall goal of community improvement and well-being and help ensure implementation of the actions. Each action will be implemented according to the following strategies:

1. Incorporate mitigation objectives into existing and future plans, regulations, programs, and projects.
2. Promote and encourage collaboration between disparate agencies and departments to create synergy that results in benefits that would not be possible through a single agency.
3. Employ sustainable principles and techniques in the implementation of each objective to attain maximum benefits.
4. Create and implement a prioritization process that includes monetary, environmental and sociological considerations.

### 4.3 Implementation of Mitigation Actions

**44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.**

Jurisdictional MPC members were encouraged to meet with others in their community to finalize the actions to be submitted for the updated mitigation strategy. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Missouri State Hazard Mitigation Plan. The benefit/cost review at the planning stage primarily consisted of a qualitative analysis, and was not the detailed process required grant funding application. For each action, the plan sets forth a narrative describing the types of benefits that could be realized from action implementation. The cost was estimated as closely as possible, with further refinement to be supplied as project development occurs.

FEMA's STAPLEE methodology was used to assess the costs and benefits, overall feasibility of mitigation actions, and other issues impacting project. During the prioritization process, the MPC used worksheets to assign scores. The worksheets posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the questions as follows:

- Definitely yes = 3 points
- Maybe yes = 2 points
- Probably no = 1
- Definitely no = 0

The following questions were asked for each proposed action.

S: Is the action socially acceptable?

T: Is the action technically feasible and potentially successful?

A: Does the jurisdiction have the administrative capability to successfully implement this action?

P: Is the action politically acceptable?

L: Does the jurisdiction have the legal authority to implement the action?

E: Is the action economically beneficial?

E: Will the project have an environmental impact that is either beneficial or neutral? (score "3" if positive and "2" if neutral)

Will the implemented action result in lives saved?

Will the implanted action result in a reduction of disaster damage?

The final scores are listed below in the analysis of each action. The worksheets are attached to this plan as Appendix C. The STAPLEE final score for each action, absent other considerations, such as a localized need for a project, determined the priority. Low priority action items were those that had a total score of between 0 and 24. Moderate priority actions were those scoring between 25 and 29. High priority actions scored 30 or above. A blank STAPLEE worksheet is shown in Figure 4.1 below.

Figure 4.1

**XXXXXX COUNTY  
MULTI-JURISDICTIONAL  
LOCAL HAZARD MITIGATION PLAN**

<b>Action Title:</b>		<b>Jurisdiction:</b>	
<b>Action ID:</b>			
<b>STAPLEE Criteria</b>	<b>Evaluation Rating</b> Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	<b>Score</b>	
S: Is it Socially acceptable?			
T: Is it Technically feasible and potentially successful?			
A: Does the jurisdiction have the administrative capacity to execute this action?			
P: Is it Politically acceptable?			
L: Is there Legal authority to implement?			
E: Is it Economically beneficial?			
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)			
Will historic structures be saved or protected?			
Could it be implemented quickly?			
<b>STAPLEE Score</b>			

Mitigation Effectiveness Criteria	Evaluation Rating	Score
Will the implemented action result in lives saved?	Assign from 5-10 points based on the likelihood that lives would be saved.	
Will the implemented action result in a reduction of disaster damages?	Assign from 5-10 points based on the relative reduction of disaster damages.	
<b>Mitigation Effectiveness Score</b>		

Total Score (STAPLEE Score + Mitigation Effectiveness Score): \_\_\_\_\_

Priority Level:  High (30+ points)       Medium (25-29 points)       Low (less than 25 points)

Completed by (name/title/phone #): \_\_\_\_\_

Goal 1: Implement mitigation actions that improve the protection of human life, health, and safety from the adverse effects of disasters.

Action 1.1 Adopt and/or enforce floodplain ordinances

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Floodplain construction ordinances.
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure, Levee Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 1
<b>Name of Action or Project:</b>	Adopt and/or enforce floodplain ordinances.
<b>Action or Project Description:</b>	Examine city ordinances regarding construction in floodplains.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Regulating the type of construction in a flood zone will help prevent future structure damage. Helps reduce flood insurance rates.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Management
<b>Action/Project Priority:</b>	M,26
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City ordinances and Planning and Zoning board
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	

Action 1.1 Adopt and/or enforce floodplain ordinances

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Fisk
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Floodplain construction ordinances.
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure, Levee Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 1
<b>Name of Action or Project:</b>	Adopt and/or enforce floodplain ordinances.
<b>Action or Project Description:</b>	Examine city ordinances regarding construction in floodplains.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Regulating the type of construction in a flood zone will help prevent future structure damage. Helps reduce flood insurance rates.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Fisk City Council
<b>Action/Project Priority:</b>	M,26
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City ordinances and Planning and Zoning board
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	

Action 1.1 Adopt and/or enforce floodplain ordinances

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Neelyville
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Floodplain construction ordinances.
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure, Levee Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 1
<b>Name of Action or Project:</b>	Adopt and/or enforce floodplain ordinances.
<b>Action or Project Description:</b>	Examine city ordinances regarding construction in floodplains.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Regulating the type of construction in a flood zone will help prevent future structure damage. Helps reduce flood insurance rates.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Neelyville City Council
<b>Action/Project Priority:</b>	M,26
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City ordinances and Planning and Zoning board
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	

Action 1.1 Adopt and/or enforce floodplain ordinances

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Floodplain construction ordinances.
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure, Levee Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 1
<b>Name of Action or Project:</b>	Adopt and/or enforce floodplain ordinances.
<b>Action or Project Description:</b>	Examine city ordinances regarding construction in floodplains.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Regulating the type of construction in a flood zone will help prevent future structure damage. Helps reduce flood insurance rates.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Poplar Bluff Planning Department
<b>Action/Project Priority:</b>	M,26
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City ordinances and Planning and Zoning board
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	

Action 1.1 Adopt and/or enforce floodplain ordinances

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Qulin
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Floodplain construction ordinances.
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure, Levee Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 1
<b>Name of Action or Project:</b>	Adopt and/or enforce floodplain ordinances.
<b>Action or Project Description:</b>	Examine city ordinances regarding construction in floodplains.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Regulating the type of construction in a flood zone will help prevent future structure damage. Helps reduce flood insurance rates.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Qulin City Council
<b>Action/Project Priority:</b>	M,26
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City ordinances and Planning and Zoning board
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	

Action 1.2 Education of the Dangers of Extreme Heat

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Heat related illnesses education.
<b>Hazard(s) Addressed:</b>	Extreme Heat
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Heat 1
<b>Name of Action or Project:</b>	Education of Extreme Heat
<b>Action or Project Description:</b>	Provide educational resources to residents on avoiding heat related illnesses, and accidents.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, sickness, and death due to heat.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Health Department
<b>Action/Project Priority:</b>	M,28
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.3 Earthquake Awareness

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Earthquake awareness.
<b>Hazard(s) Addressed:</b>	Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Earthquake 1
<b>Name of Action or Project:</b>	Earthquake Awareness
<b>Action or Project Description:</b>	Provide educational resources to residents on earthquake procedure and how to stay safe.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to earthquakes.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Management Agency
<b>Action/Project Priority:</b>	M,25
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Continue to conduct earthquake drills and provide educational materials
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.3 Earthquake Awareness

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Poplar Bluff R-I School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Earthquake awareness.
<b>Hazard(s) Addressed:</b>	Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Earthquake 1
<b>Name of Action or Project:</b>	Earthquake Awareness
<b>Action or Project Description:</b>	Provide educational resources and earthquake drills in the school district to students and staff.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to earthquakes.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Poplar Bluff R-I School District
<b>Action/Project Priority:</b>	M,25
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Continue to conduct earthquake drills and provide educational materials
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.3 Earthquake Awareness

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Twin Rivers R-X School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Earthquake awareness.
<b>Hazard(s) Addressed:</b>	Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Earthquake 1
<b>Name of Action or Project:</b>	Earthquake Awareness
<b>Action or Project Description:</b>	Provide educational resources to and earthquake drills to students, faculty and staff on earthquake procedure and how to stay safe.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to earthquakes.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Twin Rivers R-X School District
<b>Action/Project Priority:</b>	M,25
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Continue to conduct earthquake drills and provide educational materials
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.3 Earthquake Awareness

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Three Rivers College
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Earthquake awareness.
<b>Hazard(s) Addressed:</b>	Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Earthquake 1
<b>Name of Action or Project:</b>	Earthquake Awareness
<b>Action or Project Description:</b>	Provide educational resources to and earthquake drills to students, faculty and staff on earthquake procedure and how to stay safe.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to earthquakes.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Three Rivers College
<b>Action/Project Priority:</b>	M,25
<b>Timeline for Completion:</b>	1-3 years
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Continue to conduct earthquake drills and provide educational materials
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.4 Tornado Safety Drills and Educational Information

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Tornado Safety
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Tornado 1
<b>Name of Action or Project:</b>	Tornado Safety Drills
<b>Action or Project Description:</b>	Implement drills into the local schools, nursing homes, and child care facilities for protection of citizens.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to tornados.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Management Agency
<b>Action/Project Priority:</b>	L, 21
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.4 Tornado Safety Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Poplar Bluff R-I School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Tornado Safety
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Tornado 1
<b>Name of Action or Project:</b>	Tornado Safety Drills
<b>Action or Project Description:</b>	Implement drills into the local schools, nursing homes, and child care facilities for protection of citizens.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to tornados.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Poplar Bluff R-I Schools
<b>Action/Project Priority:</b>	L, 21
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.4 Tornado Safety Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Twin Rivers R-X School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Tornado Safety
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Tornado 1
<b>Name of Action or Project:</b>	Tornado Safety Drills
<b>Action or Project Description:</b>	Implement drills into the local schools, nursing homes, and child care facilities for protection of citizens.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to tornados.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Twin Rivers R-X Schools
<b>Action/Project Priority:</b>	L, 21
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.4 Tornado Safety Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Three Rivers College
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Tornado Safety
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Tornado 1
<b>Name of Action or Project:</b>	Tornado Safety Drills
<b>Action or Project Description:</b>	Implement drills into the local schools, nursing homes, and child care facilities for protection of citizens.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Reduction in accidents, and deaths due to tornados.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Three Rivers College
<b>Action/Project Priority:</b>	L, 21
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.5 Fire Education and Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Fire Awareness
<b>Hazard(s) Addressed:</b>	Fire
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Fire 1
<b>Name of Action or Project:</b>	Fire Education and Alarms
<b>Action or Project Description:</b>	Provide education for residents. Install smoke detectors throughout the county.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	\$70,000
<b>Benefits:</b>	Reduction in accidents, and deaths due to fire or damage from smoke. Protect structures or prevent full destruction.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Fire Department and Emergency Management Department
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.5 Fire Education and Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Fire Awareness
<b>Hazard(s) Addressed:</b>	Fire
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Fire 1
<b>Name of Action or Project:</b>	Fire Education and Alarms
<b>Action or Project Description:</b>	Implement fire drills into schools. Provide education for residents. Install smoke detectors throughout the county.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	\$70,000
<b>Benefits:</b>	Reduction in accidents, and deaths due to fire or damage from smoke. Protect structures or prevent full destruction.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Poplar Bluff Fire Department
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.5 Fire Education and Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Poplar Bluff R-I School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Fire Awareness
<b>Hazard(s) Addressed:</b>	Fire
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Fire 1
<b>Name of Action or Project:</b>	Fire Education and Alarms
<b>Action or Project Description:</b>	Implement fire drills into schools. Provide education for residents. Install smoke detectors throughout the county.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	\$70,000
<b>Benefits:</b>	Reduction in accidents, and deaths due to fire or damage from smoke. Protect structures or prevent full destruction.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Poplar Bluff R-I School District
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.5 Fire Education and Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Twin Rivers R-X School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Fire Awareness
<b>Hazard(s) Addressed:</b>	Fire
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Fire 1
<b>Name of Action or Project:</b>	Fire Education and Alarms
<b>Action or Project Description:</b>	Implement fire drills into schools. Provide education for residents. Install smoke detectors throughout the county.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	\$70,000
<b>Benefits:</b>	Reduction in accidents, and deaths due to fire or damage from smoke. Protect structures or prevent full destruction.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Twin Rivers School District
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.5 Fire Education and Drills

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Three Rivers College
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Fire Awareness
<b>Hazard(s) Addressed:</b>	Fire
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Fire 1
<b>Name of Action or Project:</b>	Fire Education and Alarms
<b>Action or Project Description:</b>	Implement fire drills into schools. Provide education for residents. Install smoke detectors throughout the county.
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	
<b>Benefits:</b>	Reduction in accidents, and deaths due to fire or damage from smoke. Protect structures or prevent full destruction.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Three Rivers College
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	1 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.6 Construct Tornado Safe Room

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Three Rivers College
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Severe Weather
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Safe Room1
<b>Name of Action or Project:</b>	Tornado SafeRoom TRC
<b>Action or Project Description:</b>	Construct new tornado safe room on the campus of TRC in Poplar Bluff
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	
<b>Benefits:</b>	Protection of human life from death and injury resulting from tornados
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Three Rivers College
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	3 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.6 Construct Tornado Safe Room

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Poplar Bluff R-I School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Severe Weather
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Safe Room1
<b>Name of Action or Project:</b>	Tornado SafeRoom PBRI
<b>Action or Project Description:</b>	Construct new tornado safe room on the campus of Poplar Bluff RI Schools
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	
<b>Benefits:</b>	Protection of human life from death and injury resulting from tornados
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Poplar Bluff R-I School District
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	3 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 1.6 Construct Tornado Safe Room

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Twin Rivers R-X School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Severe Weather
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Safe Room1
<b>Name of Action or Project:</b>	Tornado SafeRoom Twin Rivers
<b>Action or Project Description:</b>	Construct new tornado safe room on the campus of Twin Rivers High School in Broseley, MO
<b>Applicable Goal Statement:</b>	Improve the protection of human life, health, and safety from adverse effects of disasters.
<b>Estimated Cost:</b>	
<b>Benefits:</b>	Protection of human life from death and injury resulting from tornados
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Twin Rivers R-X School District
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	3 year
<b>Potential Fund Sources:</b>	Local funds, grants, and community matching.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Goal 2: Implement mitigation actions that improve the continuity of government and essential services from the adverse effects of disasters

Action 2.1 Warning Siren Coverage Mapping and Inventory

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Tornado Sirens
<b>Hazard(s) Addressed:</b>	Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Tornado 2
<b>Name of Action or Project:</b>	Warning Siren Mapping
<b>Action or Project Description:</b>	Created an updated map of warning sirens in the area.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the continuity of government and essential services from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$10,000
<b>Benefits:</b>	Improve the warning time of a spotted hazard.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Management
<b>Action/Project Priority:</b>	L, 20
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	County Emergency Management Director
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 2.2 Hazard Training for Local Emergency Service Employment

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Hazard Training
<b>Hazard(s) Addressed:</b>	All
<b>Action or Project</b>	
<b>Action/Project Number:</b>	HMP 2
<b>Name of Action or Project:</b>	Hazarding Training for Local Emergency Service Employment
<b>Action or Project Description:</b>	Provide educational services to local EMA, VFD, Health Department, Ambulance, and Police, weather spotters
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the continuity of government and essential services from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$10,000
<b>Benefits:</b>	Improve the response time, and knowledge of hazards.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Management
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local, grant matching, educational opportunities.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Goal 3: Implement mitigation actions that improve the protections of public and private property from the adverse effects of disasters.

