

Callaway County, MO

Natural Hazard Mitigation Plan

2017

Prepared by:

Mid-Missouri Regional Planning Commission

206 East Broadway

P.O. Box 140

Ashland, MO 65010

Phone: (573) 657-9779

Fax: (573) 657-2829

Plan updates available online at www.midmorpc.org



THIS PAGE INTENTIONALLY LEFT BLANK

Table of Contents

Executive Summary	1
Prerequisites	2
Section 1: Introduction and Planning Process	
1.1 Purpose	3
1.2 Background	4
1.3 History of the Cooper County Hazard Mitigation Plan	4
1.4 Participating Jurisdictions	6
1.5 The Update Process	8
Section 2: Planning Area Profile and Capabilities	
2.1 Geography and Ecology	15
2.2 Climate	22
2.3 History	24
2.4 Natural Hazard History	25
2.5 Demographics	28
2.6 Economy, Industry, and Employment	33
2.7 Transportation and Commuting Patterns	36
2.8 Communities - Inventory of Assets and Capabilities	41
Callaway County	42
Auxvasse	
Fulton	
Holts Summit	
Kingdom City	
Mokane	
New Bloomfield	
2.9 Special Districts - Inventory of Assets and Capabilities	62
School Districts	62
Fulton Public Schools	
New Bloomfield R-III School District	
North Callaway R-I School District	
South Callaway R-II School District	
Fire Protection Districts	67
Callaway Nuclear Power Plant/Energy Center	69
Water Districts	69
2.10 Policy, Planning, and Program Capabilities	74
Legal Authority and Political Willpower	77
Community and Regional Partnerships	78
Non-Governmental and Volunteer Organizations	78
Media	79
2.11 Development Trends	81

Section 3: Risk Assessment

Methodology	82
Identification of Hazards	82
Profiling Hazards	84
Vulnerability Assessment	85
3.1 Dam Failure	89
3.2 Drought	121
3.3 Earthquake	131
3.4 Extreme Heat	142
3.5 Flood	150
National Flood Insurance Program (NFIP)	177
NFIP Repetitive Losses Properties	179
3.6 Levee Failure	183
3.7 Severe Winter Weather	202
3.8 Wildfire	210
3.9 Windstorm and Hailstorm	216
Windstorm	217
Hailstorm	226
3.10 Tornado	234

Section 4: Mitigation Strategy

4.1 Hazard Mitigation Goals	244
4.2 Update of Mitigation Actions	245
4.3 Mitigation Goals and Actions	249
Mitigation Actions by Hazard and Jurisdiction	251
Mitigation Actions by Jurisdiction	257
Callaway County	257
Auxvasse	259
Fulton	260
Holts Summit	261
Kingdom City	262
Mokane	263
New Bloomfield	264
Callaway County PWSD#1	265
Callaway County PWSD#2	265
Fulton Public Schools	266
New Bloomfield R-III Schools District	267
North Callaway R-I Schools District	268
South Callaway R-II Schools District	269
Mitigation Actions Addressing Compliance with NFIP Requirements	270
4.4 Prioritization, Implementation, and Administration of Mitigation Actions	272
Prioritization of Actions using STAPLEE and Benefit/Cost Reviews	272
Implementation and Administration by Action	277
4.5 Funding Sources	393

Section 5: Plan Maintenance Process

5.1 Plan Monitoring and Evaluation	398
5.2 Plan Updating	400
5.3 Integration of Hazard Mitigation into Other Planning Mechanisms	402
5.4 Public Participation in Plan Maintenance	404

Appendices

Appendix A	Adoption Resolutions
Appendix B	Meeting Agenda Sample
Appendix C	Annex J of Missouri State Hazard Analysis: Nuclear Power Plants
Appendix D	Levee Consolidation Resolution for Cedar City and Capital View Drainage Districts 2009
Appendix E	Jurisdiction Assets

Executive Summary

The Callaway County Natural Hazard Mitigation Plan is a multi-jurisdictional plan prepared and written with the participation of Callaway County government and the following Callaway County communities and special districts: Auxvasse, Fulton, Holts Summit, Lake Mykee, New Bloomfield, Fulton Public Schools, New Bloomfield R-III School District, North Callaway R-I School District, South Callaway R-II School District, and Public Water Supply District #9.

The plan profiles eleven natural hazards (dam failure, drought, earthquake, extreme heat, flood, levee failure, severe winter weather, wildfire, windstorm, tornado, and hailstorm) which threaten lives and property in some, or all, of the participating jurisdictions. All hazards were evaluated with regard to previous occurrence, probability and severity of future occurrence, existing mitigation strategies, and the potential impact on each jurisdiction.

An overall mitigation strategy was developed through the consideration of potential threats, resources, and willpower available to mitigate their effects. The goals of this mitigation strategy are:

Goal 1: Mitigation Planning - Mitigate effects of future natural hazards through public and private cooperation.

Goal 2: Mitigation Policy - Develop policies that limit the impact of natural hazards on lives and property.

Goal 3: Mitigation Programs - Implement cost effective and feasible mitigation programs to protect lives and property.

Goal 4: Public Awareness - Increase public awareness of natural hazards.

Goal 5: Future Development - Promote hazard-proof development.

Specific mitigation actions have been developed and prioritized to further the goals of the overall mitigation strategy in each participating jurisdiction.

The Callaway County Natural Hazard Mitigation Plan will be formally adopted by each of the participating jurisdictions after a final draft is approved by FEMA. Participation in, and formal adoption of, the plan qualifies a jurisdiction to apply for Federal Emergency Management Agency (FEMA) pre-disaster mitigation grants and the mitigation portion of post-disaster mitigation grants.

The plan will be updated in five years, as required by FEMA. It will be evaluated and maintained on an annual basis prior to this update.

Prerequisites

Multi-Jurisdictional Plan Adoption

<i>Requirement §201.6(c)(5):</i>	<i>For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.</i>
--------------------------------------	---

Adoption resolutions for the participating jurisdictions are included in Appendix A.

Section 1: Introduction and Planning Process

1.1 Purpose

The Callaway County Hazard Mitigation Plan is designed as a resource for county and municipal governments, residents, developers, organizations, and others interested in controlling the potentially disastrous effects of natural hazards in Callaway County. Each year natural hazards take a great toll in the United States. Callaway County is not immune; it is subject to numerous natural hazards which can threaten life and property. A well-conceived mitigation strategy, developed through an inclusive and thoughtful planning process, is an important step in protecting citizens and reducing loss.

The Federal Emergency Management Agency (FEMA) defines mitigation as “sustained action taken to reduce or eliminate long-term risk to people and their property from hazards and their effects.” A 2006 study by the Institute for Building Science found that \$4 was saved in post-disaster response and recovery for every \$1 spent on pre-disaster mitigation.

The Callaway County Hazard Mitigation Plan was developed by the communities and citizens of Callaway County, their elected officials and public servants. The process was carried out by identifying the natural hazards that impact Callaway County and its residents, assessing the probability of occurrence and severity posed by each hazard, identifying the most vulnerable areas, and evaluating all possible mitigation actions which might be effective. Potential mitigation actions were assessed and prioritized based on the perceived need, probable outcome, potential for being executed, and benefit related to cost.

The plan was developed in accordance with FEMA’s Mitigation Planning regulations under Code of Federal Regulations (CFR), Title 44, Part 201.6, *Local Mitigation Plans*. Relevant requirements from CFR §201.6 are highlighted throughout the plan.

Multiple jurisdictions within Callaway County participated in the development of this plan. Having a current and approved hazard mitigation plan makes each of the participating jurisdictions eligible to apply for FEMA pre-disaster mitigation grants and the mitigation portion of post-disaster mitigation grants.

1.2 Background

Responding to and mitigating for natural disasters has been a subject of increasing focus for the federal government in the past decades.

The process for declaring Presidential Disasters was established with the passage of the Disaster Relief Act of 1974. In 1988, the Robert T. Stafford Disaster Relief and Emergency Assistance Act created the organizational framework through which funds and assistance would be provided after a Presidential Disaster Declaration; FEMA was designated to coordinate the relief efforts.

In 1993, FEMA created the Mitigation Directorate to oversee hazard mitigation. This established mitigation as the cornerstone of emergency management.

The Disaster Mitigation Act of 2000 further defined activities related to disaster relief and mitigation; one of its provisions encourages development of hazard mitigation measures, including land use and construction regulations.

1.3 History of the Callaway County Hazard Mitigation Plan

In November 2003, a “current and approved” hazard mitigation plan became a FEMA eligibility requirement for local jurisdictions applying for pre-disaster mitigation grants and the mitigation portion of post-disaster grant funds.

Due to this change in FEMA grant requirements, the Missouri State Emergency Management Agency (SEMA) contracted with the Missouri Council of Governments for the Regional Planning Commissions to direct hazard mitigation planning for interested counties within their respective regions. Callaway County, a member of the Mid-Missouri Regional Planning Commission (Mid-MO RPC), contracted with the Mid-MO RPC to facilitate the development of a hazard mitigation plan for the county.

A Project Steering Committee was formed to oversee the planning and writing of the original Callaway County Hazard Mitigation Plan in (2005). The original plan was approved by FEMA and adopted by the participating jurisdictions in February of 2006.

Maintenance of Hazard Mitigation Plan 2006- 2011

The Callaway County Hazard Mitigation Plan 2006 was written to be a working document to guide participating jurisdictions in the county in the work of mitigating potential hazards. To this effect, the plan has been publicly available on the website of the Mid-MO RPC (www.midmorpc.org) since it was approved and adopted in 2006.

During the ensuing years, the Mid-MO RPC has kept the jurisdictions informed of mitigation grant opportunities through letters, the RPC’s monthly newsletter (*The Current*), and announcements at meetings of the RPC.

16 of the mitigation actions decided upon in the original plan have been implemented or completed at this time. A table of these completed mitigation actions is included in Section 4 of this plan.

The maintenance plan in the original document called for an annual review of the plan by the Callaway County Hazard Mitigation Steering Committee, facilitated by the Mid-MO RPC. These annual reviews did not take place; lack of a defined time table for the reviews, shortage of time and personnel, and personnel changes all played a role in this omission.

This plan update lays out a clearly defined maintenance process with a timetable for review and concrete tools to be employed in the review. This process is found in Section 5 of the plan.

Maintenance of Hazard Mitigation Plan 2011-2016

The Callaway County Hazard Mitigation Plan (2011) succumbed to the same issues in regard to annual maintenance as the last update of the plan. Although an annual maintenance of the plan was not done, MMRPC notified the county when relevant grants were available for mitigation activities. The county worked toward accomplishing their mitigation actions and meeting goals throughout the previous five years; this is reflected in the completed or ongoing mitigation actions in Section 4.

It is the intention of the Mid-Missouri Regional Planning Commission in coordination with Callaway County to maintain annual updates of the hazard mitigation plan from 2017-2022.

1.4 Participating Jurisdictions

Requirement
§201.6(a)(3):

Multi-jurisdictional plans...may be accepted, as appropriate, as long as each jurisdiction has participated in the process....Statewide plans will not be accepted as multi-jurisdictional plans.

The Callaway County Hazard Mitigation Plan is a multi-jurisdictional plan. Planners from the Mid-MO RPC (Plan Author) developed the following criteria for a jurisdiction to qualify as a participating jurisdiction:

1. Submission of information regarding capabilities, vulnerable assets, and future development within the jurisdiction
2. Review of a draft of the plan and provision of feedback, if warranted
3. Review of mitigation actions suggested by the Technical Steering Committee for the jurisdiction; prioritization of actions deemed feasible for the jurisdiction based on benefit/cost and time/resources available for implementation and administration
4. Formal adoption of the plan by resolution

The participating jurisdictions in the original plan (2005) and those participating to any degree in the updated plan (2017) are shown in Figure 1.1.1. The chart also tracks the completion of the criteria for inclusion as a participating jurisdiction in the plan. The column on the far right of the chart in Figure 1.1.1 (“2017 Participating Jurisdictions”) indicates those jurisdictions which have completed the above requirements and are requesting approval of the plan prior to formal adoption.

Jefferson City

A portion of Jefferson City lies within Callaway County along the Missouri River. Jefferson City is already participating in the Cole County Hazard Mitigation Plan and, while not a participating jurisdiction in this plan, did provide information for the plan.

Jefferson City Public Schools

A portion of Jefferson City Public Schools also lies within Callaway County and serves the community of Holts Summit and part of unincorporated Callaway County. The school district is already participating in the Cole County Hazard Mitigation Plan.

The Cole County Hazard Mitigation Plan is available through the Mid-Missouri Regional Planning Commission and the Cole County/Jefferson City Emergency Management Agency. It was written in 2015/2016 and approved by FEMA in August 2016.

The term “planning area” is used in the plan to indicate, as a whole, all of the jurisdictions which participated in the planning process to any degree.

Figure 1.1.1

Multi-jurisdictional Plan Participants

2017 Participating Jurisdiction Criteria

Jurisdiction	2005 Participating Jurisdiction	2011 Planning Participation	Survey Completed	Review of Draft	Mitigation Actions	Formal Adoption	2017 Participating Jurisdiction
Callaway County	X	X	X	X	X	X	X
Auxvasse	X	X	X	X	X	X	X
Fulton	X	X	X	X	X		X
Holts Summit	X	X	X	X	X	X	X
Kingdom City	X		X	X	X	X	X
Lake Mykee	X	X					
Mokane	X		X	X	X	*	X
New Bloomfield	X	X	X	X	X		X
Fulton Public Schools		X	X	X	X	X	X
New Bloomfield R-III Schools		X	X	X	X	X	X
North Callaway R-I Schools		X	X	X	X	X	X
South Callaway R-II Schools		X	X	X	X	X	X
PWSD #1			X	X	X		X
PWSD #2			X	X	X		X
PWSD #9		X					

*During the update of this plan, Mokane’s government had unforeseen complications and is not in a functional capacity to pass nor provide a resolution.

1.5 The Update Process

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.

A Hazard Mitigation Plan must be updated and adopted by the participating jurisdictions every five years to be considered current. The update process for the current plan commenced in July of 2017; the update was directed by planners from Mid-MO RPC (Plan Author) as specified by contract with Callaway County.

Mid-MO RPC planners met and decided on the following general planning process for the update:

1. Initial update of technical data in charts and graphs (e.g. storm history events, population statistics, etc.) by Mid-MO RPC staff
2. Formation of a Technical Steering Committee to prepare preliminary draft of the update and provide input throughout the update process
3. Meetings with Technical Steering Committee to prepare update including decision on/prioritization of mitigation actions for the participating jurisdictions
4. Continuing work by Technical Steering Committee on update of the plan
5. Survey to officials of potentially participating jurisdictions regarding risks/vulnerabilities in the jurisdictions
6. Incorporation of survey information into update draft
7. Presentation of update draft to officials of participating jurisdictions, neighboring jurisdictions, the public, interested agencies, businesses, and non-profits
8. Feedback from participating jurisdictions on mitigation actions which they intend to pursue in their jurisdictions
9. Initial SEMA review of preliminary draft
10. Ongoing incorporation of feedback into update draft with continuing review by the Technical Steering Committee
11. Presentation of final draft for public comment before SEMA/FEMA final approval
12. Presentation of the approved plan for participating jurisdictions' approvals

Technical Steering Committee

The Technical Steering Committee was formed with the intention of having a diversity of members who would represent the interests of all participating jurisdictions. Planners from the Mid-MO RPC, which works with communities throughout Callaway County, initiated the formation of the committee and participated in the committee meetings.

The Technical Steering Committee was formed with representatives of Callaway County, city governments, school districts, and public water supply districts. All of the incorporated communities had direct representation on the committee.

The Technical Steering Committee consisted of the following individuals:

Callaway County	Michelle Kidwell Gary Jungerman	Callaway County EMA Director Callaway County Commissioner
Auxvasse	Michael Bertschinger	City Administrator
Fulton	Leroy Benton	Fulton Mayor
Kingdom City	Curt Warfield	City Manager
Holts Summit	Rick Hess	City Administrator
Mokane	Peggy Nalls	Mayor
New Bloomfield	Mike Rieken	City Administrator
Callaway Co. PWSD #1	Brad Scrivner	District Director/Supervisor
Callaway Co. PWSD #2	Randal Crocker	District Director/Supervisor
Fulton Public Schools	Jacque Cowherd	Superintendent
New Bloomfield Schools	Sarah Wisdom	Superintendent
North Callaway Schools	Bryan Thomsen	Superintendent
South Callaway Schools	Kevin Hillman	Superintendent

In addition, personnel from Callaway County attended meetings, as needed, to contribute local expertise.

Other key participants in the area contributed to the planning process. The information received from these participants was invaluable to the update of the Callaway County Natural Hazard Mitigation Plan. These participants include:

- Callaway County Fire Protection District
- New Bloomfield Fire Protection District
- North Callaway Fire Protection District
- Central Callaway Fire Protection District
- South Callaway Fire Protection District
- Auxvasse Fire Department
- Fulton Fire Department
- Holts Summit Fire Department
- Callaway Ambulance District

Technical Steering Committee Meetings

Regular meetings of the Technical Steering Committee were held from July to October 2017. A brief summary of each meeting is shown in Figure 1.1.2.

Figure 1.1.2		
Technical Steering Committee Meetings		
Meeting	Agenda	Meeting Date
Meeting No. 1	This meeting was the initial meeting for the plan update. The group was given a presentation by Mid-MO RPC Staff about the update process. The group discussed possible changes to goals, objectives, and actions and the process for prioritization.	August 8, 2017
Meeting No. 2	Review and editing of mitigation actions pertaining to Severe Winter Weather, Tornado, Hailstorm, and Windstorm. Probability and Severity for each hazard was assessed by guidance from the State Hazard Mitigation Plan. Mitigation actions from 2012 were discussed.	August 29, 2017
Meeting No. 3	Review and editing of mitigation actions pertaining to Severe winter weather, extreme temperatures, earthquake, sinkholes, and drought. Probability and Severity for each hazard was assessed by guidance from the State Hazard Mitigation Plan. Mitigation actions from 2012 were discussed.	September 12, 2017
Meeting No.4	Review and editing of mitigation actions pertaining to Flood, Dam Failure, and manmade hazards. Committee rated actions using the STAPLEE prioritization method and Benefit/Cost. Probability and Severity was assessed by guidance from the State Hazard Mitigation. Levee Failure was discussed but deferred for a meeting with levee district representatives.	September 28, 2017
Educators Meeting	School districts were invited to a special meeting to review their options in regard to participation in the planning process. Representatives created, evaluated, and prioritized new actions for the forthcoming plan.	August 30, 2017
Fire Chiefs Meeting	This was during their monthly meeting. They reviewed mitigation actions, information about fire departments, and what they believe is of importance in the plan. Wildfire was discussed in detail and issues they perceive with the hazard.	September 13, 2017

Summary of Update of the Plan

The Technical Steering Committee decided that each section of the original plan needed to be updated. The original plan was written early in FEMA's interpretation of the requirements for Hazard Mitigation Plans. The current guidance, *Local Multi-Hazard Mitigation Planning Guidance*, was published in July 2008. A restructuring of the plan seemed appropriate to fulfill the current interpretation of FEMA requirements in a clear and cohesive manner.

The Technical Steering committee also changed the name of the plan to be in accordance with other county documents and plans.

Given the structural changes, the updated plan's organization is:

- Table of Contents**
- Executive Summary**
- Prerequisites**
- Section 1: Introduction and Planning Process**
- Section 2: Planning Area Profile and Capabilities**
- Section 3: Risk Assessment**
- Section 4: Mitigation Strategy**
- Section 5: Plan Maintenance Process**
- Appendices**

The plan was also restructured from its original organization to promote readability and flow. A general description of changes and updates made to the plan are shown in Figure 1.1.3.

Figure 1.1.3		
General Review and Update of Plan by Section		
Description	Revised	Pages (Original Plan)
<p>Section 1: Introduction Moved some material from Section 1 to more appropriate sections in the plan. Added some material and reorganized according to the following subsections: Purpose, Background, History of the Callaway County Natural Hazard Mitigation Plan, Participating Jurisdictions, and The Update Process. Material on Plan Monitoring was moved to a new Section in updated plan (Section 5: Plan Maintenance Process).</p>	Yes	5-15
<p>Section 2: Community Profile Removed and updated community profiles. Updated all charts and graphs to reflect more recent data. Historic properties and the NFIP information were moved to Section 3. Subsection titles were changed and some were merged and/or eliminated.</p>	Yes	16-36
<p>Section 3: Risk Assessment Reviewed all charts and graphs and updated with current information, as necessary; edited text to reflect new information; changed rating system of each natural hazard to "Measure of Probability and Severity" using the same rating system as in the Missouri State Hazard Mitigation Plan 2010. Reorganized hazard profiles and made specific changes to each hazard profile to make the plan a more relevant and useful document. Removed all vulnerability assessment charts to update data and reformat per FEMA guidelines.</p>	Yes	37-118
<p>Section 4: Mitigation Goals and Strategies Updated the Mitigation Goals, Objectives, and Actions to reflect decisions made by the Technical Steering Committee and participating jurisdictions; added documentation of changes to Mitigation Actions; added mitigation action matrix for each participating jurisdiction.</p>	Yes	132-146
<p>Appendices Replaced appendices with appropriate ones for update.</p>	Yes	156-181

Requirement §201.6(b):	<i>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;</i>
Requirement §201.6(b):	<i>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;</i>

Public Meetings for Comment and Input

Two meetings were held for public comment and input on the update of this plan. The first meeting was held during the drafting stage and the second prior to the plan being submitted for approval by FEMA. Public notice was given for the meetings in accordance with Missouri’s “Sunshine Law” (Revised Statutes of Missouri 610.010, 610.020, 610.023, and 610.024.) The meetings were also announced through various media outlets.

The meetings listed on page 12 of this section were open to the public and posted at the Mid-Missouri Regional Planning Office and online. The public was invited to attend and provide input and discussion at these meetings. Presentations were given on the plan itself, with information on where to read a copy of the draft and how to contact the Mid-MO RPC planners.

- Announcements were sent to all participating jurisdictions to distribute and post in their respective communities and departments including:
 - Callaway Emergency Management
 - Callaway County Commission
 - Callaway County Public Health Department
 - Callaway County Road and Bridge Department
 - Fulton Public Schools
 - New Bloomfield R-III School District
 - North Callaway R-I School District
 - South Callaway R-II School District
 - City of Auxvasse
 - City of Fulton
 - City of Holts Summit
 - City of Kingdom City
 - Town of Lake Mykee
 - Village of Mokane
 - City of New Bloomfield
 - Boone County Public Water Supply District No. 9
 - Callaway County Public Water Supply District No. 1

- Callaway Public Water Supply District No. 2

Requirement
§201.6(b):

***In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
(3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.***

Many existing plans, studies, and reports were consulted in the development of this plan. These include:

- Missouri State Hazard Mitigation Plan (2013), State Emergency Management Agency (SEMA)
- Callaway County Emergency Operations Plan
- Annex J of the Missouri State Hazard Analysis
- SEMA Situation Reports (<http://sema.dps.mo.gov/SitReps/Situation%20Reports.htm>)
- Comprehensive Economic Development Strategy for the Mid-MO Region (2009)
- Long Range Transportation Plan (LRTP), Missouri Department of Transportation
- Regional Transportation Plan (2013), Mid-MO Regional Planning Commission
- Atlas of Missouri Ecoregions, Missouri Department of Conservation
- Missouri Drought Plan (2002), Missouri Department of Natural Resources
- The Drought of 2012, State of Missouri
- Missouri Spatial Data Information Service
- FEMA Flood Map Service Center, Federal Emergency Management Agency
- US Army Corps of Engineers National Levee Database (NLD)

Section 2: Planning Area Profile and Capabilities

2.1 Geography and Ecology

Callaway County is located in central Missouri with an area covering 847 square miles. It is approximately midway between Kansas City to the west and St. Louis to the east.

The county is bordered on the south by the Missouri River, which separates it from Cole and Osage counties, on the west by Cedar Creek which separates it from Boone County, on the east by Montgomery County, and on the north by Audrain County.

The county is located on the border of two Ecoregions, the northern border of the Ozark Highlands and southern border of the Central Dissected Till Plains. The *Atlas of Missouri Ecoregions*, published by the Missouri Department of Conservation, describes these Ecoregions as:

Ozark Highlands

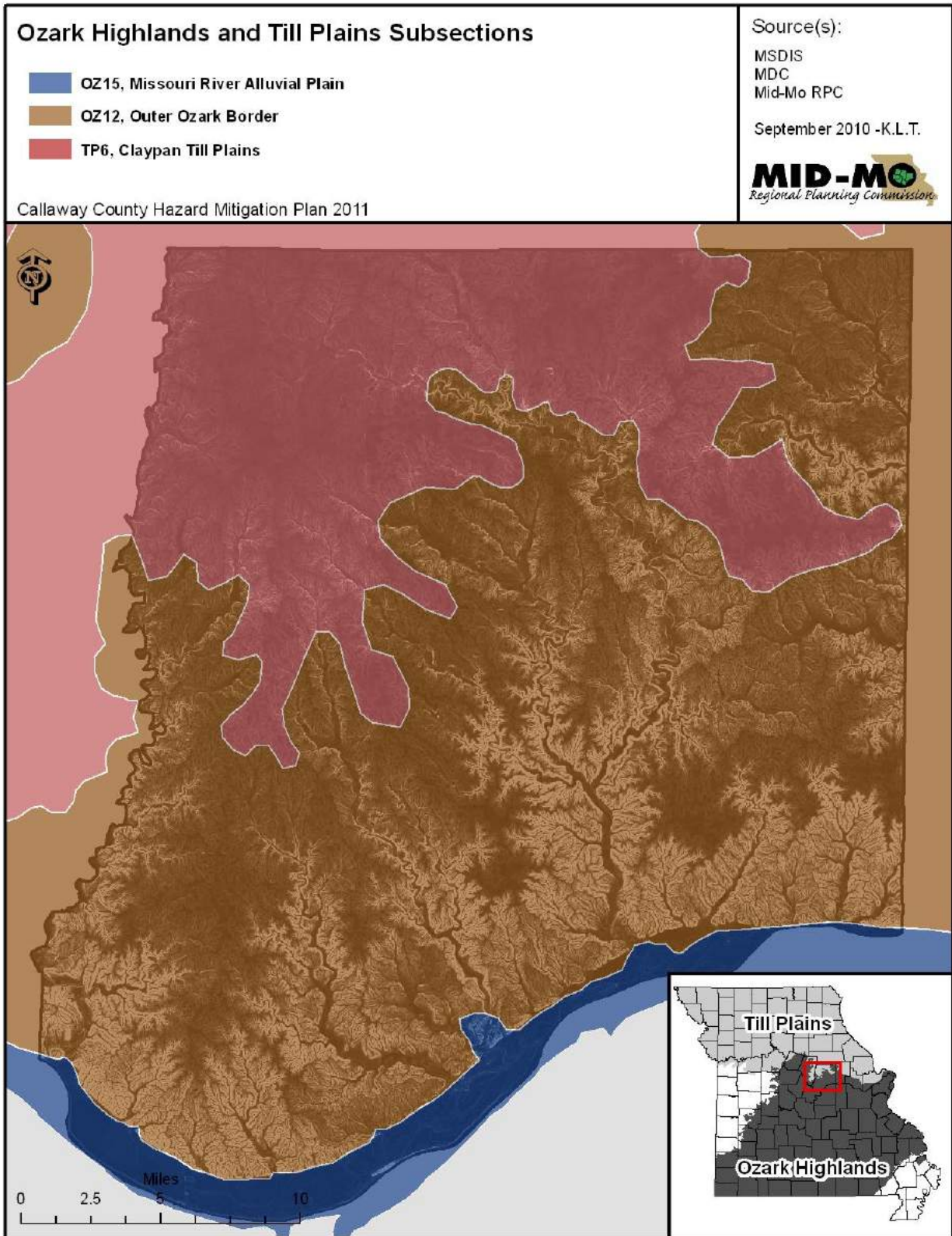
“...a distinctive biogeographic region that includes most of southern Missouri and much of northern Arkansas and small parts of Illinois, Oklahoma, and Kansas. Geologically, the Ozark Highlands is a low structural dome of essentially horizontally bedded strata that has been undergoing erosion and weathering for a quarter billion years into a thoroughly dissected plateau.”

Central Dissected Till Plains

“...characterized by moderately dissected glaciated plains that slope regionally toward the Missouri and Mississippi Rivers. The section covers almost all of Missouri north of the Missouri River and extends into southern Iowa and portions of Kansas, Nebraska, and Illinois. In Missouri, the ecoregion is blanketed with Pleistocene loess over glacial till that varies in thickness from complete absence in peripheral regions to over three hundred feet thick in northern Missouri.”

The land area of Callaway County falls into two different subsections of the Ozark Highlands and one subsection of the Central Dissected Till Plains. These subsections are distinguished by differing landforms, soils, and vegetation (see Figure 2.1.1). In turn, these subsections give rise to differences in land use patterns, conservation needs, and vulnerability to certain natural hazards.