Action 3.1 Ditch Cleanout and Construction

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Flooding
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 2
<b>Name of Action or Project:</b>	Ditch Cleanout and Construction
<b>Action or Project Description:</b>	Clean out ditches, and construct new ditches or drainage systems.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$15,000
<b>Benefits:</b>	Protection of roadways, surrounding property, and preventive measure for damages.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Highway Department
<b>Action/Project Priority:</b>	L, 20
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local, grant funds
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	County street department
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.1 Ditch Cleanout and Construction

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Flooding
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 2
<b>Name of Action or Project:</b>	Ditch Cleanout and Construction
<b>Action or Project Description:</b>	Clean out ditches, and construct new ditches or drainage systems.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$15,000
<b>Benefits:</b>	Protection of roadways, surrounding property, and preventive measure for damages.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Poplar Bluff Street Department
<b>Action/Project Priority:</b>	L, 20
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local, grant funds
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Planner
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.1 Ditch Cleanout and Construction

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Fisk
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Flooding
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 2
<b>Name of Action or Project:</b>	Ditch Cleanout and Construction
<b>Action or Project Description:</b>	Clean out ditches, and construct new ditches or drainage systems.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$15,000
<b>Benefits:</b>	Protection of roadways, surrounding property, and preventive measure for damages.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Fisk Street Department
<b>Action/Project Priority:</b>	L, 20
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local, grant funds
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Council
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.1 Ditch Cleanout and Construction

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Neelyville
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Flooding
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 2
<b>Name of Action or Project:</b>	Ditch Cleanout and Construction
<b>Action or Project Description:</b>	Clean out ditches, and construct new ditches or drainage systems.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$15,000
<b>Benefits:</b>	Protection of roadways, surrounding property, and preventive measure for damages.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Neelyville City Council
<b>Action/Project Priority:</b>	L, 20
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local, grant funds
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Council
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.1 Ditch Cleanout and Construction

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Qulin
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Flooding
<b>Hazard(s) Addressed:</b>	Flooding, Dam Failure
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 2
<b>Name of Action or Project:</b>	Ditch Cleanout and Construction
<b>Action or Project Description:</b>	Clean out ditches, and construct new ditches or drainage systems.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$15,000
<b>Benefits:</b>	Protection of roadways, surrounding property, and preventive measure for damages.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Qulin
<b>Action/Project Priority:</b>	L, 20
<b>Timeline for Completion:</b>	1 -5 years
<b>Potential Fund Sources:</b>	Local, grant funds
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Council
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.2 Trim trees around overhead utility lines.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Property Protection
<b>Hazard(s) Addressed:</b>	Winter weather
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Land Subsidence 1
<b>Name of Action or Project:</b>	Trim trees around overhead utility lines.
<b>Action or Project Description:</b>	Cut trees, limbs, and brush around powerlines and electrical areas.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Protection of roadways, surrounding property, and preventive measure for damages.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Poplar Bluff Municipal Utilities
<b>Action/Project Priority:</b>	H,31
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Local, grant funds if needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Municipal Utilities
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.3 Inventory and Prioritize Low Water Crossings

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Bridges and Roadways
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding
<b>Name of Action or Project:</b>	Prioritize work on low water crossings that are vulnerable to flooding.
<b>Action or Project Description:</b>	Reinforce low water crossings
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Road Way protection
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Local, grant funds if needed, and city capital improvement tax.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Butler County Highway Department
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.4 Relocation of structures from floodways

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Participate in Flood buyout programs
<b>Hazard(s) Addressed:</b>	Property protection
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 3
<b>Name of Action or Project:</b>	Relocation of structures from floodways.
<b>Action or Project Description:</b>	Flood buyout
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Structural protection.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	FEMA/SEMA
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Butler County EMD/Floodplain manager
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.4 Relocation of structures from floodways

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Fisk
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Participate in Flood buyout programs
<b>Hazard(s) Addressed:</b>	Property protection
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 3
<b>Name of Action or Project:</b>	Relocation of structures from floodways.
<b>Action or Project Description:</b>	Flood buyout
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Structural protection.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Fisk
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	FEMA/SEMA
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain manager
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.4 Relocation of structures from floodways

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Neelyville
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Participate in Flood buyout programs
<b>Hazard(s) Addressed:</b>	Property protection
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 3
<b>Name of Action or Project:</b>	Relocation of structures from floodways.
<b>Action or Project Description:</b>	Flood buyout
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Structural protection.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Neelyville
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	FEMA/SEMA
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain manager
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.4 Relocation of structures from floodways

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Participate in Flood buyout programs
<b>Hazard(s) Addressed:</b>	Property protection
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 3
<b>Name of Action or Project:</b>	Relocation of structures from floodways.
<b>Action or Project Description:</b>	Flood buyout
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Structural protection.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Fisk
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	FEMA/SEMA
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain manager/planner
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.4 Relocation of structures from floodways

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Qulin
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Participate in Flood buyout programs
<b>Hazard(s) Addressed:</b>	Property protection
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 3
<b>Name of Action or Project:</b>	Relocation of structures from floodways.
<b>Action or Project Description:</b>	Flood buyout
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Structural protection.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Qulin
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	FEMA/SEMA
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain manager
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.5 Establish Alternate Transportation Routes

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Alternate Routes
<b>Hazard(s) Addressed:</b>	All
<b>Action or Project</b>	
<b>Action/Project Number:</b>	HMP 3
<b>Name of Action or Project:</b>	Establish Alternate Transportation
<b>Action or Project Description:</b>	Establish alternate routes during an emergency.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Safety
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County EMA Director, County Highway Dept, and MoDOT
<b>Action/Project Priority:</b>	L, 22
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Local Funds, MoDot
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.5 Establish Alternate Transportation Routes

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Poplar Bluff R-I School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Alternate Routes
<b>Hazard(s) Addressed:</b>	All
<b>Action or Project</b>	
<b>Action/Project Number:</b>	HMP 3
<b>Name of Action or Project:</b>	Establish Alternate Transportation Routes
<b>Action or Project Description:</b>	Establish alternate routes during an emergency.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Safety of students and school buses
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Poplar Bluff r-I Schools
<b>Action/Project Priority:</b>	L, 22
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Local Funds, MoDot
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.5 Establish Alternate Transportation Routes

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Twin Rivers R-X School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Alternate Routes
<b>Hazard(s) Addressed:</b>	All
<b>Action or Project</b>	
<b>Action/Project Number:</b>	HMP 3
<b>Name of Action or Project:</b>	Establish Alternate Transportation Routes
<b>Action or Project Description:</b>	Establish alternate routes during an emergency.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	n/a
<b>Benefits:</b>	Safety of students and school buses
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Twin Rivers R-X School District
<b>Action/Project Priority:</b>	L, 22
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Local Funds, MoDot
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.6 Promote use of emergency power generators to local businesses and industry

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Power Outage
<b>Hazard(s) Addressed:</b>	Storm, Snow, Ice, Tornado
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Tornado 3
<b>Name of Action or Project:</b>	Promote use of emergency power generators to local governments, local businesses and industry for critical facilities
<b>Action or Project Description:</b>	Seek funding for emergency power generators to decrease loss of business and services during power outages. Solar generators would save on cost.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$80,000
<b>Benefits:</b>	Continuity of government and private services
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler Emergency Management Director, Butler County Health Department
<b>Action/Project Priority:</b>	M, 29
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	FEMA/SEMA, Public Funds, Grants
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.8 Upgrade Water Supply and Treatment Systems

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Water
<b>Hazard(s) Addressed:</b>	Drought
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 4
<b>Name of Action or Project:</b>	Upgrade water systems.
<b>Action or Project Description:</b>	Seek funding to improve water and sewage throughout the county.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$150,000
<b>Benefits:</b>	Improve public water supply
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Local Public Water Supply Districts
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.8 Upgrade Water Supply and Treatment Systems

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Water
<b>Hazard(s) Addressed:</b>	Drought
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 4
<b>Name of Action or Project:</b>	Upgrade water systems.
<b>Action or Project Description:</b>	Seek funding to improve water and sewage throughout the county.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$150,000
<b>Benefits:</b>	Improve public water supply
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Poplar Bluff
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Municipal Utilities
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.8 Upgrade Water Supply and Treatment Systems

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Neelyville
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Water
<b>Hazard(s) Addressed:</b>	Drought
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flooding 4
<b>Name of Action or Project:</b>	Upgrade water systems.
<b>Action or Project Description:</b>	Seek funding to improve water and sewage throughout the county.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$1,500,000
<b>Benefits:</b>	Improve public water supply
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City of Neelyville
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Council
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.9 Database of Vulnerable People

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	All
<b>Action or Project</b>	
<b>Action/Project Number:</b>	HMP 5
<b>Name of Action or Project:</b>	Database of Vulnerable People
<b>Action or Project Description:</b>	Create a database of vulnerable populations within the jurisdiction, and create awareness for their plan during a hazard.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$60,000
<b>Benefits:</b>	Public information
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Health Department
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.10 Lightning Protection

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lightning
<b>Hazard(s) Addressed:</b>	Thunder Storm
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Storm 1
<b>Name of Action or Project:</b>	Lightning Protection
<b>Action or Project Description:</b>	Explore needed lightning protection at critical facilities and communication equipment
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disaster
<b>Estimated Cost:</b>	
<b>Benefits:</b>	Continuity of services
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County
<b>Action/Project Priority:</b>	L, 24
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Emergency Management Director and Health Department
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.11 Mapping of Sinkholes

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Sink Holes
<b>Hazard(s) Addressed:</b>	Sink Holes, Land Subsidence
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Land Subsidence 2
<b>Name of Action or Project:</b>	Mapping of Sinkholes
<b>Action or Project Description:</b>	Create a county wide map of active, and potential sinkholes.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of public and private property from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Public information, prevent future accidents.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Emergency Management Director, Commissioners
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.11 Improve Levees on the Black River

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Riverine Flooding
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Levee Repairs
<b>Name of Action or Project:</b>	Levee Reparis
<b>Action or Project Description:</b>	Repair the levees located along the Black River
<b>Applicable Goal Statement:</b>	Increase the protection provided by the various levees along the Black River
<b>Estimated Cost:</b>	\$2,500,000
<b>Benefits:</b>	Protection of property
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Manager and Commissioners
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.12 Debris removal from the Black River

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Flooding
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	River Cleanout
<b>Name of Action or Project:</b>	Black River Cleanout
<b>Action or Project Description:</b>	Clean debris and log jams from Black River
<b>Applicable Goal Statement:</b>	Remove debris and log jams from Black River to improve flow and protect property from flooding.
<b>Estimated Cost:</b>	\$2,000,000
<b>Benefits:</b>	Protection of Property from flooding
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Butler County Emergency Manager and Commissioners
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 3.13 Backup Wells for water supply districts

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Drought/Lack of Water
<b>Hazard(s) Addressed:</b>	Drought
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Drought
<b>Name of Action or Project:</b>	Backup Wells
<b>Action or Project Description:</b>	Ensure that all water supply districts have a backup well or water supply source.
<b>Applicable Goal Statement:</b>	Ensure that all water supply districts have a backup well or water supply source to provide adequate water supply in the case of severe droughts.
<b>Estimated Cost:</b>	\$200,000
<b>Benefits:</b>	Adequate water supply for local residents and businesses.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Emergency Management Director, Health Department
<b>Action/Project Priority:</b>	M, 26
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	MoDNR, USDA, CDBG
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Goal 4: Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.