Figure 2.1.1



The following information summarized from the *Atlas of Missouri Ecoregions* gives brief descriptions of the three subsections found within the two Ecoregions in Callaway County.

Missouri River Alluvial Plain

This subsection, consisting of the Missouri River channel and its adjoining alluvial plain, is found along the northern border of the county. Soils are deep and loamy and the area is subject to riverine flooding. Historically, the vegetation was typical bottomland species such as cottonwood, willow, sycamore, silver maple, elm, and hackberry.

Outer Ozark Border

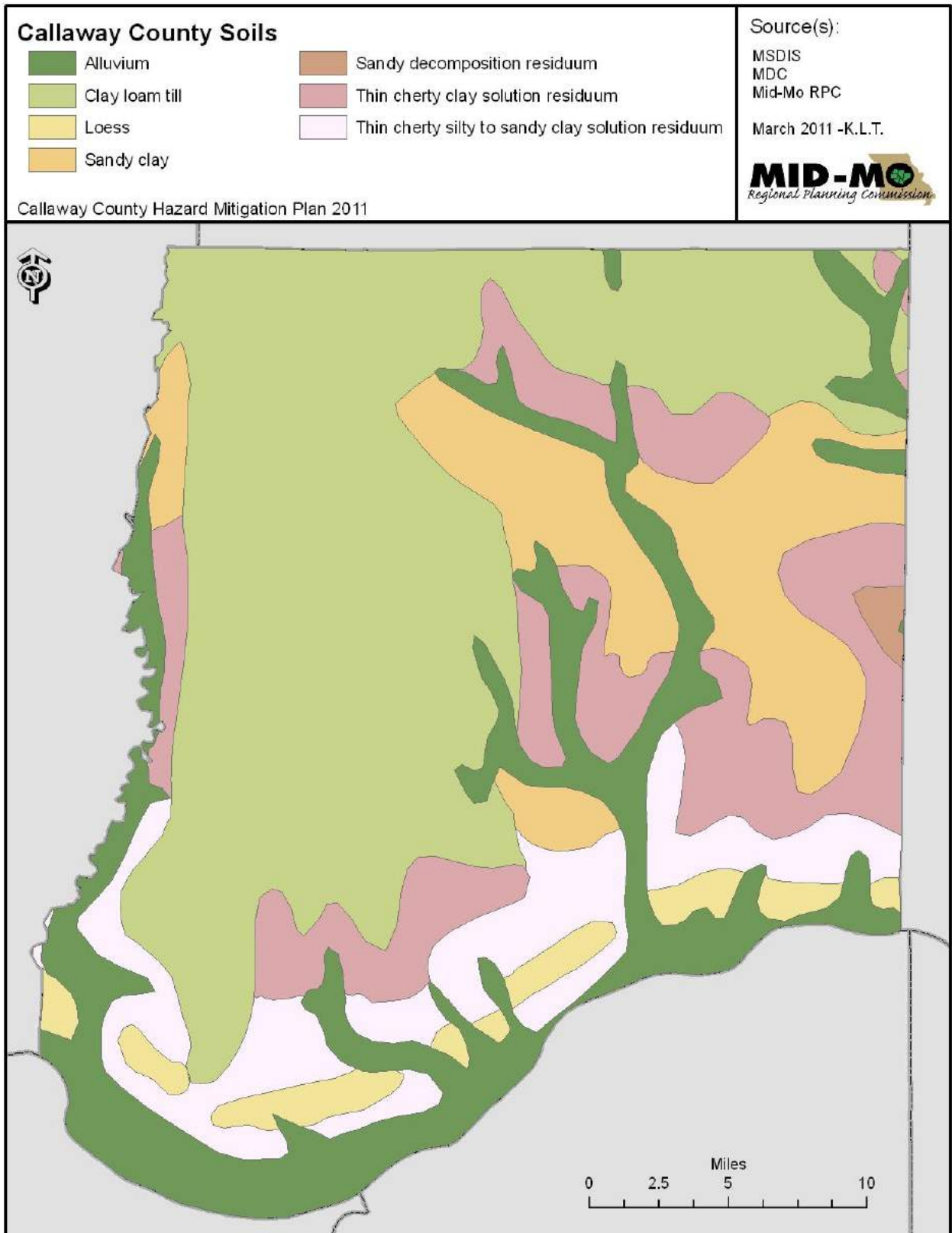
This subsection includes most of the northern and western parts of the county. This area has steep loess-covered hills and bluffs along the Missouri River. The underlying strata are limestone and dolomite. This area is the most rugged bluffland on the southern side of the Missouri River west of the Osage River. Prior to European settlement, oak savanna and woodlands dominated the higher areas and dense oak and mixed-hardwoods were found in the steep-sided limestone ravines. Currently, the uplands are primarily fescue pasture and the ravines are second-growth forests and cedar thickets.

Claypan Till Plain

This subsection includes well-developed claypan soils on a flat glacial till plain. Postglacial stream erosion has made little progress in this subsection, and most of the surface is flat or gently rolling with local relief less than 100 feet. Bedrock exposures are rare. Most of the subsection was formerly prairie, with narrow belts of timber along stream courses. Most of the subsection is now farmland, of which a very large percentage is in cropland.

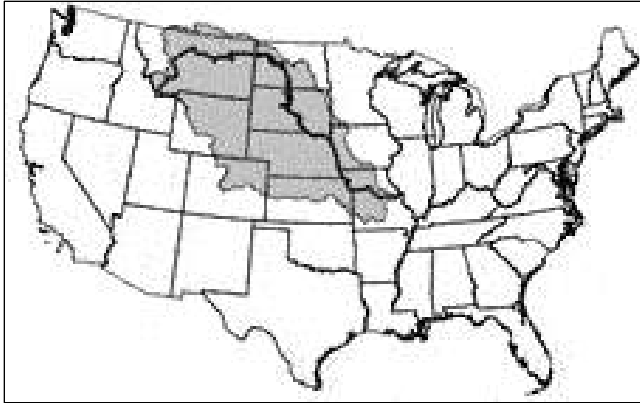
In addition to the two Ecoregions that divide Callaway County, there are also several soil types. Figure 2.1.2 shows a general overview of soil types in the county. Soil types and geology are important to note because they can directly affect land use patterns the impacts of certain hazards such as earthquakes or land subsidence.

Figure 2.1.2



The Missouri River

Figure 2.1.3 Missouri River basin



Source: US Geological Survey

The Missouri River and its relationship to Callaway County deserve special attention. The Missouri River is the longest river in the nation; it measures 2,341 miles long, according to the U.S. Geological Survey. The Missouri River Basin is the second largest watershed in the U.S. and touches nine states and a small portion of Canada (see Figure 2.1.3). It is the defining physical feature in Mid-Missouri and forms the southern border of Callaway County. The river drains approximately one sixth of the United States and is only a few hundred miles from its confluence with the Mississippi River at St. Louis when it flows through mid-Missouri. The location of population centers and agricultural land close to the river in Callaway County has meant significant flooding damage in the county in the recent past (see Section 2.4).

In both 1994 and 1995 the Missouri River was listed as one of the “10 Most Endangered Rivers in the Country” by American Rivers, a river conservation group (<http://www.americanrivers.org/>). This “Most Endangered” list does not reflect the rivers in the worst condition; rather, it seeks to highlight rivers “confronted by decisions in the coming year that could determine their future.” The Missouri River was chosen for the list in the mid-1990s because of dam, channelization, navigation, and agricultural runoff issues.

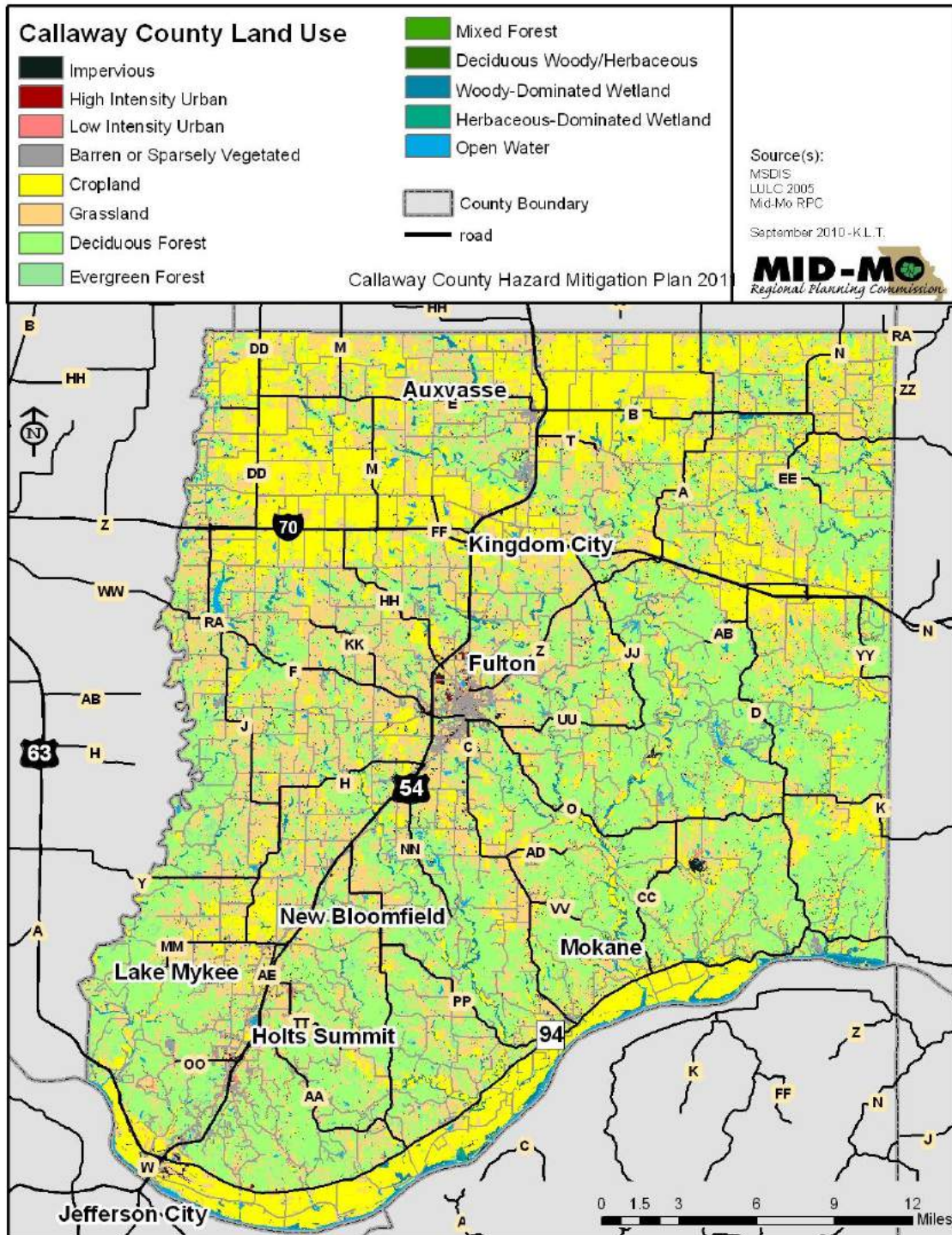
Flood control structures, power plants, and other engineering projects have profoundly changed the course of the river since Lewis and Clark first traversed it in the early 1800s. In recent years debates over the future of the Missouri River have taken place among the seven states through which it runs. Commercial river traffic, recreational use, environmental concerns, managing river levels to comply with the needs of endangered species, and the preservation of sacred and historical sites along the river and floodplain are all issues which make the management of the river a sensitive balancing act.

The State of Missouri, located at the mouth of the river, feels the impact of river management decisions further upstream. Likewise, Callaway County feels the impact of whatever decisions are made by the U.S. Army Corps of Engineers, the overseer of the river, concerning the river.

Current Land Use

Current land use in Callaway County is shown in Figure 2.1.4.

Figure 2.1.4



Public Land

There is more than 83,912 acres of public land in the planning area. These areas are owned and managed by state and federal agencies (see Figure 2.1.5). Mark Twain National Forest constitutes 15% of public land, while the Reform Conservation Area and Whetstone Conservation Area constitute 8.4% and 6% respectively.

Figure 2.1.5		
State or Federal Public Land		
Name	Responsible Agency	Acres
Mark Twain National Forest	United States Forest Service	12,789
Reform Conservation Area	Missouri Department of Conservation	7,044
Whetstone Conservation Area	Missouri Department of Conservation	5,147
Tucker Prairie	University of Missouri/Missouri Department of Conservation	144
Prairie Fork Conservation Area	Missouri Department of Conservation	711
Little Dixie Lake Conservation Area	Missouri Department of Conservation	733
Mokane Access	Missouri Department of Conservation	10
Capitol View Access	Missouri Department of Conservation	13
Earthquake Hollow Conservation Area	Missouri Department of Conservation	87
Tate Island CA	Missouri Department of Conservation	422
University of MO (McCredie Farm Lake)	University of Missouri/Missouri Department of Conservation	~11
Moore's Mill Access	Missouri Department of Conservation	101
Katy Trail State Park (Callaway County Section)	Missouri Department of Natural Resources	~ 35 Miles
Source: Missouri Department of Conservation (MDC), Missouri Spatial Data Server(MSDIS)		

2.2 Climate

Callaway County, like the rest of the state of Missouri, has variable weather patterns and temperature extremes. With its central continental location, Missouri receives air masses bringing weather from all directions.

Warm humid air from the Gulf of Mexico can bring moisture year round and is the principal source of precipitation in the spring, summer, and fall; in contrast, air from other directions may be hot and dry (southwest), warm and dry (west), cold (northwest and north), cool and moist (northeast). The flow from the different source regions typically changes in a matter of days, giving rise to the commonly heard expression in Missouri, “If you don’t like the weather, wait a day.”

At times, the flow of air from one of the source regions will settle in and persist for weeks or months. These periods are associated with particular upper air flow patterns and associated surface conditions.

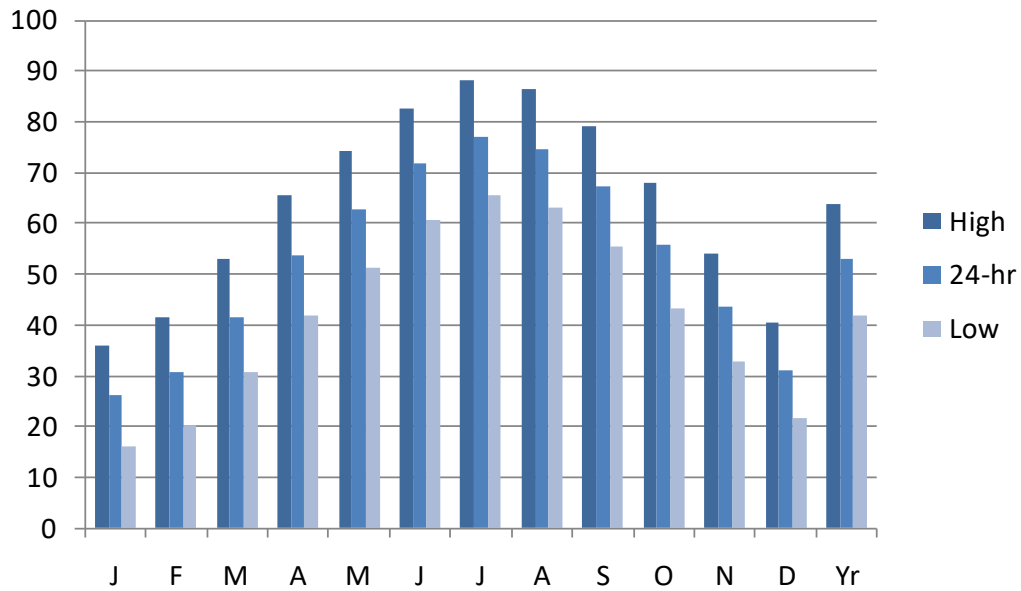
The Missouri State Hazard Mitigation Plan quotes Dr. Grant Darkow of the University of Missouri - Department of Atmospheric Science on the importance of understanding these weather patterns:

“The persistence of these weather patterns and the possible resulting condition is the subject of several of the natural disasters discussed in this study. Specifically, floods, droughts, fires, heat waves, severe cold, and winter storms can be the result of the persistence of one of these weather patterns, whereas tornadoes can represent the outgrowth of rapid shifts in weather patterns. Knowing these patterns may assist in alerting disaster planners and the general public to the possibility of a developing emergency situation.”

While Callaway County does have extreme variations in weather at times, there is a relative pattern of temperature and rainfall consistent with a humid continental climate (see Figures 2.2.1 and 2.2.2). The data shown in the charts was collected at the Fulton weather station in the years 1961-1990. The rainfall data showed an average of 38.6” of rainfall per year; average rainfall in this data set is defined as including precipitation of any form.

Fig. 2.2.1

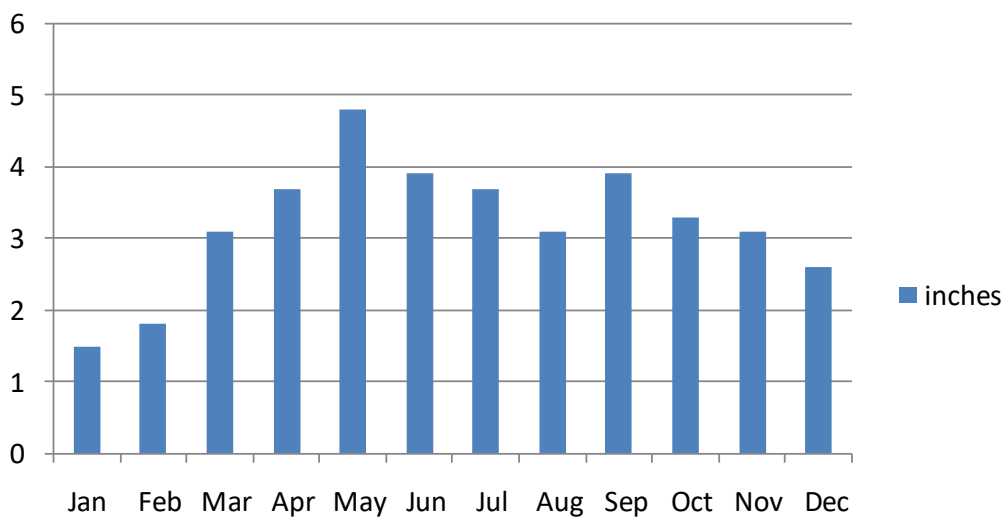
Average Temperature in Callaway County F, 1961-1990



Source: <http://www.worldclimate.com/cgi-bin/grid.pl?gr=N38W091>

Fig. 2.2.2

Average Rainfall in Callaway County, 1961-1990



Source: <http://www.worldclimate.com/cgi-bin/data.pl?ref=N38W091+2300+233079C>

2.3 History

Callaway County, along with much of the surrounding area, has a rich history that has been well documented and researched. Before the influx of settlers, the Callaway County region was home to a handful of Native American groups including the Sac and Fox, although early accounts of the region state that the land was nearly void of Native American settlements. In recent years this has been proven incorrect. Currently, there are two archaeological sites in Callaway County that have shed new light on the region's earliest inhabitants.

The City of Fulton maintains a history section on their website and the following was taken from that site:

“The first European settlement in what would become Callaway County was in 1808 at Cote Sans Dessein, along the Missouri River. At this time the area was part of Louisiana Territory, which the United States had purchased from France in 1803. Cote Sans Dessein was originally chosen as the site of Missouri's permanent state capital, but after questions regarding title to the land were raised, the location was moved to Jefferson City.

Callaway County was created in 1820 out of a section of Montgomery County and named after Captain James Callaway. The town of Elizabeth, located on Ham's Prairie, became the county seat. In June 1825, George Nichols founded what would eventually become the City of Fulton. Originally named Volney, after French author Count Constantin Volney, many in the community were unhappy with the name as the man's beliefs were much different than those living in the town. So two months later, the town's name was changed to Fulton, named after Robert Fulton, the inventor of the first commercial successful steamboat.”

2.4 Natural Hazard History

Callaway County has been subject to many natural hazards in the past. Floods, droughts, windstorms, hail, tornadoes, severe winter weather, and extreme heat have all taken their tolls; dam failure has threatened. A brief overview of the more recent natural hazard events in the county will be discussed here; more extensive history will be given with each Hazard Profile in Section 3 of the plan.

Probably the most prominent natural hazard within memory is the **Flood of 1993** (see Figure 2.4.1). This flood was devastating to much of Missouri and the Midwest; it took a great toll in Callaway County. According to data from the U.S. Corps of Engineers (<http://el.erdc.usace.army.mil/flood/fl93home.html>), there was extensive damage in varying amounts in the following sectors:

- Agricultural property \$10 million to \$50 million
- Commercial Properties More than \$10 million
- Transportation More than \$5 million
- Residential properties \$1 million to \$5 million
- Public Facilities \$500,000 to \$1 million
- Utilities \$100,000 to \$500,000
- Emergency Expenses \$100,000 to \$500,000

Estimates of the per capita costs of this flood for three sectors in the Mid-Missouri Region are shown in Figure 2.4.2. It is important to note that this chart reflects *per capita cost* and that Callaway County has the third largest population in the region.

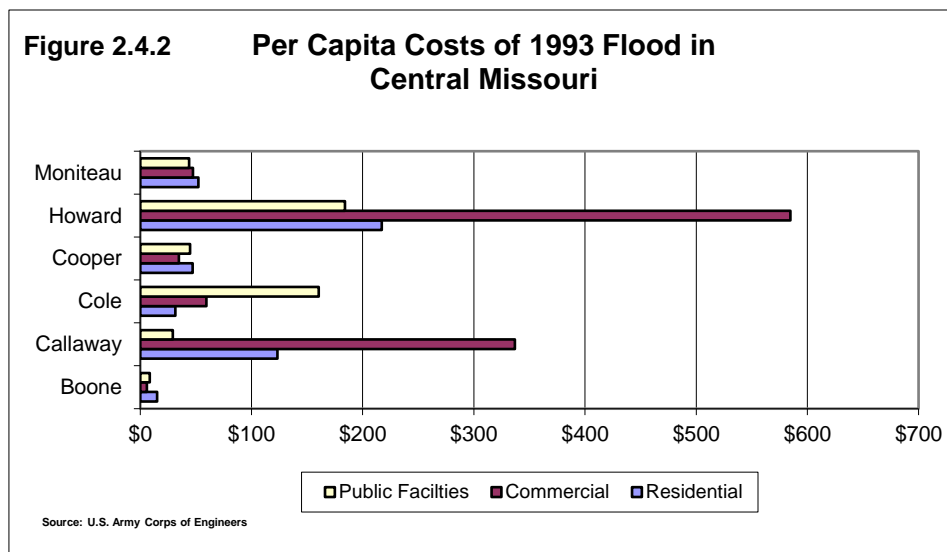


Figure 2.4.1 View of Missouri River Bridge in Jefferson City from Callaway County, 1993



Aerial view of the Missouri River flooding on July 30, 1993, at U.S. Highway 54 just north of Jefferson City, Missouri, looking south (photograph from the Missouri Highway and Transportation Department).

The devastating flood of 1993 was followed by floods in 1994, 1995, and most recently in 2016 (Federal Emergency Declaration #3374). Callaway County was included in Presidential Disaster Declarations for flooding 1993-1995.

Although the county does not experience severe flooding every year, thunderstorms can be expected annually. In most years there are reports of associated high winds (**windstorms**) and **hails** someplace in the county. The most recent windstorm was in July 2016, damaging trees, power lines, poles, and houses, but luckily no one was injured¹. The thunderstorm winds in 2007 caused \$500,000 in property damage five miles east of Kingdom City in the unincorporated community of Calwood (NOAA Storm Database). Severe hail mixed with tornado was a problem in July 2008².

Less frequently, thunderstorms will spawn **tornadoes** in the area. Callaway County experienced 37 tornadoes between 1950 and 2016 resulting in \$867,750 in property damage (NOAA Storm Database). There were five injuries and one death from these tornadoes (NOAA Storm Database), which makes this an ever present concern.

¹ <http://www.komu.com/news/tornado-thunderstorm-leave-trail-of-damage-in-mid-missouri>

² https://www.weather.gov/lxx/callaway_tor

Severe winter weather can be expected in Callaway County almost every year. The county has been included in five Presidential Disaster Declarations for severe winter weather from 2006 to 2016. In 1995, a 24-hour snow fall record was set in the City of Columbia, in nearby Boone County with 19.7 inches, causing the shutdown of Interstate 70 across the northern portion of Callaway County and killing at least five people³. A winter storm in December 2006 caused widespread power outages leaving 300,000 people without power for up to a week and resulting in \$169,000 in property damage (NOAA Storm Database).

On the other end of the temperature spectrum, periods of **extreme heat** also commonly occur in the county. **Drought** is an ever present possibility; several surrounding counties experiences significant crop and livestock losses during the last major drought in 2012 summer to fall (NOAA Storm Database).

³ <http://archive.showmenews.com/2001/Centennial/20010912Cent011.asp>

2.5 Demographics

The county’s population is the densest in Fulton with more than a quarter of the county’s citizens residing there.

Callaway County saw a small population growth between 2010 and 2015 (slower than the state). The county falls slightly lower than the state percentage of people below the poverty line and has a slightly lower median household income compared to the state. Compared to statistics for the State of Missouri, Callaway County has a little bit lower percentage of seniors and high school graduates, and a much lower percentage of persons with a college degree. The disability rate within Callaway County exceeds the state’s one percent disability rate and the mean travel time to work is similar to the statewide average of time spent commuting.

Key demographics for Callaway County and the State of Missouri are shown in Figure 2.5.1.

Figure 2.5.1		
Selected Demographic Statistics		
	Callaway County	Missouri
Total population	44,566	6,045,448
Estimated population change (2010 to 2015)*	1.1%	1.6%
Percentage of population 65 years and older	13.9%	15.0%
High school graduate or higher (age 25+)	85.7%	88.4%
Bachelor’s degree or higher (age 25+)	20.4%	27.1%
Percent of noninstitutionalized population with a disability	15.3%	14.3%
Mean travel time to work (min.)	22.4	23.2
Median household income in the past 12 months	\$47,744	\$48,173
Percentage of people below poverty level	14.4%	15.6%
Sources: Data are from U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates unless marked * *U.S. Census Bureau, Population Division		

A small portion of Jefferson City is located in Callaway County separated from Cole County by the Missouri River. Key Jefferson City infrastructure located in Callaway County includes the airport and water treatment facility. The Callaway County section of Jefferson City is included in the 2017 Cole County Hazard Mitigation Plan.

Racial/Ethnic Demographics

Callaway County has been and is currently a predominantly white non-Hispanic community. White non-Hispanics comprise 90.4% of the population as estimated by the 2011-2015 American Community Survey of the U.S. Census Bureau. This compares to a statewide percentage of 80.2% and a nationwide percentage of 62.3% (2011-2015 ACS).

The next largest group in Callaway County is black/African American non-Hispanics at 3.7% of the population. This compares to a statewide percentage of 11.4% and a nationwide percentage of 12.3% (2011-2015 ACS).