Action 4.1 National Flood Insurance Program

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 5
<b>Name of Action or Project:</b>	National Flood Insurance Program
<b>Action or Project Description:</b>	Explore CRS county wide. Receive a community rating.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Flood hazard awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Emergency Management Director
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.1 National Flood Insurance Program

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 5
<b>Name of Action or Project:</b>	National Flood Insurance Program
<b>Action or Project Description:</b>	Explore CRS county wide. Receive a community rating.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Flood hazard awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Emergency Management Director
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.1 National Flood Insurance Program

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Fisk
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 5
<b>Name of Action or Project:</b>	National Flood Insurance Program
<b>Action or Project Description:</b>	Explore CRS county wide. Receive a community rating.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Flood hazard awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.1 National Flood Insurance Program

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Neelyville
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 5
<b>Name of Action or Project:</b>	National Flood Insurance Program
<b>Action or Project Description:</b>	Explore CRS county wide. Receive a community rating.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Flood hazard awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.1 National Flood Insurance Program

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 5
<b>Name of Action or Project:</b>	National Flood Insurance Program
<b>Action or Project Description:</b>	Explore CRS county wide. Receive a community rating.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Flood hazard awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager/City Planner
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.1 National Flood Insurance Program

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Qulin
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Flood 5
<b>Name of Action or Project:</b>	National Flood Insurance Program
<b>Action or Project Description:</b>	Explore CRS county wide. Receive a community rating.
<b>Applicable Goal Statement:</b>	Implement mitigation actions that improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$8,000
<b>Benefits:</b>	Flood hazard awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County Commissioners, Butler County Emergency Management Director, Butler County Health Department
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Fisk
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City Council
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Neelyville
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City Council
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Poplar Bluff
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City Manager, City Planner, City Council
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	City of Qulin
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City council
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Poplar Bluff R-I School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Twin Rivers R-X School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.2 Integrate HMP into other plans

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Three Rivers College
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	All Hazards
<b>Name of Action or Project:</b>	Planning
<b>Action or Project Description:</b>	Integrate County HMP into other planning efforts.
<b>Applicable Goal Statement:</b>	Incorporate HMP into other planning efforts to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	College President and Trustees
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

Action 4.3 Maintain and/or implement StormReady Community

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Butler County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Public Awareness
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	Thunderstorms, High winds, Lightning, Hail, Tornado, Flooding
<b>Name of Action or Project:</b>	StormReady
<b>Action or Project Description:</b>	Maintain StormReady Certification
<b>Applicable Goal Statement:</b>	Maintain StormReady Certification to improve the protection of community tranquility from the adverse effects of disasters.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	All Hazard Awareness
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Emergency Management Director
<b>Action/Project Priority:</b>	L, 19
<b>Timeline for Completion:</b>	Ongoing
<b>Potential Fund Sources:</b>	Public Funds, Grants as needed.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	
<b>Progress Report</b>	
<b>Action Status</b>	
<b>Report of Progress</b>	
<b>Completed by:</b>	

## 5 PLAN MAINTENANCE PROCESS

### 5 PLAN MAINTENANCE PROCESS

#### 5.1 Monitoring, Evaluating, and Updating the Plan

##### 5.1.1 Responsibility for Plan Maintenance

##### 5.1.2 Plan Maintenance Schedule

##### 5.1.3 Plan Maintenance Process

#### 5.2 Incorporation into Existing Planning Mechanisms

#### 5.3 Continued Public Involvement

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

### 5.1 Monitoring, Evaluating, and Updating the Plan

**44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.**

#### 5.1.1 Responsibility for Plan Maintenance

The Mitigation Planning Committee (MPC) will be a standing committee appointed by the Butler County Commission, with oversight provided by the Butler County Commission through the Butler County Emergency Management Director. The role of the MPC in regards to implementation monitoring, action evaluation and plan maintenance is described below. The participating jurisdictions, public water supply districts, and school districts commit to conduct the following:

- meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan;
- act as a forum for hazard mitigation issues;
- disseminate hazard mitigation ideas and activities to all participants;
- pursue the implementation of high priority, low- or no-cost recommended actions;
- maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;

- monitor and assist in implementation and update of this plan;
- keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- report on plan progress and recommended changes to the County Commissioners and governing bodies of participating jurisdictions; and
- inform and solicit input from the public.

The MPC is an advisory body and can only make recommendations to county, city, or special district elected officials. Its primary duty is to see the plan successfully carried out and to report the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

### 5.1.2 Plan Maintenance Schedule

The MPC agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. The Butler County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC to the meeting, as well as document all review meetings.

In coordination with all participating jurisdictions, a five-year written update of the plan will be submitted to the Missouri State Emergency Management Agency (SEMA) and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

### 5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The MPC during the annual meeting will review changes in vulnerability identified as follows:

- decreased vulnerability as a result of implementing recommended actions;
- increased vulnerability as a result of failed or ineffective mitigation actions;
- increased vulnerability due to hazard events; and/or,
- increased vulnerability as a result of new development (including annexation).

Future 5-year updates to this plan will include the following activities:

- consideration of changes in vulnerability due to action implementation;
- documentation of success stories where mitigation efforts have proven effective;
- documentation of unsuccessful mitigation actions and why the actions were not effective;
- documentation of previously overlooked hazard events that may have occurred since the previous plan approval;
- incorporation of new data or studies with information on hazard risks;

- incorporation of new capabilities or changes in capabilities;
- incorporation of growth data and changes to inventories; and/or,
- incorporation of ideas for new actions and changes in action prioritization.

Each proposed action in the plan identified an individual, office, or agency responsible for action implementation. This appointee will track and report on an annual basis to the jurisdictional MPC member on the status of each action. The appointee will provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing risk. If the action does not meet the identified objectives, the jurisdictional MPC member will determine necessary remedial action, making any required modifications to the plan. The participating jurisdictions have identified the above-described process as the best method to evaluate and document any changes in vulnerability as a result of plan implementation.

Changes will be made to the plan to remedy actions that have failed or are not considered feasible. Feasibility will be determined after a review of the action's consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high, but were identified as potential mitigation activities, will be reviewed as well during the monitoring of the plan. Updating of the plan will be accomplished by written changes and submissions, as the MPC deems appropriate and necessary. Changes will be approved by the Butler County Commission and the governing boards of the other participating jurisdictions.

### 5.2 Incorporation into Existing Planning Mechanisms

**44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.**

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Those existing plans and programs, if any, were described in Section 2 of this plan. Based on the capability assessments of the participating jurisdictions, communities in Butler County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs. It recommends implementing actions, where possible, through the following plans:

- general, master, or comprehensive plans of participating jurisdictions;
- ordinances of participating jurisdictions;
- the Butler County Emergency Operations Plan;
- capital improvement plans and budgets;
- other community plans within the County, such as water conservation plans, storm water management plans, and parks and recreation plans;
- school and special district plans and budgets; and
- other plans and policies outlined in the capability assessment sections for each jurisdiction in Section 2 of this plan.

The MPC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate for their

jurisdiction/district. The MPC is also responsible for monitoring this integration and incorporation of the appropriate information into the five-year update of the county’s multi-jurisdictional hazard mitigation plan.

Additionally, after the annual review of the Butler County Hazard Mitigation Plan, the Butler County Emergency Management Director will provide the updated Mitigation Strategy—with current status of each mitigation action—to the County Commission as well as all Mayors, City Clerks, School District Superintendents, and other special district representatives. The Emergency Manager Director will request that the mitigation strategy be incorporated, where appropriate, in other planning mechanisms.

**Table 5.1** below lists the planning mechanisms by jurisdiction into which the updated Hazard Mitigation Plan will be integrated.

**Table 5.1, Planning Mechanisms Identified for Integration of Hazard Mitigation Plan**

Jurisdiction	Planning Mechanisms
Unincorporated Portion of Butler County	Comprehensive Plan Annual Budget Watershed Plan
City of Poplar Bluff	Capital Improvement Plan Comprehensive Plan Planning and Zoning Board Zoning Ordinances Annual Budget
City of Fisk	Annual Budget Zoning Ordinances
City of Neelyville	Annual Budget Zoning Ordinances
City of Qulin	Annual Budget Zoning Ordinances
Poplar Bluff R-I School District	Emergency operations plan Annual Budget School Calendar Safety and Security Procedures
Twin Rivers RX School District	Emergency operations plan Annual Budget School Calendar Safety and Security Procedures
Three Rivers College	Emergency operations plan Annual Budget School Calendar Safety and Security Procedures

### 5.3 Continued Public Involvement

**44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.**

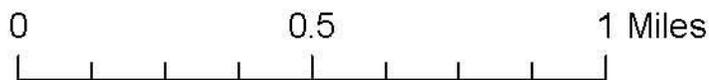
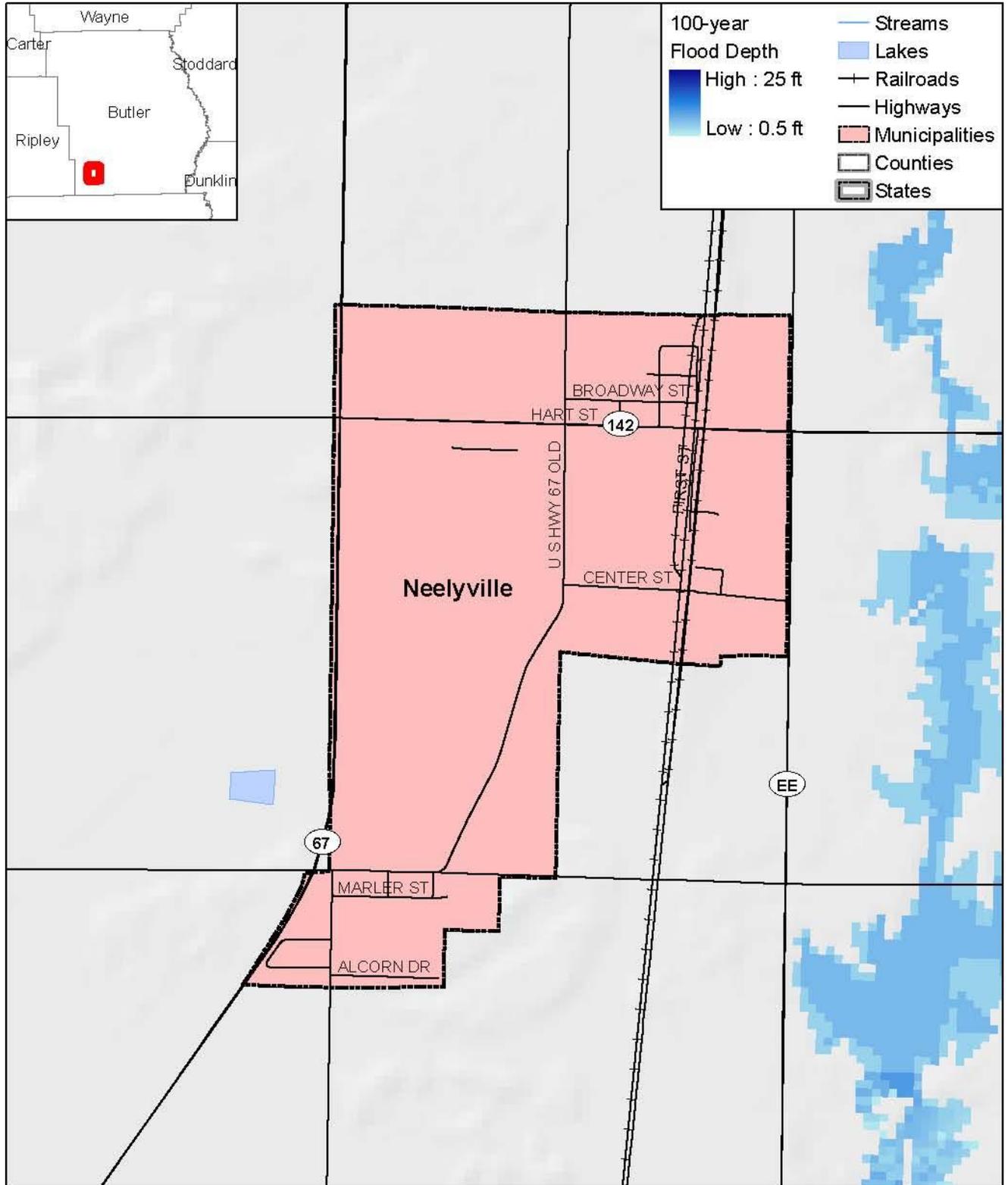
The hazard mitigation plan update process provides an opportunity to publicize success stories resulting from the plan's implementation and seek public comment. Information about the annual reviews will be posted in the county-wide newspaper, as well as on the Butler County website and the Ozark Foothills Regional Planning Commission website following each annual review of the mitigation plan. When the MPC reconvenes for the five-year update, it will coordinate with all stakeholders participating in the current planning process. Included in this group will be those who joined the MPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be actively solicited, at a minimum, through available website postings and press releases to local media outlets, primarily newspapers.