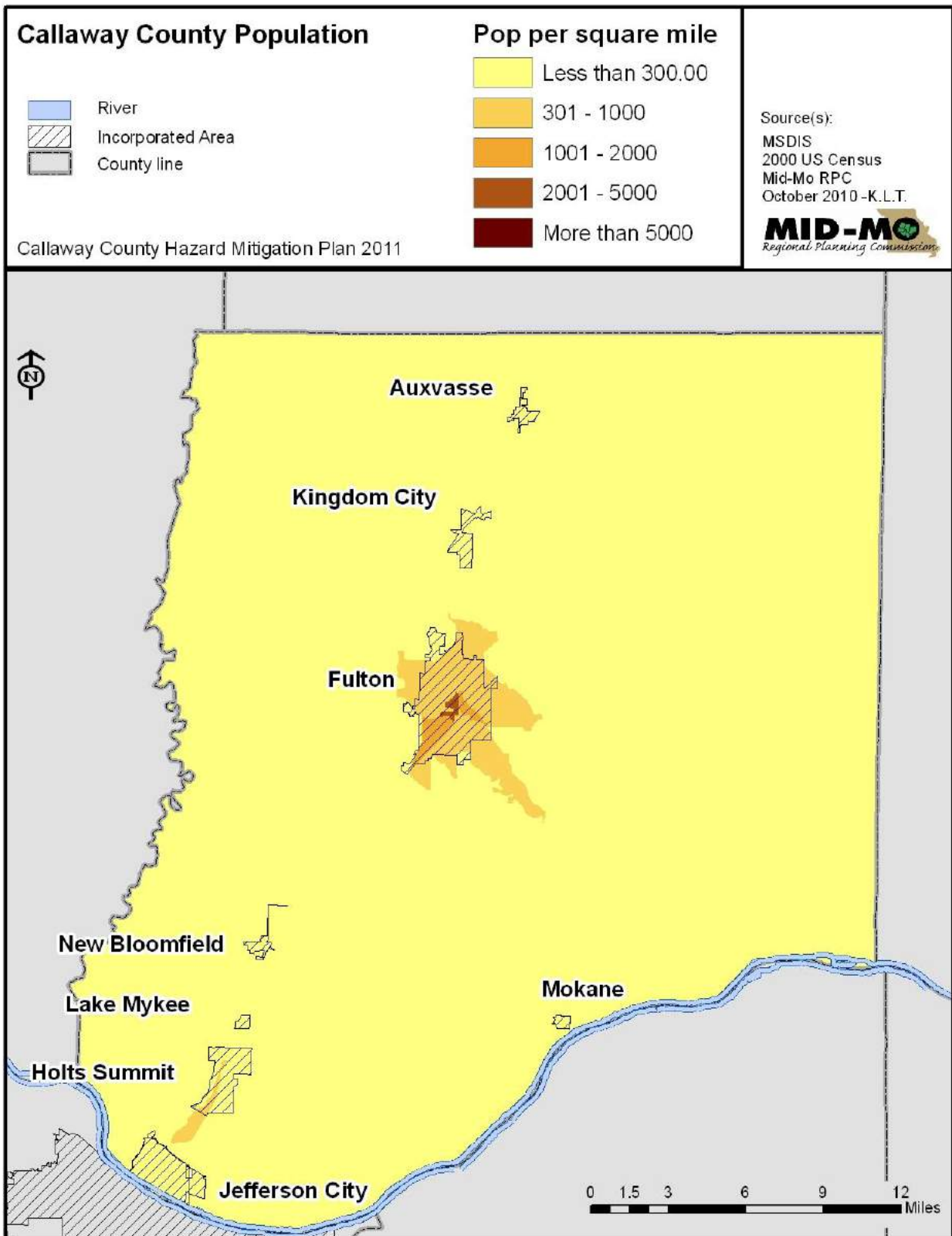
The estimated racial/ethnic profile of the county is shown in Figure 2.5.2.

Figure 2.5.2	
Race/Ethnicity in Callaway County	
Race/Ethnicity	%
White alone	91.8
Black or African-American alone	3.7
Two or more races	2.8
Asian alone	0.9
American Indian and Alaska Native	<0.5
Some other race alone	0.5
White non-Hispanic	90.4
Hispanic	1.9
Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates	

Population Density

There are six incorporated communities in Callaway County: Fulton (the county seat), Auxvasse, Holts Summit, Kingdom City, Mokane, and New Bloomfield. Population densities in the county are shown in Figure 2.5.3.

Figure 2.5.3



Income

The median household income in Callaway County (\$47,744) is lower than the median household income for the state of Missouri (\$48,173), according to 2011-2015 ACS data.

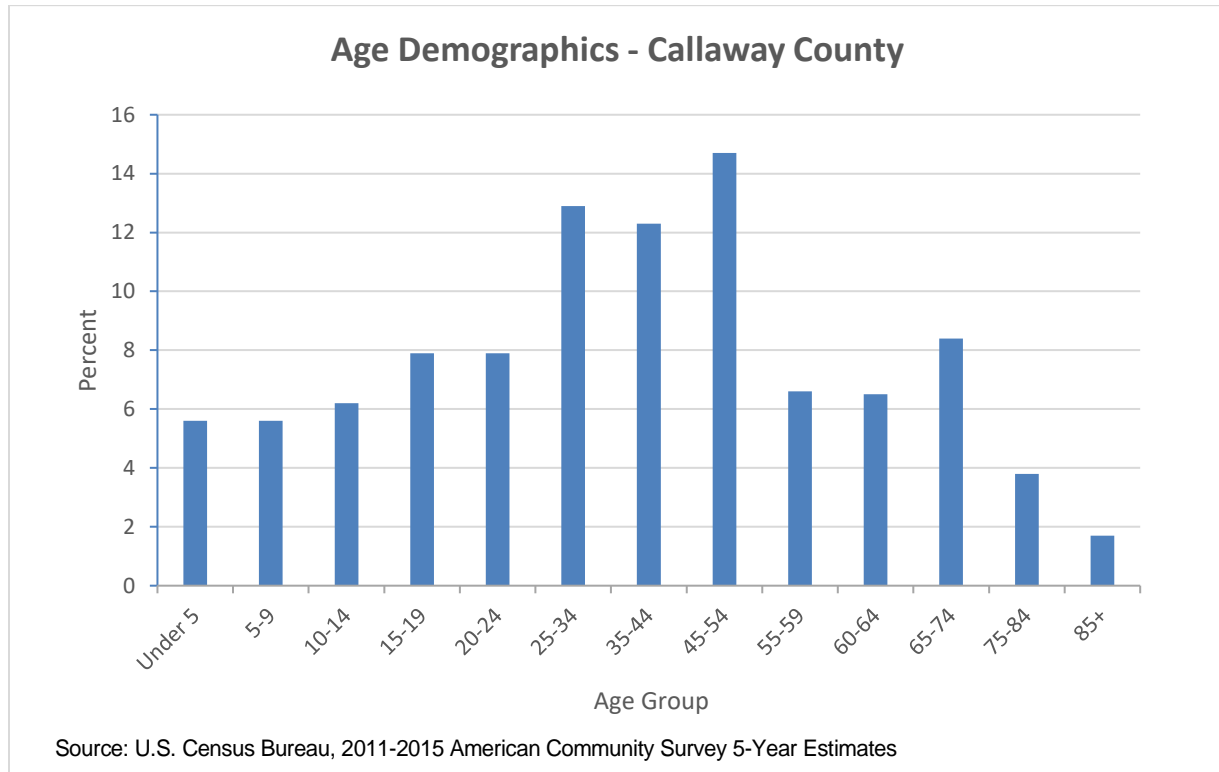
The distribution of household income and benefits in the county is shown in Figure 2.5.4.

Figure 2.5.4		
Household Income and Benefits Callaway County		
Income	# of Households	% of Households
Less than \$10,000	1,187	7.3
\$10,000 to \$14,999	1,034	6.4
\$15,000 to \$24,999	1,702	10.5
\$25,000 to \$34,999	1,869	11.6
\$35,000 to \$49,999	2,671	16.5
\$50,000 to \$74,999	3,506	21.7
\$75,000 to \$99,999	1,883	11.7
\$100,000 to \$149,999	1,711	10.6
\$150,000 to \$199,999	325	2.0
\$200,000 or more	262	1.6
Median household income		\$47,744
Mean household income		\$58,407
Source: U.S. Census Bureau, 2011-2015 American Community Survey 5-Year Estimates		

Vulnerable Populations

The elderly, children, and the poor are all particularly vulnerable to natural hazards. 21.6% of the county's population is under the age of 18; 13.9% is 65 years and older, according to 2011-2015 American Community Survey of the U.S. Census Bureau (see Figure 2.5.4).

Figure 2.5.4



There is also significant poverty in the county (14.4%), even though it is lower than the state rate of 15.6% (see Figure 2.5.1). The population in the lower income brackets is particularly vulnerable to natural hazards. Poor housing conditions, lack of reliable transportation, and inadequate insurance can all contribute to making the impacts of a natural hazard worse for people living in poverty.

Hazard mitigation planning must take into account the needs of these, and other, vulnerable populations.

2.6 Economy, Industry, and Employment

Callaway County is within the designated Jefferson City, Mo Metropolitan Statistical Area (MSA), according to the U.S. Census Bureau. MSAs are geographic entities defined by the U.S. Office of Management and Budget (OMB) for use by Federal statistical agencies in collecting, tabulating, and publishing Federal statistics. An MSA consists of a core urban area of 50,000 or more population, the county or counties containing the core urban area, and adjacent counties which have a high degree of social and economic integration with the urban core (as measured by commuting to work).

Jefferson City is the urban core for the MSA which includes Cole County and neighboring Callaway, Moniteau, and Osage Counties. The MSA designation is indicative of growth in Jefferson City area; prior to the year 2000, the core area's population was below 50,000.

Figure 2.6.1 depicts the principle types of employment found in the county; the major employers are shown in Figure 2.6.2. Figure 2.6.3 depicts major employers within 30 miles of Fulton.

Figure 2.6.1

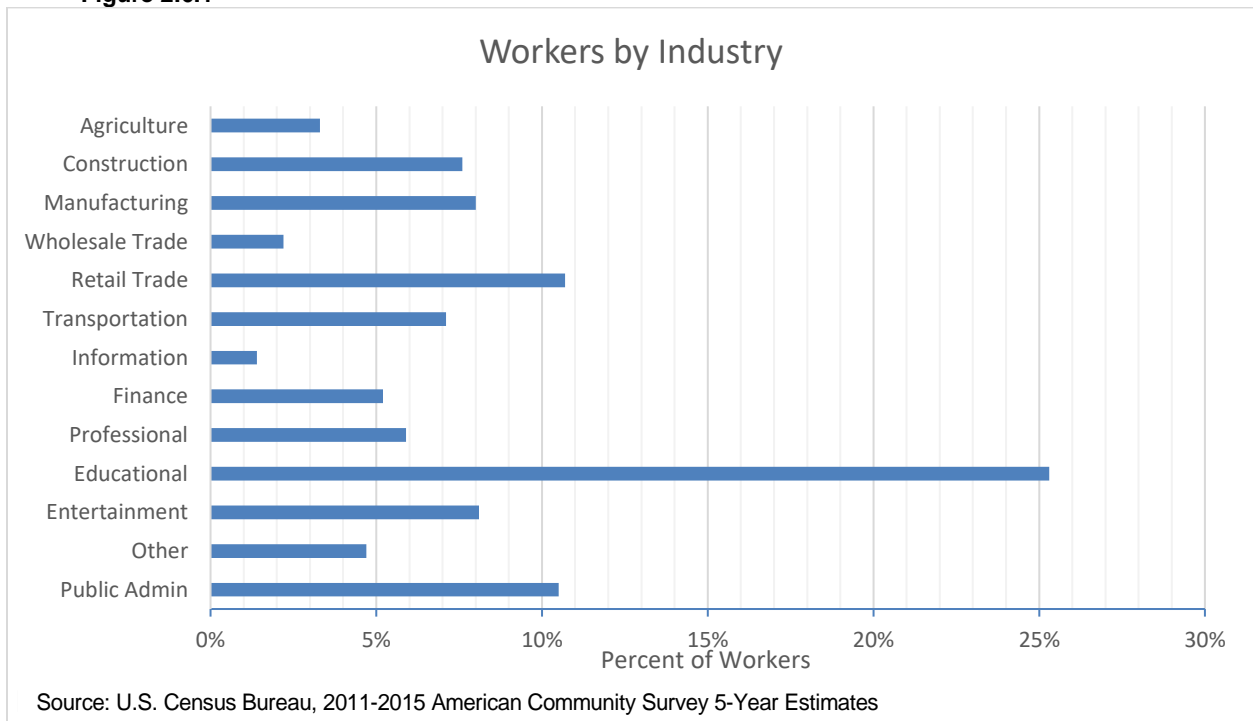


Figure 2.6.2**Major Employers in Callaway County**

Employer	City	Function	Employees
Fulton State Hospital	Fulton	Mental Health	1,250
Ameren UE Callaway Nuclear Plant	Fulton	Utility	923
ABB Power T&D Company	Holts Summit	Manufacturing	725
Dollar General Distribution Center	Fulton	Distribution	650
Fulton Public Schools	Fulton	Education	450
Fulton Reception & Diagnostic Center	Fulton	Government	400
Wal-Mart Supercenter	Fulton	Retail	250
North Callaway School District	Kingdom City	Education	221
Callaway Community Hospital	Fulton	Health Care	210
Westminster College	Fulton	Education	205
William Woods University	Fulton	Education	196
City of Fulton	Fulton	Government	193
Missouri School for the Deaf	Fulton	Education	190
Callaway County	Fulton	Government	177
South Callaway School District	Mokane	Education	150
AZZ/Central Electric Company	Fulton	Manufacturing	136
ANH Refractories	Fulton	Manufacturing	133
Ovid Bell Press	Fulton	Manufacturing	125
The Callaway Bank	Fulton	Financial	105
New Bloomfield School District	New Bloomfield	Education	103

Source: Fulton Area Development Corporation June 2010 Data

Figure 2.6.3**Major Employers Within a 30-Mile Radius of Fulton**

Employer	City	Function	Employees
State of Missouri	Jefferson City	Government	18,203
University of Missouri	Columbia	Education	7,905
University Hospital & Clinics	Columbia	Health Care	4,054
Columbia Public Schools	Columbia	Education	2,150
Boone Hospital Center	Columbia	Health Care	1,769
Scholastic	Jefferson City	Distribution	1,500
Capital Region Medical Center	Jefferson City	Health Care	1,450
Fulton State Hospital	Fulton	Mental Health	1,250
City of Columbia	Columbia	Government	1,220
St. Mary's Health Center	Jefferson City	Health Care	1,200
State Farm Insurance Companies	Columbia	Insurance	1,151

Source: Fulton Area Development Corporation June 2010 Data

Agriculture

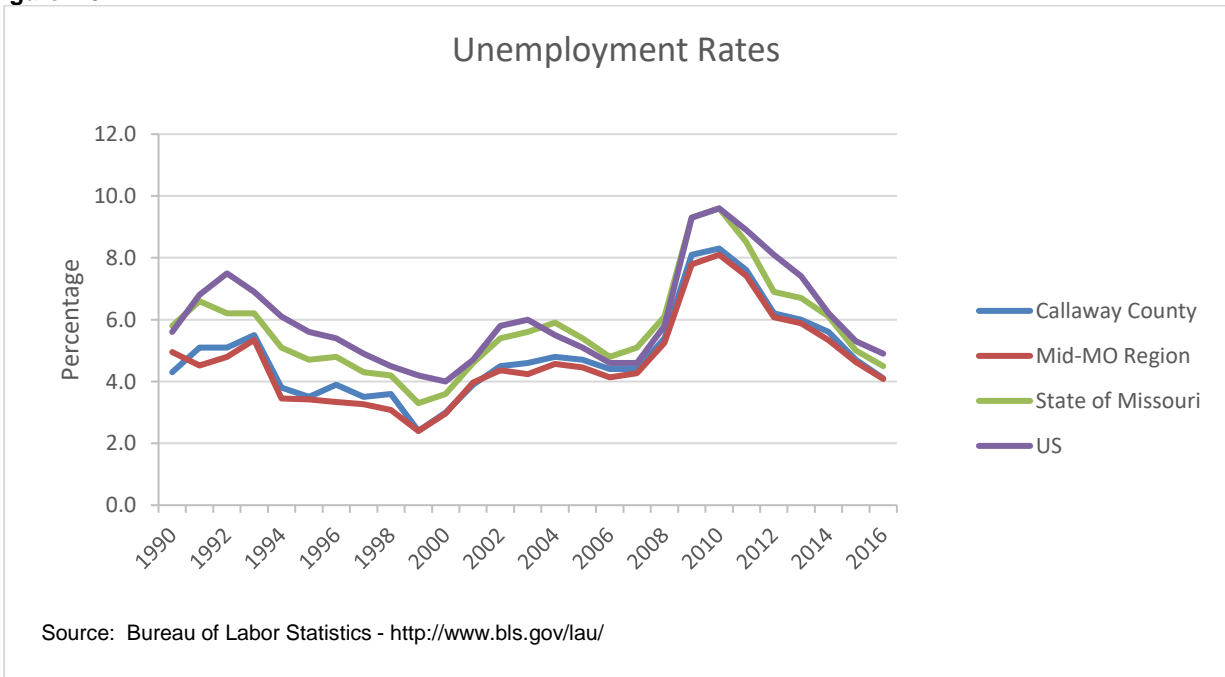
Agriculture remains an important component of the economy in Callaway County even though only 3.3% of the working population is currently employed in the sector (2011-2015 ACS). There are 316,066 acres in farmland in the county according to the 2012 Census of Agriculture from the U.S. Department of Agriculture (USDA). Of the total farmland, 50.9% is cropland and 24.1% is pasture.