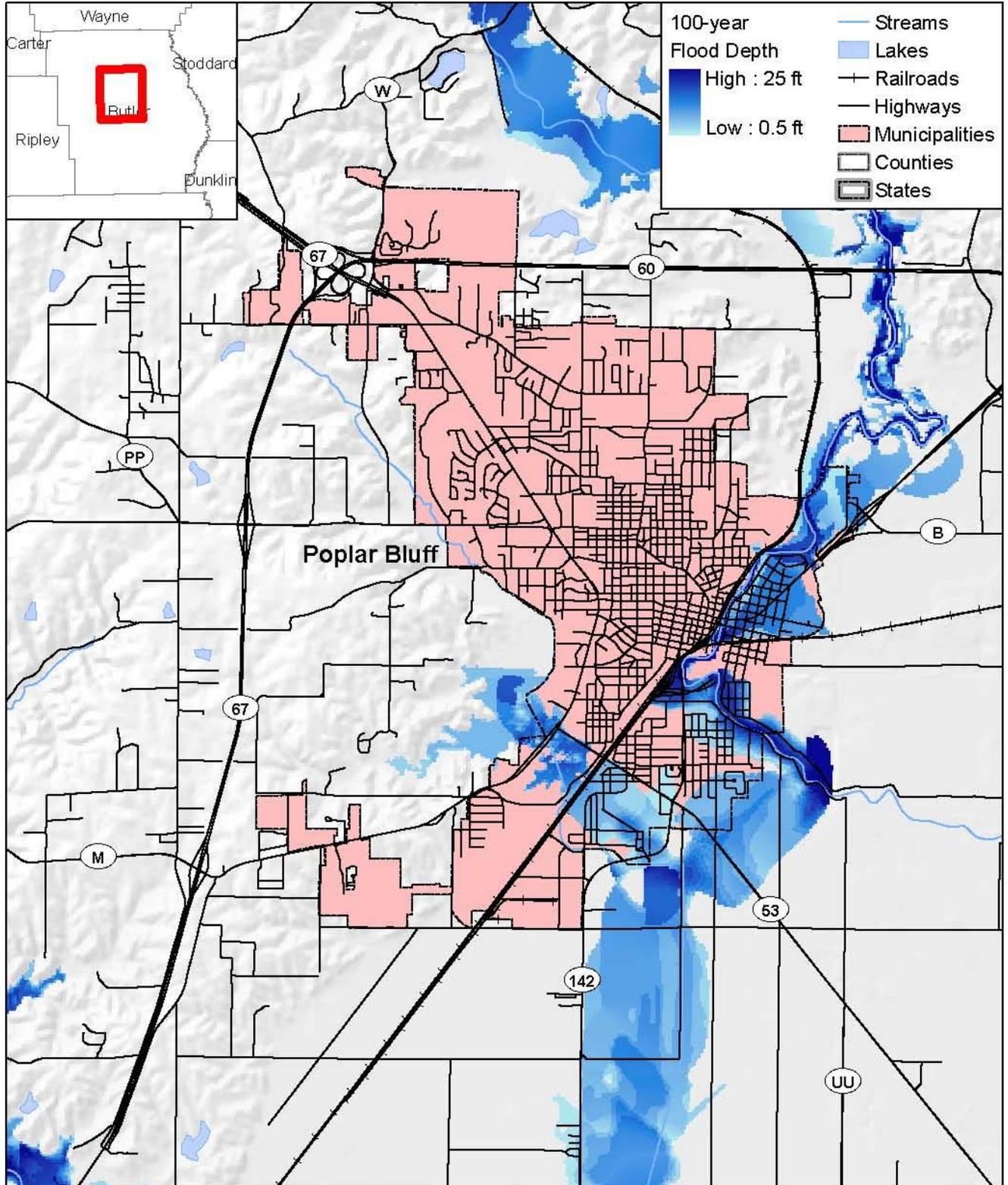
# Appendix A

# MAPS

# Neelyville HAZUS Flood Depth



# Poplar Bluff HAZUS Flood Depth



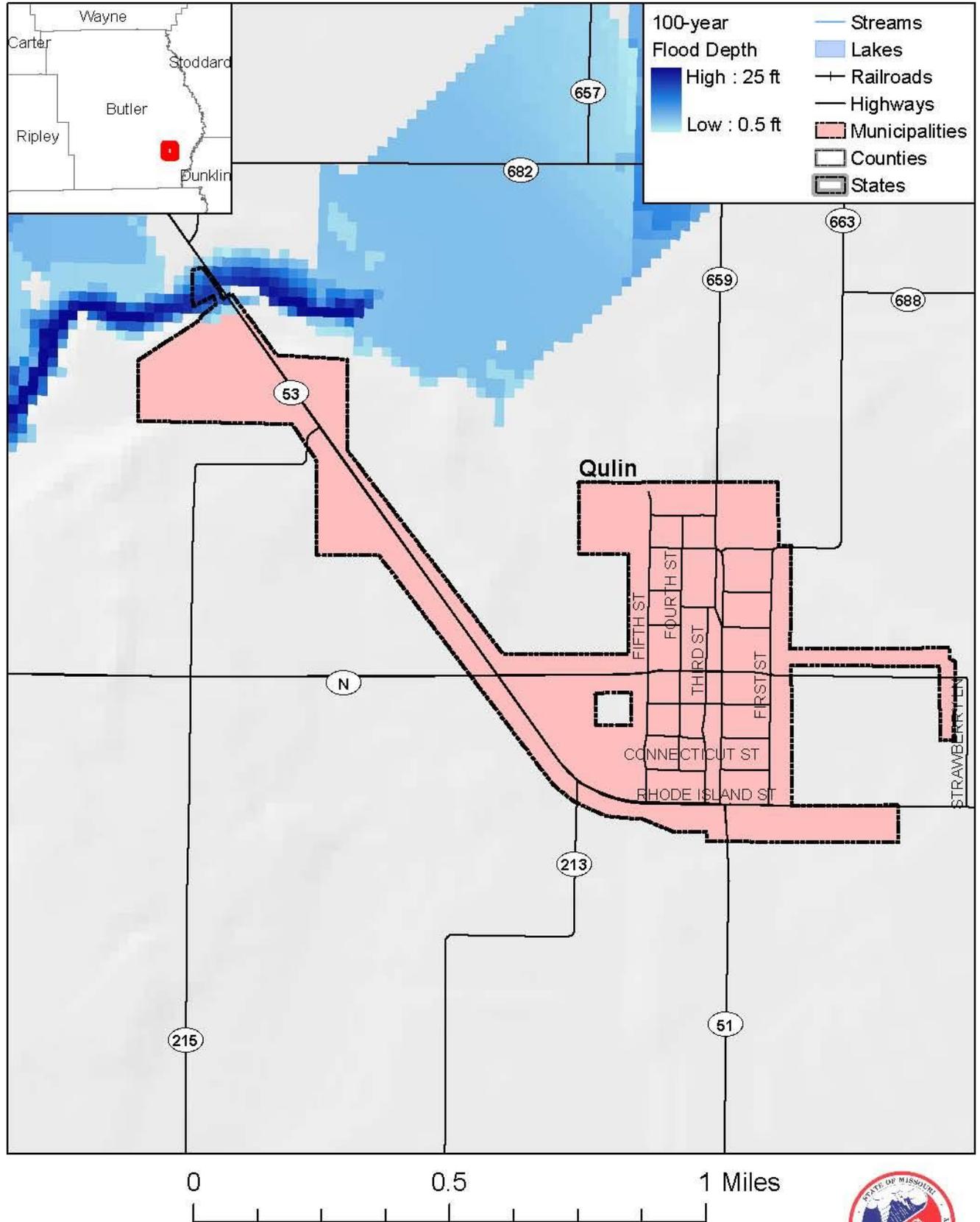
0 1 2 Miles



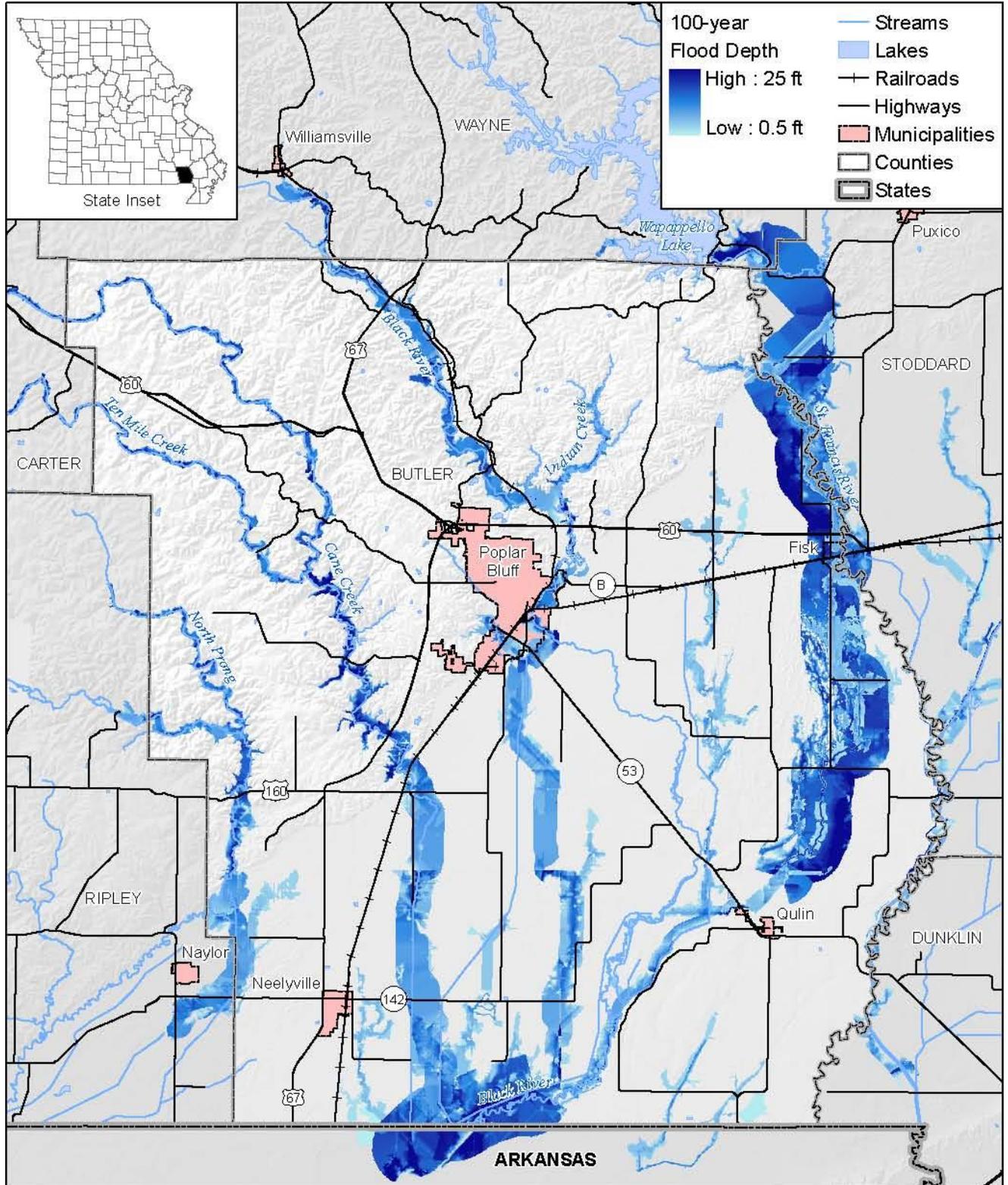
Map compiled 3/2010; intended for planning purposes only.  
Data Source: HAZUS-MH MR2, USGS, MSDIS



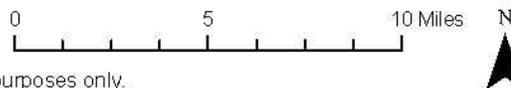
## Qulin HAZUS Flood Depth



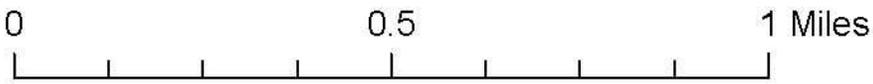
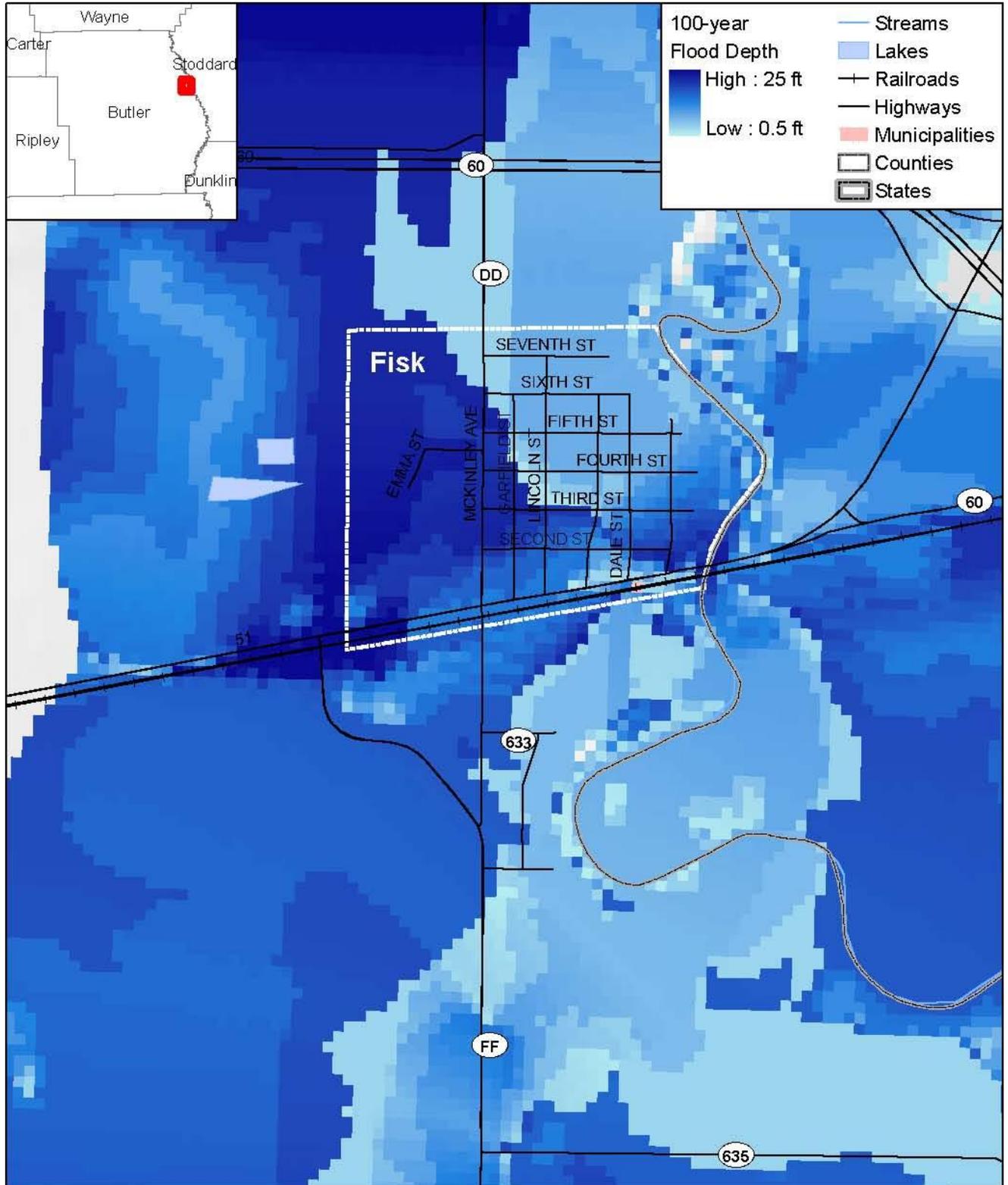
# Butler County Flood Depth

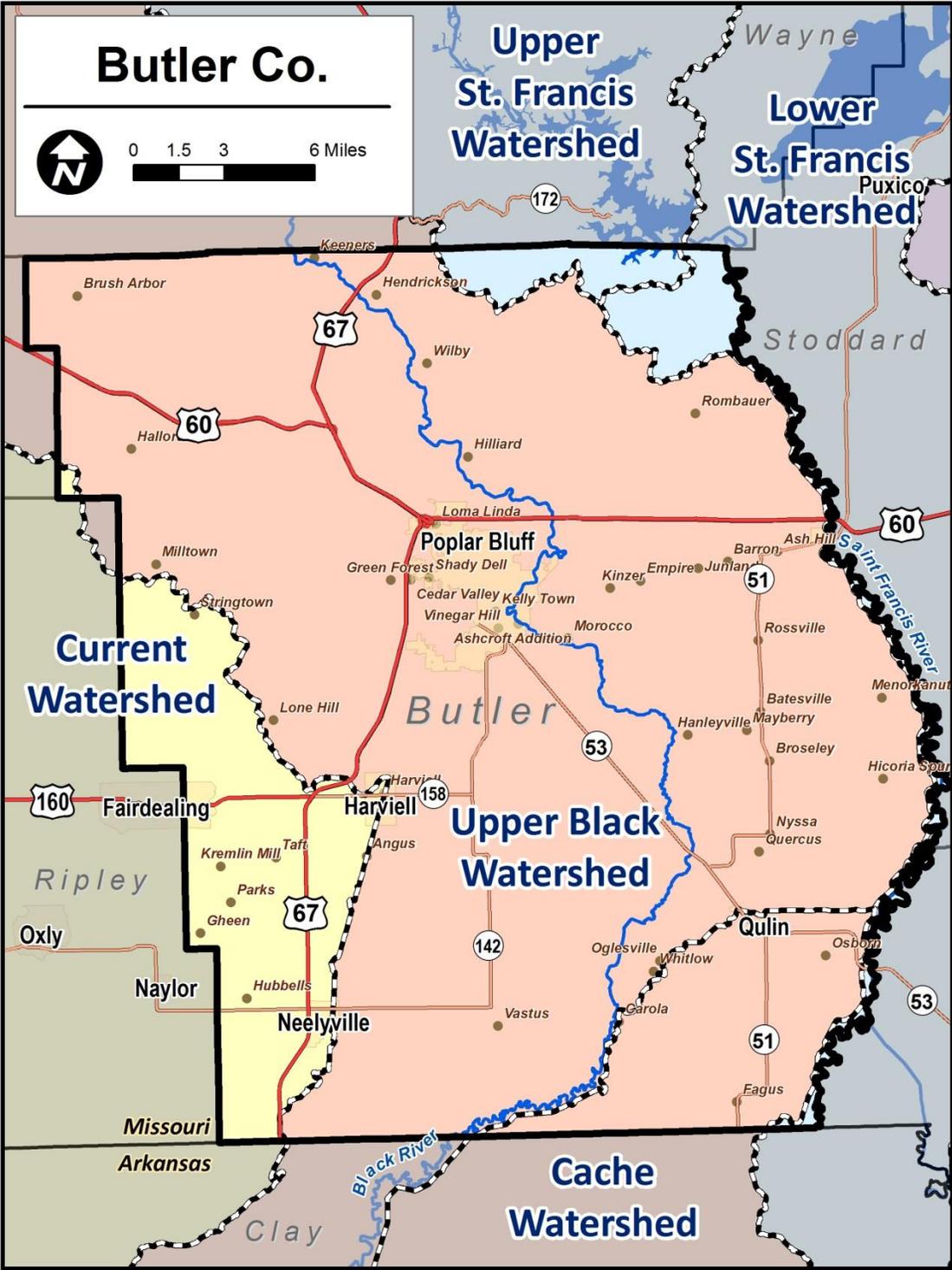


Map compiled 3/2010; intended for planning purposes only.  
 Data Source: HAZUS-MH MR2, USGS, MSDIS

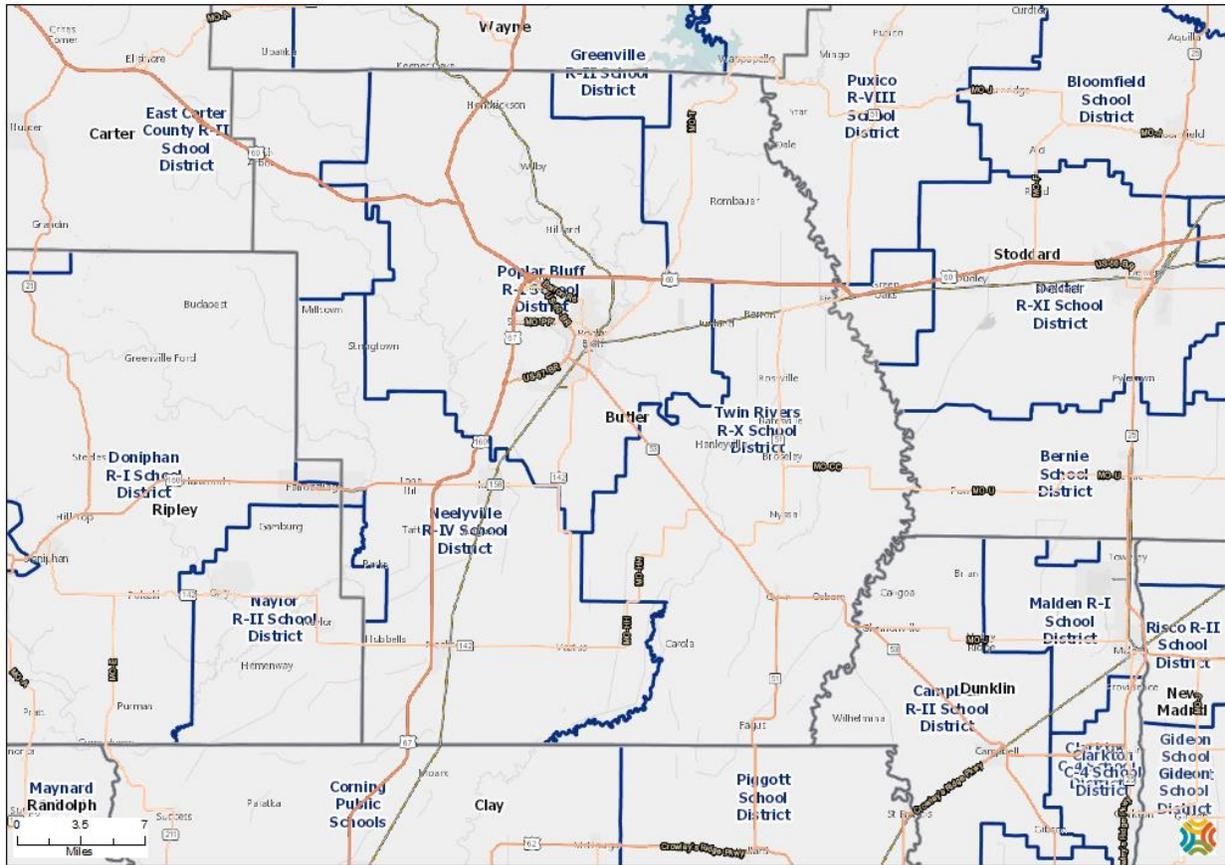


# Fisk HAZUS Flood Depth





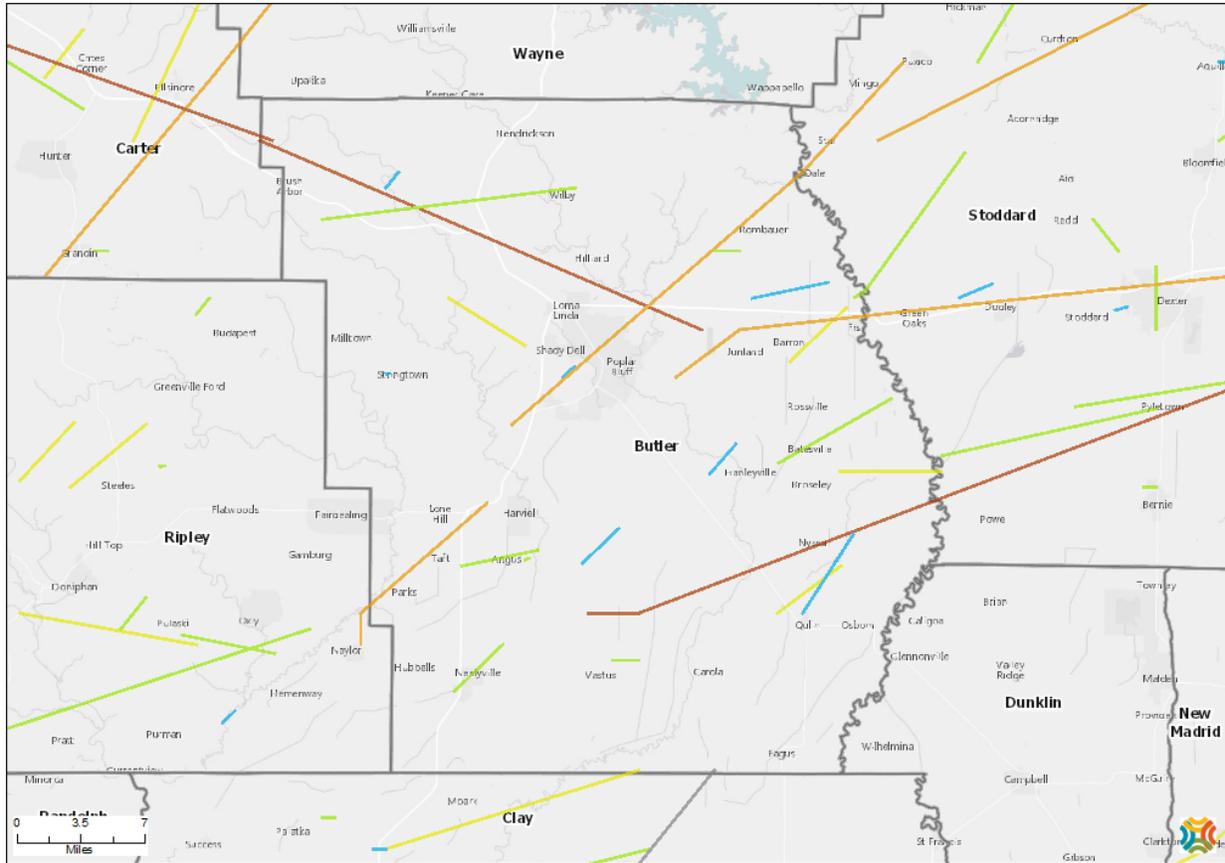
school districts map



Map Legend

Community Commons

## Butler County tornadoes



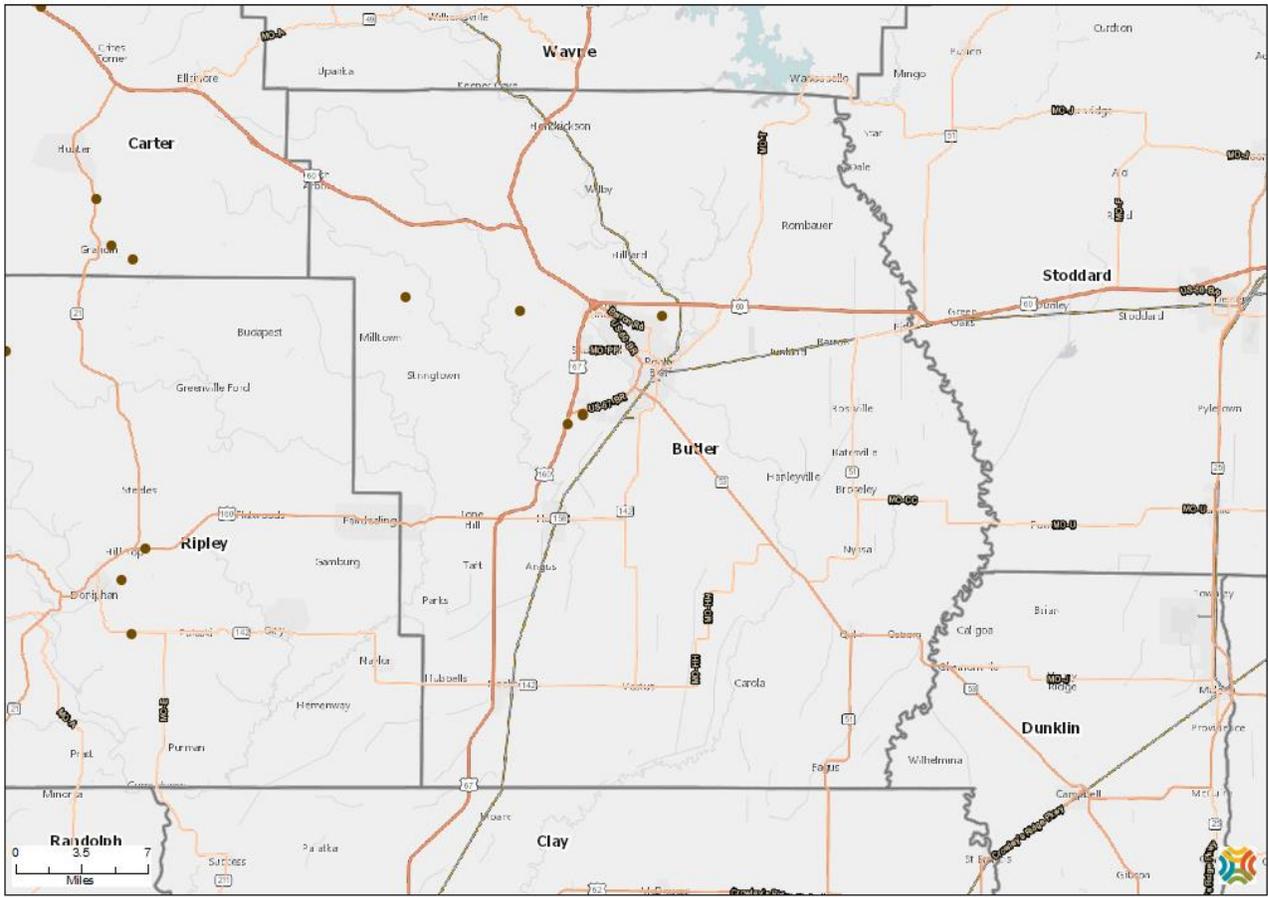
### Map Legend

Tornado Tracks, F-Scale, NOAA 1950-2014

- F-Scale of 5 (Winds 261-318 MPH)
- F-Scale of 4 (Winds 207-260 MPH)
- F-Scale of 3 (Winds 158-206 MPH)
- F-Scale of 2 (Winds 113-157 MPH)
- F-Scale of 1 (Winds 73-112 MPH)
- F-Scale of 0 (Winds 40-72 MPH)
- No F-Scale Information