Soybeans, hay, corn, wheat, and winter wheat are the major crops in the county; hogs and cattle are the main livestock. Other crops include grains, tobacco, cotton, vegetables, fruits, and trees. The total market value for all agricultural products (crops and livestock) sold in 2012 was \$84,919,000 (2012 USDA).

Unemployment Rates

The entire Mid-Missouri Region has lower unemployment rates than the state and nation (see Figure 2.6.4). Callaway County's unemployment rate falls below that of the nation and state, but is slightly higher than that of the region.

Figure 2.6.4



2.7 Transportation and Commuting Patterns

Roadways

Callaway County, like most of the United States, is heavily dependent upon personal vehicles and roads. Roads are the dominant transportation arteries in Callaway County, moving most goods and services that flow in and out of the county. The Missouri Department of Transportation (MoDOT) takes care of all state and federal roads in the county; Callaway County Public Works maintains roads in unincorporated areas and the various jurisdictions maintain their own roads.

There is one interstate (I-70), two US highways (US 63 and US 54), and one state highway (MO 94) in Callaway County. Interstate 70 runs east to west across the northern portion of the county through Kingdom City and is the direct route between Kansas City and St. Louis. US 63 cuts across the southwestern tip of the county connecting the City of Columbia in Boone County and Jefferson City in Cole County. US 54 cuts through the middle of the county from the north to the southwest. It is important to note that all incorporated communities in Callaway County, with the exception of Mokane, lie along the US 54 corridor. MO 94 runs along the southern border of the county connecting several unincorporated communities and the town of Mokane with US 63/54 and MO 19 in neighboring Montgomery County to the east.

While about half of Callaway County residents work within the county, the other half commute to neighboring counties (see Figure 2.8.3)

Public Transportation

OATS, Inc., a private not-for-profit corporation, was founded by a group of seniors in 1971 as transportation for older citizens. Its current mission is to “provide reliable transportation for transportation disadvantaged Missourians so they can live independently in their own communities.” OATS, Inc. serves a wide diversity of citizens in 87 Missouri counties. In Callaway County, the organization provides transportation between Jefferson City and the communities of Fulton, Holts Summit, and New Bloomfield as well as to the City of Columbia in neighboring Boone County (for medical reasons only). OATS predominantly serves the elderly and disabled, but will serve anyone needing transportation.

Public transportation is now available in Callaway County. SERVE Tran provides this door-to-door service to anywhere in Callaway County and the surrounding counties with a fleet of nine wheelchair-equipped buses and two vans. On average, SERVE Tran provides 3,000 one-way trips at over 22,000 miles per month. Rides are scheduled through phone calls.

Besides the two local public transportation services mentioned above, there are another 18 transportation providers that can be referred to by a transportation referral service called MO RIDES – Central Missouri. MO RIDES is a mobility management project of Central Missouri Community Action in partnership with Mid-MO Regional Planning Commission. It assists people in mid-MO communities in finding the most affordable public transportation options to meet their specific needs as to health appointments, work sites, childcare locations, etc.

Railroads

Passenger Rail

While Callaway County does not have a rail station, there is an Amtrak station directly across the Missouri River in Jefferson City that provides passenger service to both Kansas City (and points westward) and St. Louis (and points eastward) via the *Missouri River Runner*. There is another station located 13 miles east of the county line in Hermann. Two trains traveling in each direction stop daily at these stations. The completion of a 9,000-foot rail siding extension just west of California, Missouri in November 2009 increased the on-time arrival percentage of the *Missouri River Runner* trains from 55-79% in recent years to over 90%, according to the Missouri Department of Transportation (MoDOT). With a better record of on-time arrivals, ridership has subsequently increased about 20%.

Rail Freight

While Callaway County does not currently have any rail traffic, a large amount of freight travels by rail through the counties of Cole and Osage across the river to the south. Union Pacific operates tracks through these counties. According to the Missouri Department of Transportation's Long-Range Transportation Plan (LRTP), 33 percent of all product movement in Missouri is conducted by rail. Kansas City and St. Louis are ranked as the 2nd and 3rd busiest rail hubs in the nation, according to the Missouri Economic Research and Information Center (MERIC).

Air

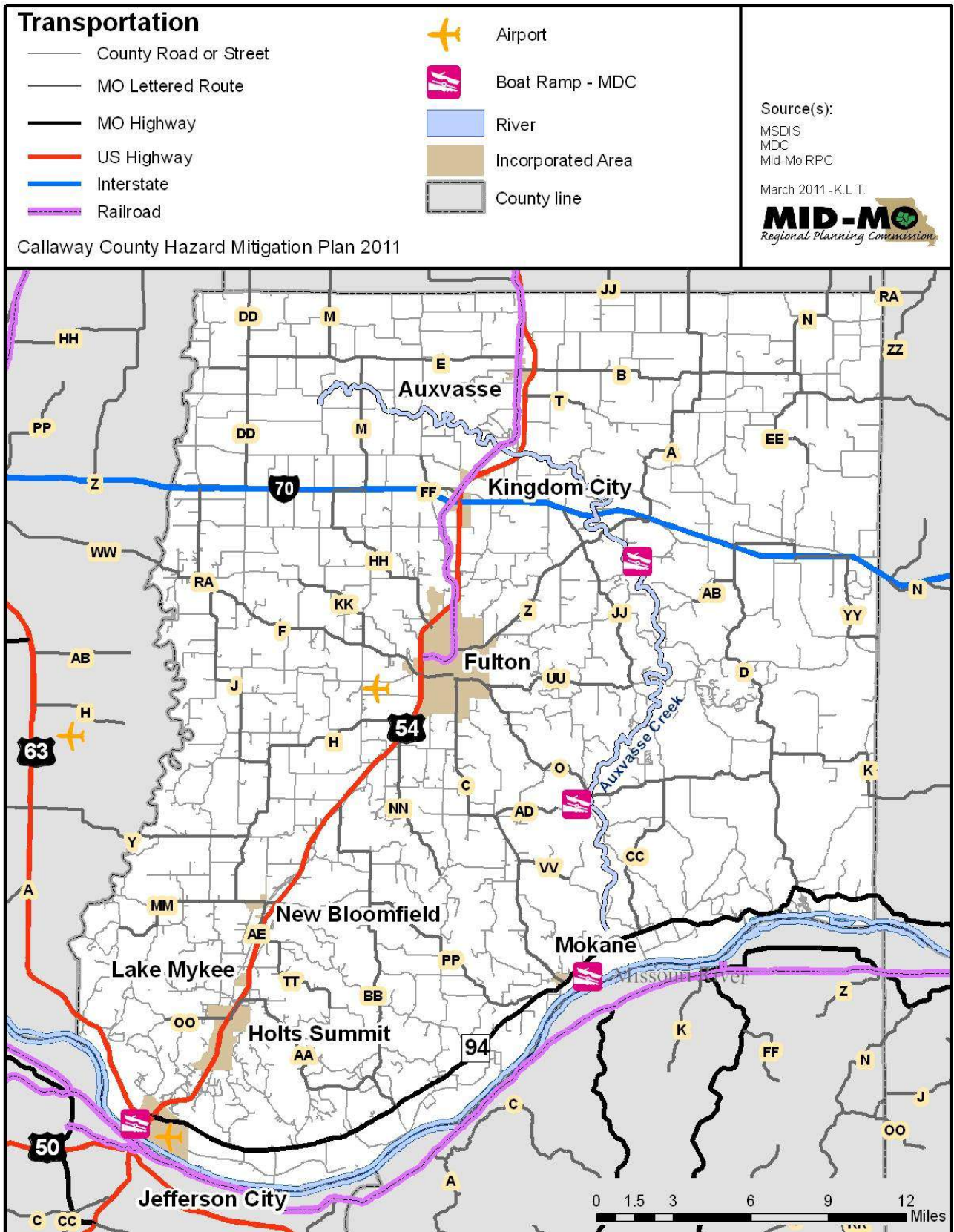
The Elton Hensley Memorial Airport, located just outside the city limits, is owned and operated by the City of Fulton and is available for corporate and private planes but does not support commercial services. The Jefferson City Memorial Airport, operated by Jefferson City, is located in southwest corner of the county near the Missouri River Bridge. The Columbia Regional Airport is located less than 25 minutes away in Boone County south of Columbia. Additionally, Kansas City International Airport and St. Louis Lambert International Airport are approximately 120 miles east and west of Boonville, along I-70.

Water

The Missouri River and Auxvasse Creek both have Missouri Department of Conservation public access boat ramps and several private access boat ramps. Most of these ramps and access points are designed for recreational use and allow access to the Missouri River and all points upstream and downstream.

Figure 2.7.1 shows the transportation makeup of Callaway County.

Figure 2.7.1



Commuting Patterns

According to 2009-2013 ACS data, more than 50% of Callaway County residents worked within the county (see Figure 2.7.2). The metropolitan areas of Jefferson City in neighboring Cole County and Columbia in neighboring Boone County provides several employment possibilities through the University of Missouri, State of Missouri, hospitals, and service industries.

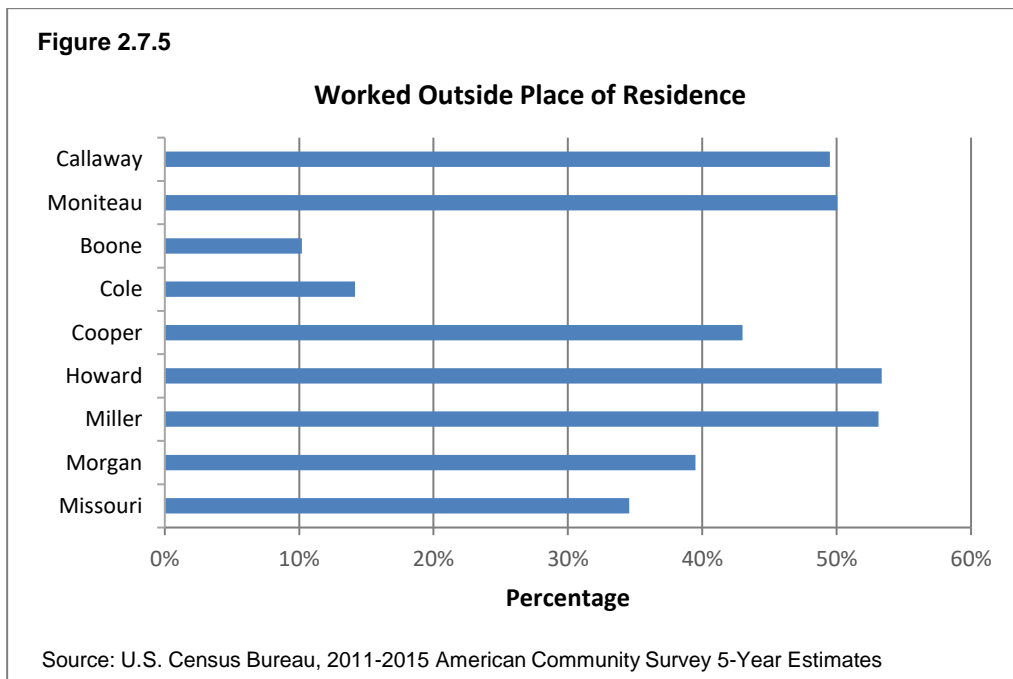
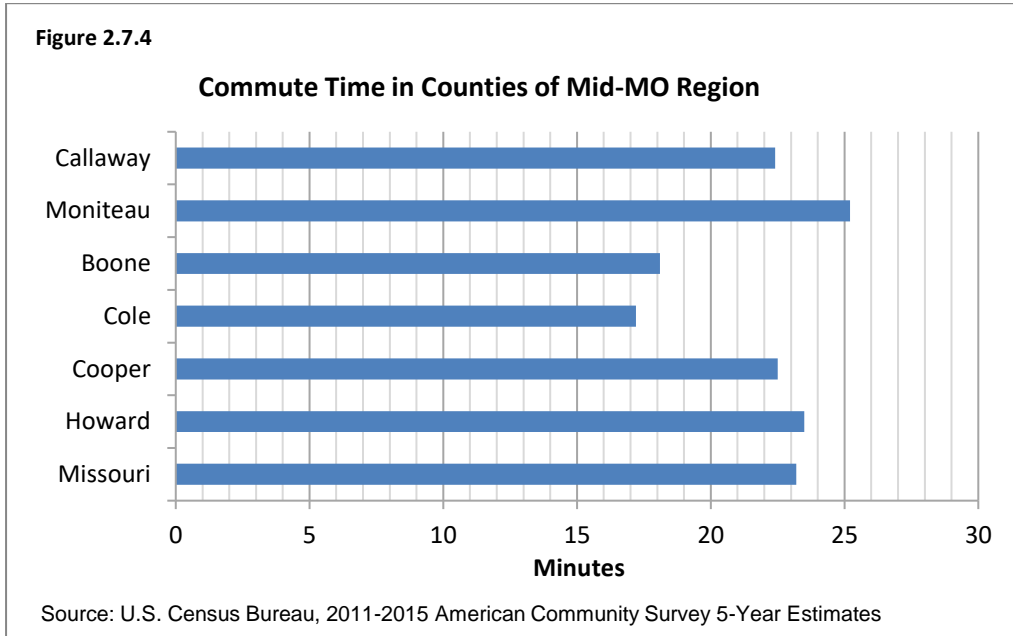
Figure 2.7.2 Places of Work for Callaway County Residents		
Place of Work in Missouri*	# of Workers	% of Total Workers
Callaway	9,967	52.1
Cole	5,823	30.4
Boone	2,666	13.9
Audrain	396	2.1
Miller	101	0.5
Osage	101	0.5
St. Charles	79	0.4
Total	19,133	100
* Only includes destinations with more than 50 trips		
Source: U.S. Census Bureau, 2009-2013 American Community Survey 5-Year Estimates		

County-to-county workflow data from the 2009-2013 ACS indicates that more than 90 percent of Callaway County workers come from within Callaway County and the neighboring counties of Boone and Cole (see Figure 2.7.3).