Community Commons, 10/17/2017

Sinkholes



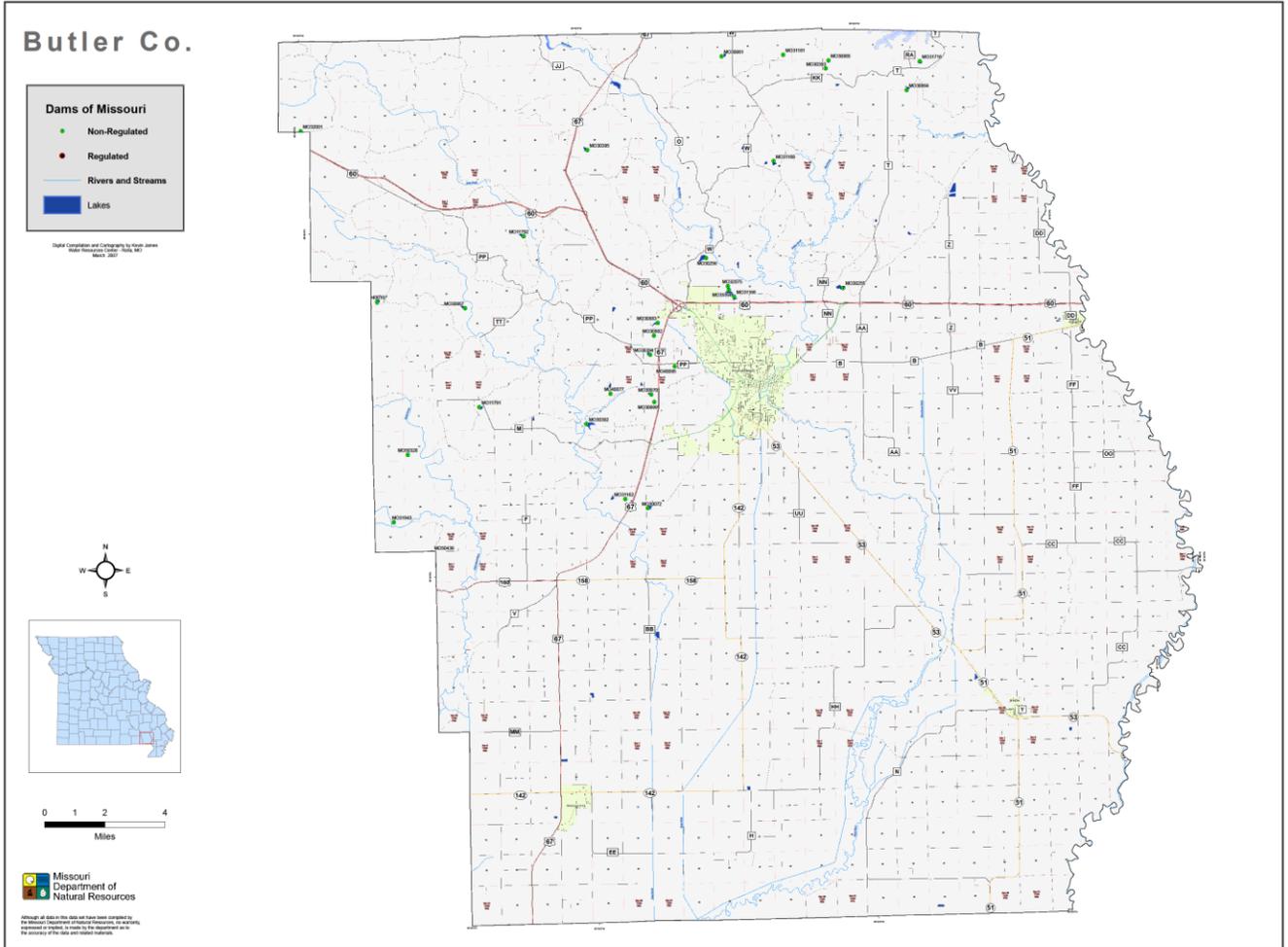
Map Legend

Sinkholes, MO DNR 2014

- Primary Sinkhole
- Primary w/ Additional Sinks
- Secondary Sinkhole
- Secondary w/ Additional Sinks
- Tertiary Sinkhole
- Tertiary Sinkhole w/ Additional Sinks
- Quaternary Sinkhole

Community Commons, 10/12/2017

# 2017 Butler County Hazard Mitigation Plan

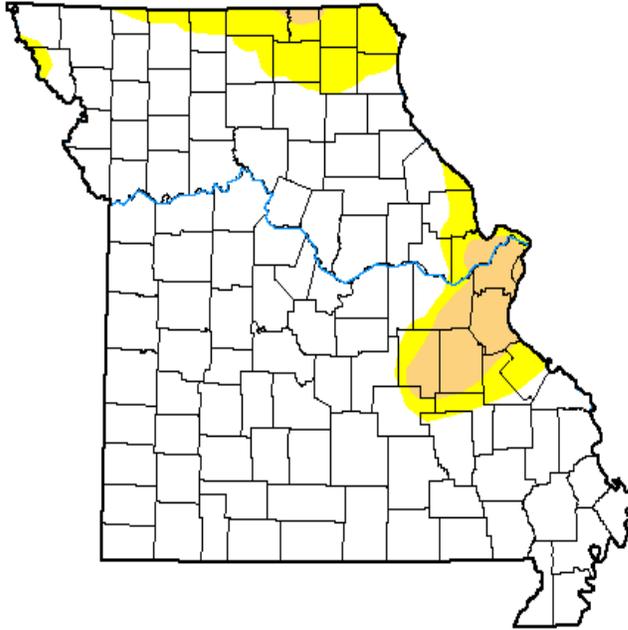


**U.S. Drought Monitor**  
**Missouri**

**September 5, 2017**

(Released Thursday, Sep. 7, 2017)

Valid 8 a.m. EDT



*Drought Conditions (Percent Area)*

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
<b>Current</b>	86.23	13.77	4.65	0.00	0.00	0.00
<b>Last Week</b> <i>08-29-2017</i>	86.40	13.60	4.65	0.00	0.00	0.00
<b>3 Months Ago</b> <i>06-06-2017</i>	95.84	4.16	0.00	0.00	0.00	0.00
<b>Start of Calendar Year</b> <i>01-03-2017</i>	10.49	89.51	26.62	0.00	0.00	0.00
<b>Start of Water Year</b> <i>09-27-2016</i>	99.74	0.26	0.00	0.00	0.00	0.00
<b>One Year Ago</b> <i>09-06-2016</i>	98.75	1.25	0.00	0.00	0.00	0.00

Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

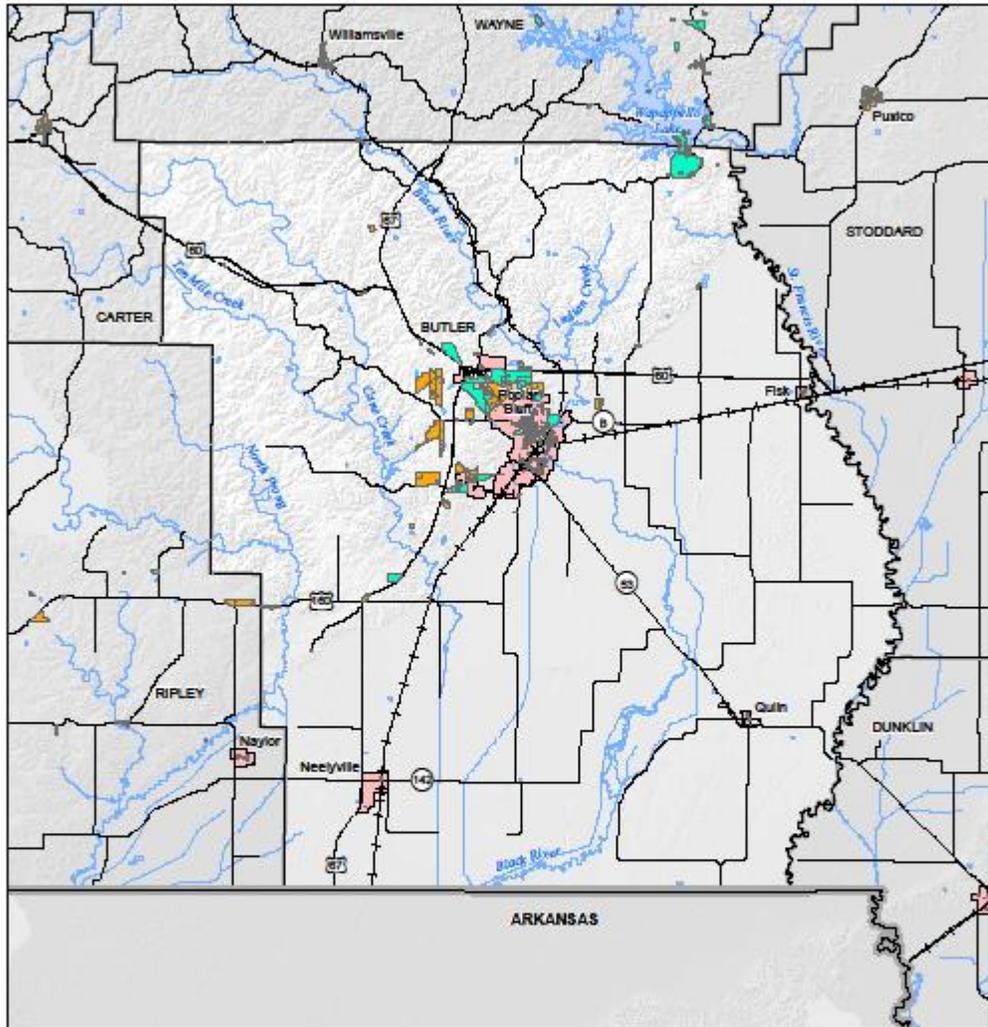
Author:

Deborah Bathke  
National Drought Mitigation Center



<http://droughtmonitor.unl.edu/>

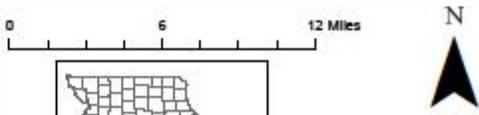
### Butler County Wildland Urban Interface



**WUI 2000**

- High\_Dens\_Interface
- Med\_Dens\_Interface
- High\_Dens\_Intermix
- Med\_Dens\_Intermix
- High\_Dens\_NoVeg

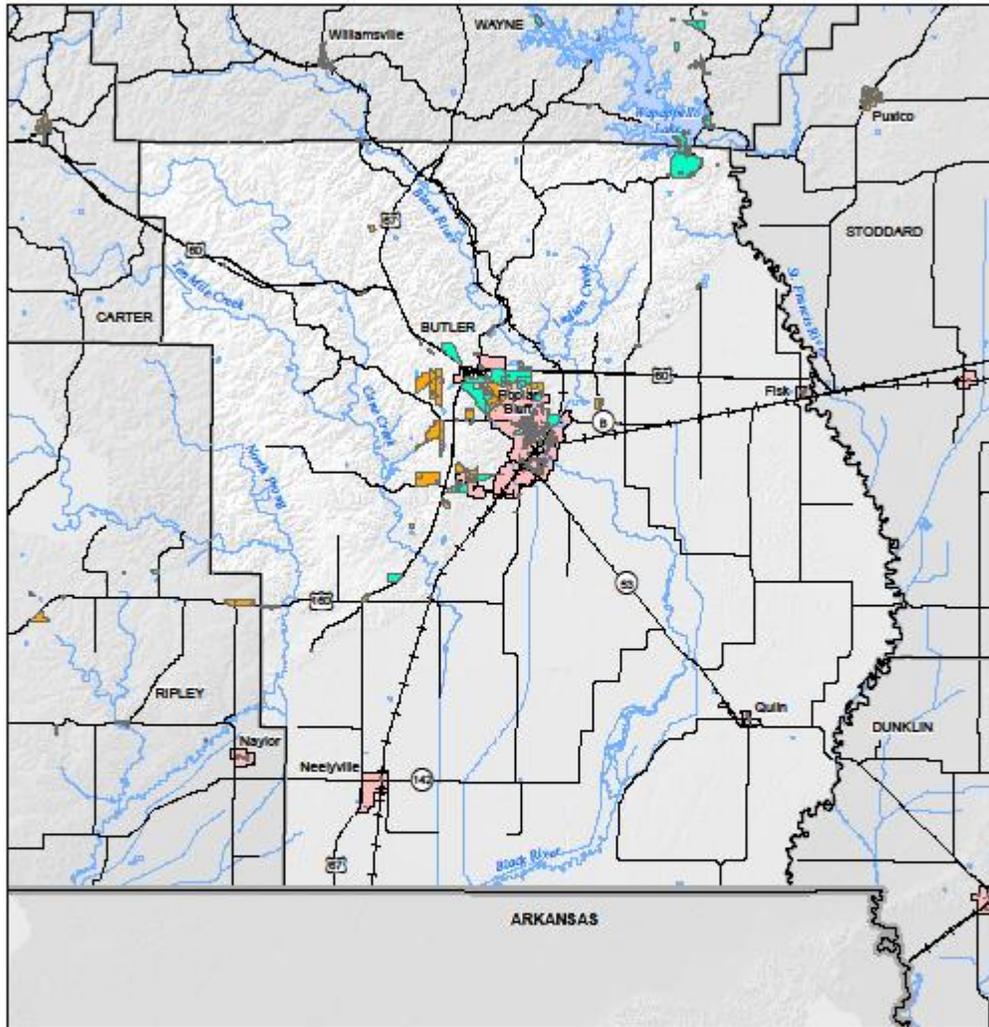
- Streams
- Lakes
- Railroads
- Highways
- Municipalities
- Counties
- States