Figure 2.7.3 Residence of Callaway County Workers		
Residence in Missouri*	# of Workers	% of Total Workers
Callaway	9,967	73.1
Boone	1,755	12.9
Cole	1,133	8.3
Audrain	327	2.4
Montgomery	213	1.6
Osage	125	0.9
Miller	117	0.9
Total	13,637	100
* Only includes destinations with more than 50 trips		
Source: U.S. Census Bureau, 2009-2013 American Community Survey 5-Year Estimates		

Commute time for workers residing in Callaway County are the fourth highest in the six-county region served by the Mid-Missouri RPC and slightly lower than the state average (see Figure

2.7.4). Callaway County also has a high percentage of workers commuting outside of their place of residence (see Figure 2.7.5).



2.8 Communities - Inventory of Assets and Capabilities

The Planning Area has many human and material assets at risk from natural hazards. There are also many capabilities in the Planning Area which can be and are used to mitigate the effects of natural hazards. This section profiles both.

In this section, each incorporated community, which is a participating jurisdiction, is profiled according to general organizational structure, assets, and capabilities. Each profile also includes an inventory of structures (including critical structures, building counts, and assessed values), equipment, and population. These inventories provide one of the bases for the Risk Assessment for each hazard in Section 3.

See Section 2.9 for profiles of special districts within the planning area, including school districts, fire districts, and water districts.

Planning Area/Callaway County

Figure 2.8.1	
Callaway County Profile	
Classification	1st class county
Total population	44,566
Median household income	\$44,744
Median owner-occupied housing value	\$124,200
Total housing units	18,539
Median gross rent	\$650
Water service	PSWD #1, #2, and #9
Electric service	Ameren UE and Callaway Electric Cooperative
Ambulance service	Callaway County
Fire service	Rural and City Fire Departments
Master Plan	No
Emergency Operations Plan	Yes
Building regulations	No
Zoning regulations	No
Subdivision regulations	No
Storm water regulations	No
NFIP participation	Yes
Floodplain regulations	Yes
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	

Figure 2.8.2 Callaway County Owned Assets		
Property	Replacement Cost	
	Building	Contents
10 East Fifth Street Fulton , MO 65251		
Courthouse	\$4,445,952	\$371,280
1201 State Road O Fulton , MO 65251		
Jail, County Law Enforcement Center	\$5,213,193	\$238,680
Evidence Shed	\$46,870	na
Wood Frame Storage Bldg.	\$80,000	na
5901 County Road 302 Fulton , MO 65251		
Main Shed - 3 Bay w/ office	\$80,000	na
Storage	\$2,640	na
Open Shed	\$30,960	na
Cinder Shed	\$17,626	na
210 Elm St New Bloomfield , MO 65063		
County Health Extension Building	\$812,588	\$50,000
4950 County Road 304 Fulton , MO 65251		
Cinder Shed	\$84,000	na
Communication Equipment Shed	\$12,661	na
Lower Shed	\$80,000	na
Road/Bridge Maintenance - Main Shop	\$160,000	\$75,000
R&B Shed for Trucks	\$116,875	na
Salt Shed	\$40,000	na
Truck Shed	\$30,002	na
Truck Shed #2	\$59,936	na
Source: Callaway County Commission Insurance Statement		

Assessed Values

Figure 2.8.3	
Callaway County 2016 Assessed Values	
Real Estate: Residential	\$270,481,500
Real Estate: Agricultural	\$23,973,190
Real Estate: Commercial	\$87,080,810
Railroad & Utility Local Assessed	\$195,738,278
Railroad & Utility State Assessed	\$20,415,732
Personal Property	\$131,152,412
Railroad & Utility Local Assessed	\$74,685,528
Railroad & Utility State Assessed	\$6,602,898
(Tax Increment Financing)	-\$3,141,090
Total	\$806,989,258
Source: Callaway County Clerk's Office	

Agriculture

Figure 2.8.4 shows value estimates for agricultural land in Callaway County and estimates of crop and livestock production. Since over half of the land area of Callaway County is farmland, the impact of agricultural losses due to a natural hazard could be a potential threat to the economic stability of the region.

Figure 2.8.4	
2012 Callaway County Agricultural Overview	
Number of Farms	1,417
Land in Farms	316,066 acres (58.3% of Callaway County)
Market Value of Products Sold	\$84,919,000
Crop Sales	\$34,075,000
Livestock Sales	\$50,845,000
Source: 2012 Census of Agriculture. Retrieved from https://www.agcensus.usda.gov/Publications/2012/	

Critical Facilities

FEMA defines “critical facilities” as *all manmade structures or other improvements that, because of their function, size, service area, or uniqueness, have the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if they are destroyed, damaged, or if their functionality is impaired.*

Critical facilities (Figures 2.8.5 - 2.8.7) commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. The adverse effects of damaged critical facilities can extend far beyond direct physical damage. Disruption of health care, fire, and police services can impair search and rescue, emergency medical care, and even access to damaged areas. Note that all critical facilities listed in Figures 2.8.6 and 2.8.7 are able to be mapped at this time.

Figure 2.8.5

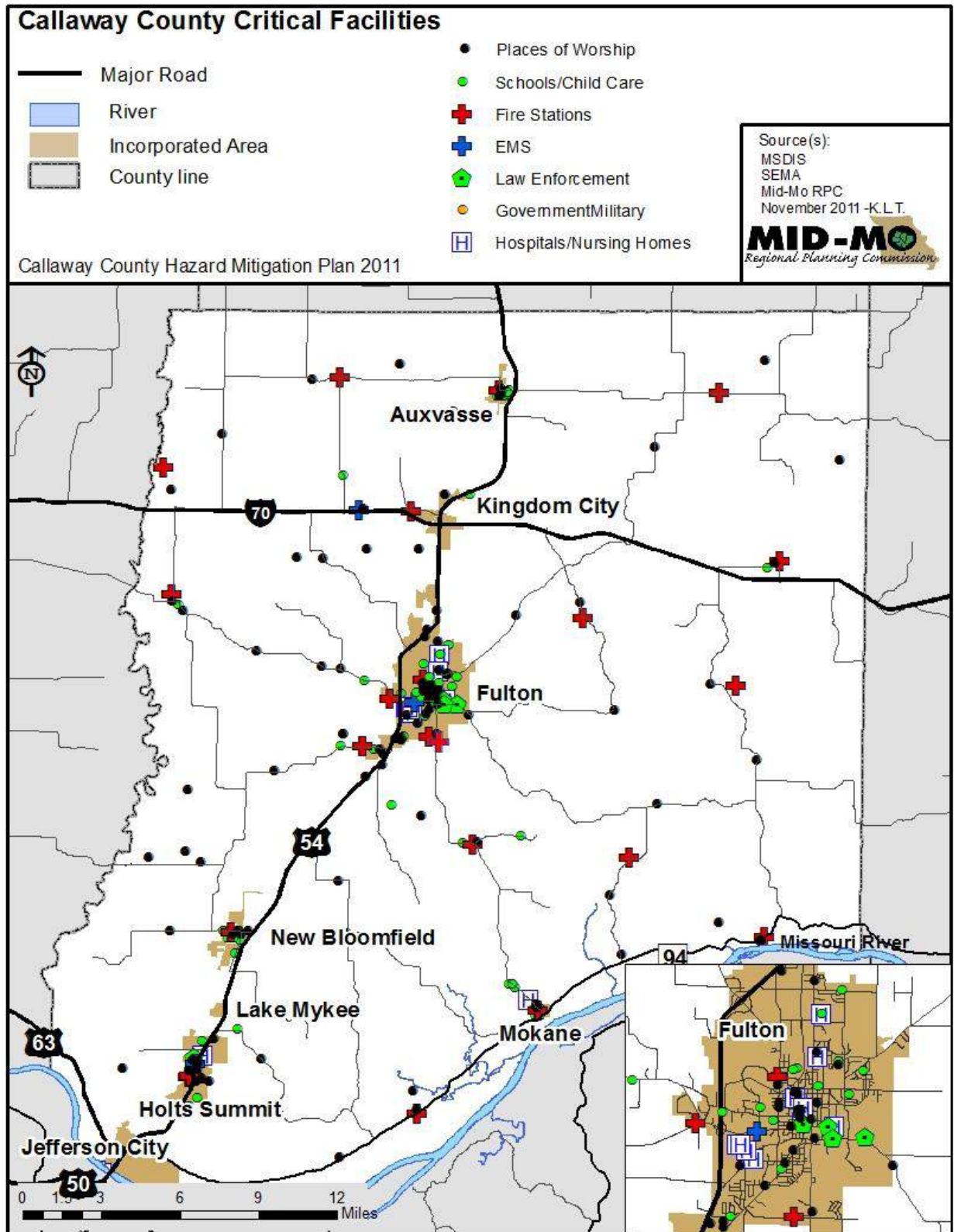


Figure 2.8.6	
Critical Medical Facilities	
Trauma Centers	City
Callaway Community Hospital	Fulton
Fulton State Hospital (30 buildings)	Fulton
Clinics	
St. Mary's Family Health Center	Holts Summit
Capitol Region Clinic	Holts Summit
Nursing Home Facilities	
Bristol Manor	Fulton
Fulton Manor Care Center	Fulton
Fulton Presbyterian Manor	Fulton
Fulton Nursing and Rehab Center	Fulton
Riverview Nursing Home	Mokane
Summit Villa	Holts Summit
Ashbury Heights	Fulton
Bridgeway Residential Care	Fulton
Churchill Terrace	Fulton
Nursing Home Facilities	Fulton
The Timbers	Holts Summit
Valley Park North	Fulton
Valley Park Retirement Center	Holts Summit
Group Homes	
Boulder 2	Fulton
Boulder 3	Fulton
Finck and Associates Boulder 1	Fulton
Granite	Fulton
Thatcher 1	Fulton
Thatcher 2	Fulton
Oliver House	Fulton
Adult Enrichment Center	Fulton
Brady Apartments	Fulton
Fisher Heights Apartments	Fulton
Timbrook House	New Bloomfield
Rosa Parks Center	Fulton
Source: Callaway County EMA	

Fulton State Hospital

The hospital is located in the City of Fulton and, according to the Missouri Department of Mental Health, is the oldest public mental health facility west of the Mississippi River. The facility has 300 maximum and intermediate security beds. In order to meet the demand of a growing population of psychiatric patients with increasingly dangerous behavior and also to guarantee the safety of its employees, the hospital redesigned the space, which included the construction of 487,000 SF of new space and the demolition of twenty antiquated buildings. The rebuild project started in 2015 on the previous site of the hospital, and is planned to be completed in 2018. The project will provide for 300 new high security hospital beds and new space for facility maintenance, dietary production, housekeeping, warehousing, IT, and administrative services⁴.

In regards to hazard mitigation planning, the Missouri Department of Mental Health has extensive internal disaster repose plans. These are not included in the planning process due to the sensitive nature of those plans. Callaway County Emergency Management Agency and Emergency Services have a direct line of communication with the Fulton State Hospital. In the case of disaster they are prepared for a coordinated response between the state, county, and city.

Critical Water Treatment and Storage Facilities

Figure 2.8.7

Public Water Supply Distributors – Critical Infrastructure				
Facility	# of Tanks/Towers	# of Wells	Area Served	People Served
Boone County PWSD #9	4/1	4/1	NE Unincorporated Callaway County and Unincorporated Boone County	2343
Callaway #2 Water District	8/2	8	Unincorporated Callaway County, Fulton	13500
Fulton	3	3	Fulton	12128
Callaway Co PWSD #1	1	1	Unincorporated Callaway County, Holts Summit	8350
Fulton State Hospital	1	1	Fulton State Hospital (Fulton)	2005
Auxvasse	1	1	Auxvasse	901
New Bloomfield	1	1	New Bloomfield	560
Mokane Water Co Op	1	1	Mokane	188
Kingdom City	1	1	Kingdom City	150
Jefferson City - North	0	1	Jefferson City (Callaway County)	95

Source: Environmental Working Group - New York Times Publication 1/11/2011 and Public Water Supply Districts

⁴ <http://fultonrebuild.mo.gov/>

Historic Properties

Figure 2.8.8 Callaway County - National Register of Historic Places	
National Register-listed Property	Location
Bell, M. Fred, Rental Cottage, 302 E 5th St.	Fulton
Bell, M. Fred, Speculative Cottage, 304 E 5th St.	Fulton
Brandon-Bell-Collier House, 207 W 9th St.	Fulton
Carver, George Washington, School, 909 Westminster	Fulton
Cote Sans Dessein Archaeological Site	N/A Address Restricted
Court Street Historic Residential District, roughly along Court bet. St. Louis and 10th St, Fulton	Fulton
Downtown Fulton Historic District , roughly bounded by 4th St., Market, 7th St. and Jefferson Ave.	Fulton
Hockaday, John Augustus, House, 105 Hockaday Ave.	Fulton
Mealy Mounds Archaeological Site	N/A Address Restricted
Oakley Chapel African Methodist Episcopal Church, County Rd. 485 at jct. of County Rd. 486	Tebbetts*
Pitcher Store, 8513 Pitcher Rd.	Fulton
Research Cave	N/A Address Restricted
Richland Christian Church, 5301 County Road 220	Fulton
Robinett-Payne House, 601 W 6th St.	Fulton
Westminster College Gymnasium, Westminster College Campus	Fulton
Westminster College Historic District, off Westminster Ave.	Fulton
White Cloud Presbyterian Church and Cemetery, S side SR F at intersection with CR 232	Fulton
Willing, Dr. George M., House, 211 Jefferson St.	Fulton
Winston Churchill Memorial, 7th St. and Westminster Ave.	Fulton
Source: http://www.dnr.mo.gov/shpo/Callaway.htm	
*Tebbetts is an unincorporated community	

Governmental Structure

Callaway County is governed by an elected three member Board of Commissioners composed of an Eastern District Commissioner, a Western District Commissioner, and a Presiding Commissioner. The Commission carries out the following responsibilities:

- establishes Callaway County policy
- approves and adopts the annual budget for all County operations
- approves actual expenditures for each department
- supervises the operations of County departments
- ensures County-wide compliance with numerous statutory requirements
- acts as liaison with County boards, commissions, and other local and regional governmental entities

Callaway County has the following departments and offices:

Assessor	Emergency Management	Road and Bridge
Auditor	911 Communications	Recorder of Deeds
Circuit Clerk	Health	Sheriff
Collector	Human Resources	Treasurer
County Clerk	Prosecuting Attorney	
Emergency Operations	Public Works	

Technical Capabilities

The following offices and departments play especially important roles in hazard mitigation:

Callaway County Emergency Management Agency (EMA)

“The Mission of the Callaway County Emergency Management Agency is to protect the lives and property of all Callaway County residents when major disasters threaten public safety in any community. The Callaway County Emergency Management Agency responds to two types of disasters - natural and manmade. Natural disasters are major snow and/or ice storms, floods, tornadoes and/or severe weather, as well as the threat of a serious earthquake along Missouri's New Madrid Fault. Manmade disasters, also known as technological emergencies, may include hazardous material incidents, nuclear power plant accidents and other radiological hazards. The Callaway County Emergency Management Agency is also responsible for developing a County Emergency Operations Plan which coordinates the actions of Missouri State government departments and agencies in the event of any emergency requiring use of State resources and personnel.” –Callaway County EMA Website

Road and Bridge Department

This department is an integral part of mitigation planning. Decisions about new roads and maintenance of current infrastructure are intertwined with the overall mission of hazard mitigation planning. The Road and Bridge Department assists with disasters as they are needed. They are involved with emergency debris removal, snow and ice removal, and road barricades during high water/flooding.