Map intended for planning purposes only.  
 Data Source: silvis.forest.wisc.edu  
 Definitions: <http://silvis.forest.wisc.edu/old/Library/WUIDefinitions.php>

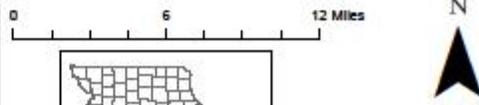


### Butler County Wildland Urban Interface



**WUI 2000**

<span style="color: red;">■</span> High_Dens_Interface	<span style="color: blue;">—</span> Streams
<span style="color: orange;">■</span> Med_Dens_Interface	<span style="color: lightblue;">—</span> Lakes
<span style="color: yellow;">■</span> High_Dens_Intermix	<span style="color: black;">+</span> Railroads
<span style="color: cyan;">■</span> Med_Dens_Intermix	<span style="color: black;">—</span> Highways
<span style="color: black;">■</span> High_Dens_NoVeg	<span style="border: 1px solid black;">□</span> Municipalities
	<span style="border: 1px solid black;">□</span> Counties
	<span style="border: 1px solid gray;">□</span> States



Map intended for planning purposes only.  
 Data Source: silvis.forest.wisc.edu  
 Definitions: <http://silvis.forest.wisc.edu/old/Library/WUIDefinitions.php>

# Appendix B

## PUBLIC PARTICIPATION

**BUTLER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE  
KICKOFF MEETING—SIGN-IN SHEET**

**Project:** Butler County, Missouri Multi-Jurisdictional Hazard Mitigation Plan Update  
**Facilitator:** Matt Winters, Associate Director  
 Omar Fochtils, PIC

**Meeting Date/Time:** April 23, 2017, 1:00 PM  
**Place/Room:** Poplar Bluff RI School District  
 1110 North Westwood Blvd, Poplar Bluff MO

Name	Title	Department/Agency	Email	Phone #	Signature
Terray Sebent	Supervisor	Tim R. Viers	jsiebar@viers.org	717-0785	
Bob Fredwell	Fire Chief	Butler Co Fire	bfredwell@insintext.net	785-6099	
Jeff Swaman	CVL	Red Cross/PRBaker	Jeffswaman@yahoo.com	716-5213	
Mike Mason	Business owner	PAE O	cmstrobin@peoction.com	686-8492	
Robert Hudson	from	Baker Health	Robert.hudson@bakerhealth.com	785-8478	
Sharon Sargent	City Clerk	City of Abbeville	msargent@abbeville.net	573-989-6504	
Chuck Strathorn	Public Safety	IRCC	strathorn@haz.edu	573-816-5074	
Rob Priest	Asst. Spt	PRSI	rodpriste@pb12.missouri.gov	573-765-3781	

**BUTLER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE  
KICKOFF MEETING SIGN-IN SHEET**

Project: Butler County, Missouri Multi-Jurisdictional Hazard Mitigation Plan Update  
 Meeting Date/Time: June 20, 2017 1:00 PM  
 Facilitator: Matt Wilczos, Associate Director  
 Place/Room: Ozark Southills Regional Planning Commission  
 3015 Fair Street, Appleton Bluff, MO 65601

Name	Title	Department/Agency	Email	Phone #	Signature
Matt Wilczos	Assoc Dir	ORPC	MattWilczos@ORPC.com	785-6402	<i>[Signature]</i>
Bob Redweil	Fire Chief	BCFD	br@redweil.com	785-6449	<i>[Signature]</i>
James Siebert	Swat	TP	jsiebert@trio.us	328-4321	<i>[Signature]</i>
Donna Fowler	Booker	TRC	dfowler@trc.com		<i>[Signature]</i>
Jeff Gaudin	VP	TRC	jgaudin@trc.com		<i>[Signature]</i>
David Stehle	Director	TRC	dstehle@trc.com		<i>[Signature]</i>

**BUTLER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE  
KICKOFF MEETING SIGN-IN SHEET**

**Project:** Butler County, Missouri Multi-jurisdictional Hazard Mitigation Plan Update  
**Facilitator:** Mett Winkers, Associate Director  
**Meeting Date/Time:** July 13, 2017 1:00 PM  
**Place/Room:** Ozark Foothills Regional Planning Commission, 307 S. 7th Street, Puyallup, WA 98901

Name	Title	Department/Agency	Email	Phone #	Signature
Mett Winkers	Assoc. Dir.	OCRPC	M.Winkers@ocrpc.org	785-676-2100	<i>Mett Winkers</i>
Wendy Winkler		BUTLER COUNTY			<i>Wendy Winkler</i>
Karen Crook	Exec. Dir.	BCCRC	karen.crook@buttercountymissouri.gov	785-730-8773	<i>Karen Crook</i>
Danna Farley		DAR	dfarley@damass.com	785-1414	<i>Danna Farley</i>
Jeremy Siebert	Superintendent	Twin Rivers	jsiebert@trw.us	328-4321	<i>Jeremy Siebert</i>
Robert Hudson	Administrator	BC Health Dept.	Robert.Hudson@bchealth.org	785-684-7676	<i>Robert Hudson</i>
Bob Fredwell	Chief	BCFD	bfredwell@missouriregion.com	785-6019	<i>Bob Fredwell</i>
Robbie Myers	Director	Butler Co. EMA	rmyers@butlercountymissouri.gov	686-8686	<i>Robbie Myers</i>

**OZARK FOOTHILLS REGIONAL PLANNING COMMISSION  
LAKE WAPPAPELLO  
BILL R. EMERSON VISITORS' CENTER  
August 29, 2017**

**SIGN IN SHEET**

	<u>NAME</u>	<u>AFFILIATION</u>
1.	Debbie Smith	Cong. Smith's office
2.	Angela Smith	Williamsville MD
3.	Sharon Crosser	Williamsville MD
4.	Jim Schultz	Williamsville (City Clerk)
5.	Heidi Edwards	Williamsville MD
6.	David Edwards	Williamsville MD
7.	Donald Black	Carter County
8.	Wynne Gibbs	Carter
9.	Becky Nicks	CRUEL CO.
10.	Debbie Ross	Haynes
11.	Ronda Ross	" "
12.	Walt Kuhnert	Piedmont
13.	Tina Bell	" "
14.	Niki Tarp	OFRPC
15.	Mike Watson	OFRPC
16.	Debra Ward	OFRPC
17.	Robert Murphy	OFRPC
18.	Ernest Sherman	OFRPC
19.	Bob Smith	Franklin County
20.	Ed DeGans	Poplar Bluff
	Samantha Rodgers	Staff

ELKS LODGE #2452  
 2452 U.S. HIGHWAY 67 NORTH  
 POPLAR BLUFF, MISSOURI  
 MARCH 9, 2017

SIGN IN SHEET

	<u>NAME</u>	<u>AFFILIATION</u>
1.	Bill Kennard	Ripley Co.
2.	Joe Leaky	Smith Co.
3.	Bill Polk	Smith Co.
4.	Joe Polk	
5.	Angela Linnel	Wayne
6.	Paul Bradley	Clay
7.	Shelley Kay	Director
8.	Charles Kay	Guest
9.	Edward Coursey	
10.	Mickled Coursey	
11.	Darrell Dement	
12.	Steve Horvath	
13.	Sherri Horvath	
14.	Brian Polk	
15.	Joe Loyd	
16.	Ronda Polk	
17.	Gene & Judy O. Klay	
18.	Storia Dement	
19.	Paul & Brenda Johnson	
20.		

**BUTLER COUNTY MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE  
KICKOFF MEETING—SIGN-IN SHEET**

**Project:** Butler County Missouri Multi-Jurisdictional Hazard Mitigation Plan Update

**Facilitator:** Matt Winters, Associate Director  
Grant Fochille, RPC

**Meeting Date/Time:** April 25, 2017 / 1:00 PM

**Place/Room:** Ozark Tootillie RPC  
3029 Fair Street, Poyler Bldg 1ND

Name	Title	Department/Agency	Email	Phone #	Signature
Scott Dill	Supervisor	BCOT	scott@bcot.com	417-237-2000	
Tammy Sprietland	City Clerk	City of BSK	513-917-3807		
Dana Brown	Assoc. Eng	Water	danabrown@water.org	573-421-0373	
Charmen Sargent	City Clerk	Asheville	redpoller@cityofasheville.com	703-589-6800	
Bob Fugall	Chief	B.C.F.D.	b.fugall@cityofbrimfield.com	765-404-7400	
Jeff Shuman	Board M.	Red Cross	jeffshuman@redcross.org	716-5213	
Robert Hudson	Admin	Battera Health	Robert.Hudson@battera.com	573-7888478	
Robbie Myers	Director	Butler Co EMA	robmyers@butlercountymo.gov	573-788-7585	
Erinny Goodin	Planner	BCFD	erinnygoodin@bca.com	765-5474	
Melissa Birchfield	City Clerk	Asheville	gale@regain.com	303-444-52	

## Public Survey: [Show-Me] Butler County Multi-jurisdictional Hazard Mitigation Plan

The federal government requires all states and local governments to have hazard mitigation plans approved by FEMA that are consistent with the Disaster Mitigation Act of 2000. Approved mitigation plans are required to maintain eligibility for certain types of federal Hazard Mitigation Assistance Grants.

A planning committee comprised of representatives from Butler County, the incorporated cities, and the public school districts is currently developing an update to the comprehensive Butler County Multi-jurisdictional Hazard Mitigation Plan with a strategy to reduce the vulnerability of people and property in the planning area to the impacts of hazards and to remain eligible for mitigation funding programs from FEMA.

One of the key components of a hazard mitigation plan is public input during the planning process. The planning committee will be evaluating information on the hazards that impact each jurisdiction within Butler County. The committee is seeking your input on the hazards that will be evaluated as well as your opinions on the types of activities that should be considered to reduce future impacts. Your comments will be considered by your community's representatives on the planning committee as the plan is developed. Please take a few moments to answer the following questions. Thank you for your participation.

1. Please select your jurisdiction from the list. You may only select one jurisdiction for each survey completed. If you belong to more than one jurisdiction in this list, please complete multiple surveys.

- |   |   |
|---|---|
| <input type="checkbox"/> Unincorporated Butler County | <input type="checkbox"/> City of Neelyville       |
| <input type="checkbox"/> City of Poplar Bluff         | <input type="checkbox"/> Poplar Bluff R-I Schools |
| <input type="checkbox"/> City of Quin                 | <input type="checkbox"/> Twin Rivers R-X Schools  |
| <input type="checkbox"/> City of Fisk                 | <input type="checkbox"/> Neelyville R-IV Schools  |

2. The hazards addressed in the Multi-jurisdictional Hazard Mitigation Plan Update are listed below. Please indicate your opinion on the likelihood for each hazard to impact YOUR JURISDICTION (identified above). **Please rate EACH hazard 1 through 4 as follows: 1=Unlikely, 2=Occasional, 3=Likely, 4=Highly Likely**

- |                                       |   |   |
|---------------------------------------|---|---|
| <input type="checkbox"/> Dam Failure  | <input type="checkbox"/> Fires                      | <input type="checkbox"/> Winter Weather/Snow/Ice/Severe Cold    |
| <input type="checkbox"/> Drought      | <input type="checkbox"/> Flooding (Flash and River) | <input type="checkbox"/> Levee Failure                          |
| <input type="checkbox"/> Earthquakes  | <input type="checkbox"/> Land Subsidence/Sinkholes  | <input type="checkbox"/> Thunderstorm/High Winds/Lightning/Hail |
| <input type="checkbox"/> Extreme Heat | <input type="checkbox"/> Tornado                    |   |

3. Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). **Please rate EACH hazard 1 through 4 as follows: 1=Negligible, 2=Limited, 3=Critical, 4=Catastrophic**

- |                                       |   |   |
|---------------------------------------|---|---|
| <input type="checkbox"/> Dam Failure  | <input type="checkbox"/> Fires                      | <input type="checkbox"/> Winter Weather/Snow/Ice/Severe Cold    |
| <input type="checkbox"/> Drought      | <input type="checkbox"/> Flooding (Flash and River) | <input type="checkbox"/> Levee Failure                          |
| <input type="checkbox"/> Earthquakes  | <input type="checkbox"/> Land Subsidence/Sinkholes  | <input type="checkbox"/> Thunderstorm/High Winds/Lightning/Hail |
| <input type="checkbox"/> Extreme Heat | <input type="checkbox"/> Tornado                    |   |

4. FEMA Hazard Mitigation Assistance Grants are administered by the State Emergency Management Agency. Listed below are some types of projects considered.

**Please check all those that could benefit your jurisdiction, in your opinion:**

- |  |   |
|--|---|
| <input type="checkbox"/> Flood-prone Property Acquisition & Structure Demolition /Relocation                                   | <input type="checkbox"/> Retrofitting of Existing Buildings, and Facilities from Wind Damage. |
| <input type="checkbox"/> Flood-Prone Structure Elevation   | <input type="checkbox"/> New Tornado Safe Room Construction                                   |
| <input type="checkbox"/> Dry Floodproofing of Historical Residential Structures and/or Non-residential Structures              | <input type="checkbox"/> Electrical Utilities Infrastructure Retrofit                         |
| <input type="checkbox"/> Minor Localized Flood Reduction Projects (storm water management or localized flood control projects) | <input type="checkbox"/> Soil Erosion Stabilization   |
| <input type="checkbox"/> Structural Retrofitting of Existing Buildings to Add a Tornado Safe Room                              | <input type="checkbox"/> Wildfire Mitigation  |
|  | <input type="checkbox"/> Other (please specify)   |
- 

5. Please comment on any other issues that the Butler County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by hazard events.

**Return / Contact Information:** Matt Winters, Associate Director, Ozark Foothills Regional Planning Commission, phone: (573) 785-6402 fax (573) 785-6402, matt@ofrpc.org

Q1

[Export](#)

[Customize](#)

Please select your jurisdiction from the list. You may only select one for each survey completed.

- Answered: 99
- Skipped: 1
- Unincorporated
- Butler County
- City of Poplar
- Bluff
- City of
- Neelyville
- City of Qulin
- City of Fisk
- Poplar Bluff
- R-I Schools
- Twin Rivers
- R-x Schools
- Neelyville
- R-IV Schools

0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

ANSWER CHOICES	RESPONSES
----------------	-----------

Unincorporated Butler County	
------------------------------	--

City of Poplar Bluff	
----------------------	--

City of Neelyville	
--------------------	--

City of Qulin	
---------------	--

City of Fisk	
--------------	--

Poplar Bluff R-I Schools	
--------------------------	--

Twin Rivers R-x Schools	
-------------------------	--

Neelyville R-IV Schools	
-------------------------	--

TOTAL	
-------	--

Q2

Export

Customize

The hazards addressed in the Multi-Jurisdictional Hazard Mitigation Plan Update are listed below. Please indicate your opinion on the likelihood for each hazard.

Please rate EACH hazard 1 through 4 as follows:

1=Unlikely, 2=Occasional, 3=Likely, 4=Highly Likely

- Answered: 100
  - Skipped: 0
- Dam Failure Drought Earthquakes Extreme Heat Fires Flooding Sinkholes Tornado  
 Winter  
 Weather/Snow...  
 Levee Failure  
 Thunderstorm/Hi  
 gh...  
 012345678910

	UNLIKELY-	OCCASIONAL-	LIKELY-	HIGHLY LIKELY-	TOTAL
-					
- Dam Failure	33.33% 33	17.17% 17	35.35% 35	14.14% 14	99
- Drought	14.00% 14	46.00% 46	28.00% 28	12.00% 12	100
- Earthquakes	9.18% 9	36.73% 36	33.67% 33	20.41% 20	99
- Extreme Heat	4.00% 4	15.00% 15	51.00% 51	30.00% 30	100
- Fires	6.06% 6	39.39% 39	43.43% 43	11.11% 11	99
- Flooding	3.00% 3	13.00% 13	48.00% 48	36.00% 36	100
- Sinkholes	42.42% 42	31.31% 31	22.22% 22	4.04% 4	99
- Tornado	4.00% 4	22.00% 22	41.00% 41	33.00% 33	100
- Winter	2.00% 2	33.00% 33	47.00% 47	18.00% 18	100

## 2017 Butler County Hazard Mitigation Plan

	UNLIKELY-	OCCASIONAL-	LIKELY-	HIGHLY LIKELY-	TOTAL
Weather/Snow/Ice/Severe Cold					
Levee Failure	5.00% 5	17.00% 17	41.00% 41	37.00% 37	100
Thunderstorm/High Winds/Lightning/Hail	0.00% 0	8.08% 8	36.36% 36	55.56% 55	99

Q3

[Export](#)

[Customize](#)

Please indicate your opinion on the potential magnitude of each hazard's impact on your jurisdiction (identified above). Please rate EACH hazard 1 through 4 as follows:  
1=Negligible, 2=Limited, 3=Critical, 4=Catastrophic

- Answered: 100
  - Skipped: 0
- Dam Failure Drought Earthquakes Fires Flooding Sinkholes Tornado  
Winter  
Weather/Snow...  
Levee Failure  
Thunderstorm/Hi  
gh...  
012345678910

	NEGLIGIBLE-	LIMITED-	CRITICAL-	CATASTROPHIC-	TOTAL
Dam Failure	8.25% 8	27.84% 27	35.05% 34	28.87% 28	99
Drought	2.02% 2	50.51% 50	42.42% 42	5.05% 5	99
Earthquakes	3.03% 3	18.18% 18	39.39% 39	39.39% 39	99
Fires	2.00% 2	47.00% 47	36.00% 36	15.00% 15	100
Flooding	2.00% 2	13.00% 13	59.00% 59	26.00% 26	100
	27.55%	56.12%	13.27%	3.06%	

## 2017 Butler County Hazard Mitigation Plan

	NEGLIGIBLE-	LIMITED-	CRITICAL-	CATASTROPHIC-	TOTA
Sinkholes	27	55	13	3	9
Tornado	1.01% 1	17.17% 17	46.46% 46	35.35% 35	9
Winter Weather/Snow/Ice/Severe Cold	4.04% 4	42.42% 42	49.49% 49	4.04% 4	9
Levee Failure	5.05% 5	14.14% 14	56.57% 56	24.24% 24	9
Thunderstorm/High Winds/Lightning/Hail	3.00% 3	39.00% 39	52.00% 52	6.00% 6	10

Q4

[Export](#)

[Customize](#)

FEMA Hazard Mitigation Assistance Grants are administered by the State Emergency Management Agency. Listed below are some of the types of projects considered. Please check all those that could benefit your jurisdiction, in your opinion.

- Answered: 97
- Skipped: 3
- Flood-prone Property...
- Flood-Prone Structure...
- Dry Floodproofin...
- Minor Localized Fl...
- Structural Retrofitting...
- Retrofitting of Existing...
- New Tornado Safe Room...
- Electrical Utilities...
- Soil Erosion Stabilization
- Wildfire Management

Other (please specify)  
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

**ANSWER CHOICES**

- Flood-prone Property Acquisition & Structure Demolition/Relocation

- Flood-Prone Structure Elevation

- Dry Floodproofing of Historical Residential Structures and/or Non-residential Structures

- Minor Localized Flood Reduction Projects (storm water management or localized flood control projects)

- Structural Retrofitting of Existing Buildings to Add a Tornado Safe Room

- Retrofitting of Existing Buildings, and Facilities, from Wind Damage

- New Tornado Safe Room Construction

- Electrical Utilities Infrastructure Retrofit

- Soil Erosion Stabilization

- Wildfire Management

- [Responses](#)

Other (please specify)

Total Respondents: 97

Q5

Please comment on any other issues that Butler County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by natural hazard events.

- Answered: 10

- Skipped: 90  
[RESPONSES \(10\)](#) [TEXT ANALYSIS](#) [MY CATEGORIES](#)

D

## PAID FEATURE

Use text analysis to search and categorize responses; see frequently-used words and phrases. To use Text Analysis, upgrade to a paid plan .

**UPGRADE** [Learn more »](#)

?

S

[Categorize as...](#) [Filter by Category](#)

Showing 10 responses

Build the levees up where there is so much flooding. They keep failing and also fix the damn in Clearwater where it is failing. Also, something needs to be done to Hwy T where the road will not be washed out by the Wappapello damn again. This last flood was serious, too many homes and lives lost.

5/16/2017 9:08 AM [View respondent's answers](#)

Drought issues for farmers

5/16/2017 9:05 AM [View respondent's answers](#)

1982's flood was called a "100-year flood". Since then, we have had 15 out of 29 Historical Crests on the Black River, not including April/May 2016's flooding. A plan needs to be in place, so that the Poplar Bluff area does not flood every time we get a big rain. North Poplar Bluff should not have to rely on a levee breach/break on the south of Poplar Bluff so that those homes do not get destroyed or flooded as much. This flooding has occurred after all of the progress over the years (4 lane of 67, new businesses, etc.), so Poplar Bluff needs some kind of plan in place for everyone, so that families will not be displaced.

5/16/2017 9:04 AM [View respondent's answers](#)

Low income families and housing are typically what is effected by the flooding. These families do not typically own their housing and typically do not have renter's insurance or any other way to compensate for damages or lost items. Their protection from flooding and other natural disasters need to be the priority. Middle class and up typically have all insurances necessary to compensate for losses and damages. Thank you for your time and continued efforts to help the community!!

5/16/2017 9:01 AM

Some of our flooding issues are being caused by levees not being maintained "supposedly because they are owned by the state" and not covered somehow by Butler County and therefore are not being maintained. I believe because of the constant flooding issues we have been having since 2008, we should look at raising the height of our levees and make sure they are maintained well.

5/16/2017 8:50 AM [View respondent's answers](#)

All electrical services underground.

5/16/2017 8:44 AM [View respondent's answers](#)

Levee repairs throughout the county.

5/16/2017 8:32 AM [View respondent's answers](#)

none at this time

5/16/2017 8:30 AM [View respondent's answers](#)

We need to have the capability of having an interoperable water system (distribution lines) between the all county wide water systems in event of an emergency

5/15/2017 9:06 AM [View respondent's answers](#)

Better tornado tracking which would benefit advanced notification

4/29/2017 12:09 AM

# Appendix C

## ADOPTION RESOLUTIONS

RESOLUTION NO. 1867

**A RESOLUTION ADOPTING THE BUTLER COUNTY MULTI-JURISDICTIONAL LOCAL HAZARD MITIGATION PLAN**

**WHEREAS**, the City of Poplar Bluff recognizes the threat that natural hazards pose to people and property within our community, and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences, and

**WHEREAS**, the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards, and

**WHEREAS**, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments, and

**WHEREAS**, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs, and

**WHEREAS**, the City of Poplar Bluff fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan, and

**WHEREAS**, the City of Poplar Bluff desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan, and

**WHEREAS**, adoption by the governing body for the City of Poplar Bluff demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan, and

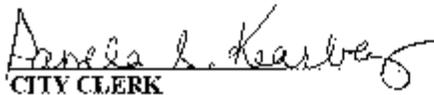
**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

**NOW, THEREFORE**, be it resolved, that the City of Poplar Bluff City Council adopts the "Butler County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan, and

**BE IT FURTHER RESOLVED**, the County of Butler will submit the updated plan along with this Adoptive Resolution to the Missouri State Emergency Management Agency and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

**PASSED BY THE CITY COUNCIL OF THE CITY OF POPLAR BLUFF, MISSOURI, THIS 4<sup>TH</sup> DAY OF DECEMBER, 2017.**

ATTEST:

  
CITY CLERK

APPROVED:

  
MAYOR

2017 Butler County Hazard Mitigation Plan - Resolution 1867 - Adoptive Resolution - December 4, 2017 - Page 11 of 11

**Resolution**

Resolution # 2017-14

**Adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan**

**Whereas**, the City of Quin recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas**, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

**Whereas**, the Disaster Mitigation Act makes available hazard mitigation grants to state and local governments; and

**Whereas**, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, the City of Quin fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, the City of Quin desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption by the governing body for the City of Quin demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**Now, therefore, be it resolved**, that the City of Quin City Council adopts the 'Butler County Multi-Jurisdictional Local Hazard Mitigation Plan' as an official plan; and

**Be it further resolved**, the County of Butler will submit the updated plan along with this Adoption Resolution to the Missouri State Emergency Management Agency and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

Date: 11/29/17

Certifying Official: [Signature]

**Resolution**

Resolution # 1-22-17

**Adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan**

**Whereas**, the County of Butler recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas**, the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

**Whereas**, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

**Whereas**, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, the County of Butler fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, the County of Butler desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption by the governing body for the County of Butler demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**Now, therefore, be it resolved**, that the Butler County Commission adopts the "Butler County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

**Be it further resolved**, the County of Butler will submit the updated plan along with this Adoption Resolution to the Missouri State Emergency Management Agency and Federal Emergency Management Agency Region VI officials to enable the plan's final approval.

Date: February 22, 2017

Certifying Official: [Signature]

**Resolution**

Resolution # \_\_\_\_\_

**Adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan**

**Whereas**, the Poplar Bluff R-I School District recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas**, the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

**Whereas**, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

**Whereas**, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, the Poplar Bluff R-I School District fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, the Poplar Bluff RI School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan; and

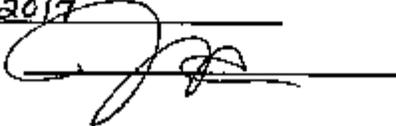
**Whereas**, adoption by the governing body for the Poplar Bluff R-I School District demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**Now, therefore, be it resolved**, that the Poplar Bluff R-I School District School Board adopts the "Butler County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

**Be it further resolved**, the County of Butler will submit the updated plan along with this Adoption Resolution to the Missouri State Emergency Management Agency and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

Date: 11-16-2017

Certifying Official: 

**Resolution**

Resolution # \_\_\_\_\_

**Adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan**

**Whereas**, the Three Rivers College recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas**, the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

**Whereas**, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

**Whereas**, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, the Three Rivers College fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

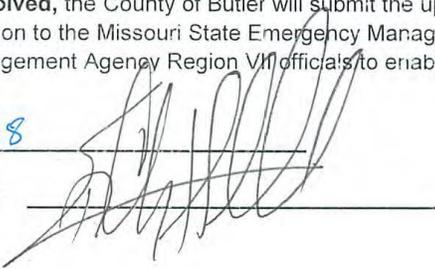
**Whereas**, the Three Rivers College desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption by the governing body for the Three Rivers College demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**Now, therefore, be it resolved**, that the Board of Education of Three Rivers College adopts the "Butler County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

**Be it further resolved**, the County of Butler will submit the updated plan along with this Adoption Resolution to the Missouri State Emergency Management Agency and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

Date: 11/17/18  
Certifying Official: 

**Resolution**

Resolution # \_\_\_\_\_

**Adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan**

**Whereas**, the Twin Rivers R-X School District recognizes the threat that natural hazards pose to people and property within our community; and

**Whereas**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**Whereas**, the U.S Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

**Whereas**, the Disaster Mitigation Act made available hazard mitigation grants to state and local governments; and

**Whereas**, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

**Whereas**, the Twin Rivers R-X School District fully participated in the hazard mitigation planning process to prepare this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, the Poplar Bluff RI School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Butler County Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption by the governing body for the Twin Rivers R-X School District demonstrates the jurisdictions' commitment to fulfilling the mitigation goals outlined in this Multi-Jurisdictional Local Hazard Mitigation Plan; and

**Whereas**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**Now, therefore, be it resolved**, that the Twin Rivers R-X School District School Board adopts the "Butler County Multi-Jurisdictional Local Hazard Mitigation Plan" as an official plan; and

**Be it further resolved**, the County of Butler will submit the updated plan along with this Adoption Resolution to the Missouri State Emergency Management Agency and Federal Emergency Management Agency Region VII officials to enable the plan's final approval.

Date: 12-18-17

Certifying Official: 