During an emergency the Road and Bridge Department directly communicate with the Callaway County Emergency Operations Center. They are vital in ensuring emergency evacuations and emergency routes proceed as planned.

In 2018, the department will replace three bridges; they regularly maintain and replace roads, bridges, and culverts as they learn about needs and funding is available.

Auxvasse

Figure 2.8.10	
Auxvasse Profile	
Classification	4 th class city
Population	1,298
Median household income	\$35,875
Median owner-occupied housing value	\$78,600
Total housing units	558
Median gross rent	\$625
Water service	City of Auxvasse
Electric service	Ameren UE
Ambulance service	
Sewer service	City of Auxvasse
Fire service	Auxvasse Fire Department
Website	http://auxvassemo.com/
Master Plan	
Emergency Operations Plan	Yes – Callaway County EOP
Building regulations	No
Zoning regulations	Yes
Subdivision regulations	Yes
Storm water regulations	Yes
NFIP participation	No
Floodplain regulations	No
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	
City Owned Assets	
Property	Replacement Cost
City Hall	\$205,000
Other Buildings (4)	\$290,000
Parks Facilities and Equipment	\$56,000
Water Tower, Well Pump, Pump House (East)	\$290,000
Pump House and Well Pump (North)	\$32,500
Other Pumps (5)	\$250,000
Source: City of Auxvasse Schedule of Property (2010)	

Assessed Values

Figure 2.8.11	
Auxvasse 2016 Assessed Values	
Real Estate: Residential	\$3,984,590
Real Estate: Agricultural	\$6,670
Real Estate: Commercial	\$1,592,700
Railroad & Utility Local Assessed	\$345,549
Railroad & Utility State Assessed	\$519,464
Personal Property	\$1,616,110

Railroad & Utility Local Assessed	\$807,740
Railroad & Utility State Assessed	\$68,663
Total	\$8,941,186
Source: Callaway County Clerk's Office	

Fulton

Figure 2.8.12	
Fulton Profile	
Classification	Home Rule
Population	12,812
Median household income	\$41,451
Median owner-occupied housing value	\$108,600
Total housing units	4,524
Median gross rent	\$608
Water service	Callaway #2 Water District and City of Fulton
Electric service	Ameren UE
Ambulance service	
Sewer service	City of Fulton
Fire service	Fulton Fire Department
Website	http://www.gofultonmissouri.com/
Master Plan	
Emergency Operations Plan	Yes – Callaway County EOP
Building regulations	Yes – International Code BOCA 2006
Zoning regulations	Yes
Subdivision regulations	Yes
Storm water regulations	Yes
NFIP participation	Yes
Floodplain regulations	Yes
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	
City Owned Assets	
Property	Replacement Cost
Buildings (407)	\$50,685,285
Contents	\$35,009,600
Vehicles (150), including trailers	\$6,000,000
Heavy Equipment	2,250,000
Source: City of Fulton (August 2010)	

Assessed Values

Figure 2.8.13	
Fulton 2016 Assessed Values	
Real Estate: Residential	\$55,160,610
Real Estate: Agricultural	\$120,360
Real Estate: Commercial	\$41,577,630
Railroad & Utility Local Assessed	\$35,354
Railroad & Utility Local Assessed	\$1,208,476
Personal Property	\$25,069,804
Railroad & Utility Local Assessed	\$156,179

Railroad & Utility Local Assessed	\$704,267
(Tax Increment Financing)	-\$3,141,090
Total	\$120,891,590
Source: Callaway County Clerk's Office	

The City of Fulton also has the following departments that are important to public safety and planning:

Engineering Department:

In charge of floodplain management and street maintenance

Utility Department:

In charge of all electrical, gas, and water distribution for the city

Planning and Protective Services Department:

In charge of building permits and code enforcement

Holts Summit

Figure 2.8.14	
Holts Summit Profile	
Classification	4 th class city
Population*	3,938
Median household income**	\$44,714
Median owner-occupied housing value**	\$131,500
Total housing units*	1,744
Median gross rent**	\$549
Water service	Callaway Co. PWSD No. 1
Electric service	Ameren UE
Ambulance service	
Sewer service	City of Holts Summit
Fire service	Holts Summit Fire Protection District
Website	http://www.holtssummit.org
Master Plan	
Emergency Operations Plan	Yes – Callaway County EOP
Building regulations	Yes
Zoning regulations	Yes
Subdivision regulations	Yes
Storm water regulations	Yes
NFIP participation	Yes
Floodplain regulations	Yes
* Number reflects the summed amount of Holts Summit and Lake Mykee. Lake Mykee is consolidated into Holts Summit in 2017.	
** Number only reflects the value in Holts Summit.	
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	
City Owned Assets	
Property	Replacement Cost
Wastewater Plant	\$3,500,000
Lift Stations (15)	\$610,000
Pump Stations (11)	\$525,000
Warning Sirens (5)	\$128,000
Pavilion (Greenway Park)	\$15,000
Volleyball Courts (Greenway Park)	\$7,000
Banquet Hall (Greenway Park)	\$190,000
Concession/Bathroom (Greenway Park)	\$30,000
Baseball Fields Lighting (Greenway Park)	\$18,000
City Hall/Storm Shelter	\$700,000
Playground Equipment	\$40,000
Maintenance Building	\$415,000
Salt/Cinder Building	\$58,000
Machine Shed	\$77,000
Source: City of Holts Summit Property Schedule (4/1/2010)	

Assessed Values

Figure 2.8.15	
Holts Summit 2016 Assessed Values	
Real Estate: Residential	\$25,790,020
Real Estate: Agricultural	\$57,990
Real Estate: Commercial	\$6,126,420
Personal Property	\$8,995,562
Total	\$40,969,992
Source: Callaway County Clerk's Office	

*Note that Holts Summit incorporated Lake Mykee in 2017. As of the update of this plan, Lake Mykee has not been assessed as a part of Holts Summit.

Figure 2.8.15	
Lake Mykee 2016 Assessed Values	
Real Estate: Residential	\$3,344,500
Real Estate: Agricultural	\$0
Real Estate: Commercial	\$0
Railroad & Utility State Assessed	\$120,354
Personal Property	\$857,600
Railroad & Utility State Assessed	\$14,102
Total	\$4,336,556
Source: Callaway County Clerk's Office	

New Bloomfield

Figure 2.8.16	
New Bloomfield Profile	
Classification	4 th class city
Population	806
Median household income	\$50,625
Median owner-occupied housing value	\$98,200
Total housing units	329
Median gross rent	\$761
Water service	City of New Bloomfield
Electric service	Ameren UE
Ambulance service	Callaway County
Sewer service	City of New Bloomfield
Fire service	New Bloomfield Volunteer Fire Department
Website	
Master Plan	No
Emergency Operations Plan	Yes – Callaway County EOP
Building regulations	Yes
Zoning regulations	Yes
Subdivision regulations	Yes
Storm water regulations	Yes
NFIP participation	No
Floodplain regulations	No
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	
City Owned Assets	
Property	Replacement Cost
<p>This data has been requested but not provided at the time of final submission. If not submitted before final adoption; this information may be added during the maintenance process.</p>	
Source: City of New Bloomfield	

Assessed Values

Figure 2.8.17	
New Bloomfield 2016 Assessed Values	
Real Estate: Residential	\$3,227,140
Real Estate: Agricultural	\$39,120
Real Estate: Commercial	\$1,194,480
Railroad & Utility State Assessed	\$359,399
Personal Property	\$1,120,630

Railroad & Utility Local Assessed	\$3,030
Railroad & Utility State Assessed	\$50,497
Total	\$5,994,296
Source: Callaway County Clerk's Office	

Kingdom City

Figure 2.8.18 Kingdom City Profile	
Classification	4 th class
Population	135
Median household income	\$36,103
Median owner-occupied housing value	\$105,000
Total housing units	72
Median gross rent	\$932
Water service	Callaway Co. PWSD No. 1
Electric service	Ameren UE
Ambulance service	Callaway County
Sewer service	Lake Mykee Subdivision Inc.
Fire service	New Bloomfield Fire, Holts Summit Fire
Website	
Master Plan	No
Emergency Operations Plan	Yes – Callaway County EOP
Building regulations	Yes
Zoning regulations	No
Subdivision regulations	Yes
Storm water regulations	Yes
NFIP participation	No
Floodplain regulations	No
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	
City Owned Assets	
Property	Replacement Cost
(There are no city owned assets)	
Source: Town of Lake Mykee	

Assessed Values

Figure 2.8.19 Kingdom City 2016 Assessed Values	
Real Estate: Residential	\$637,610
Real Estate: Agricultural	\$36,770
Real Estate: Commercial	\$6,729,430
Railroad & Utility Local Assessed	\$3,104
Railroad & Utility State Assessed	\$409,313

Personal Property	\$1,137,420
Railroad & Utility Local Assessed	\$1,789
Railroad & Utility State Assessed	\$78,845
Total	\$9,034,281
Source: Callaway County Clerk's Office	

Mokane

Figure 2.8.20	
Mokane Profile	
Classification	4 th class
Population	156
Median household income	\$26,875
Median owner-occupied housing value	\$55,000
Total housing units	77
Median gross rent	\$825
Water service	Callaway Co. PWSD No. 1
Electric service	Ameren UE
Ambulance service	Callaway County
Sewer service	Lake Mykee Subdivision Inc.
Fire service	New Bloomfield Fire, Holts Summit Fire
Website	
Master Plan	No
Emergency Operations Plan	Yes – Callaway County EOP
Building regulations	Yes
Zoning regulations	No
Subdivision regulations	Yes
Storm water regulations	Yes
NFIP participation	No
Floodplain regulations	No
Sources: U.S. Census Bureau, 2011- 2015 American Community Survey 5-Year Estimates; local officials	
City Owned Assets	
Property	Replacement Cost
(There are no city owned assets)	
Source: Town of Mokane	

Assessed Values

Figure 2.8.21	
Mokane 2016 Assessed Values	
Real Estate: Residential	\$555,760
Real Estate: Agricultural	\$1,330
Real Estate: Commercial	\$78,460
Railroad & Utility Local Assessed	\$16,207
Railroad & Utility State Assessed	\$60,032
Personal Property	\$415,920
Railroad & Utility State Assessed	\$12,627
Total	\$1,140,336
Source: Callaway County Clerk's Office	

2.9 Special Districts – Inventory of Assets and Capabilities

In this section special districts within the planning area are profiled. These districts may overlap and/or encompass several communities. Each profile also includes an inventory of structures (including critical structures, building counts, and assessed values), equipment, and population. These inventories provide one of the bases for the Risk Assessment for each hazard in Section 3.

School Districts PreK-12

Of the 5 public school districts, there are approximately 4576 students and 1767 teachers in 19 public schools (see Figure 2.9.1); there are also four private schools (see Figure 2.9.2). Each district has an elected Superintendent and School Board along with several administrative staff.

Students are a vulnerable population as they are dependent on others for natural hazard information during the school days. A mitigation plan must take this into account. Often, this has been done by building schools out of floodplains and having safe areas within the school where the students can assemble in the event of a disaster. School buildings can also act as safe rooms and shelters during a natural disaster.

Figure 2.9.1			
Callaway County Public School District Population			
School District	Grades	Certificated Staff	Students
Fulton Public Schools			
Bartley Elementary	K-5	22	272
Bush Elementary	K-5	30	382
McIntire Elementary	K-5	30	388
Fulton Middle School	6 – 8	40	526
Fulton Senior High School	9 – 12	44	652
Fulton Education Center		9	115
Totals: 6 Schools		175	2,335
Jefferson City Public Schools (Callaway County Portion Only)			
North Elementary	K-5	27	361
Callaway Hills Elementary	K-5	22	252
Totals: 2 Schools		49	613
New Bloomfield R-III			
New Bloomfield Elementary	PK-6	40	331
New Bloomfield High School	7 - 12	35	328
Totals: 2 Schools		75	659
North Callaway Co. R-I			
Auxvasse Elementary	PreK-8	376	31
Hatton McCredie Elementary	K-8	279	30
Williamsburg Elementary	K-8	190	25
North Callaway High School	7 - 12	492	46
Totals: 4 Schools		1337	132
South Callaway Co. R-II			
South Callaway Early Childhood Center	PreK-2	0	0
South Callaway Elementary	3 - 5	39	325
South Callaway Middle School	6 - 8	30	271
South Callaway High School	9 - 12	34	313
Totals: 4 Schools		103	909
Source: School districts personnel			

Figure 2.9.2			
Callaway County Private Schools			
School Name	Grades	Teachers/Staff	Students
Kingdom Christian Academy	K-9	12	150
Shepherdsfield School	1-9	2	13
St. Peter Catholic School	PK-8	8	105
Source: https://www.privateschoolreview.com/missouri/callaway-county			

Figure 2.9.3 gives an overview of value estimates and population statistics for each district.

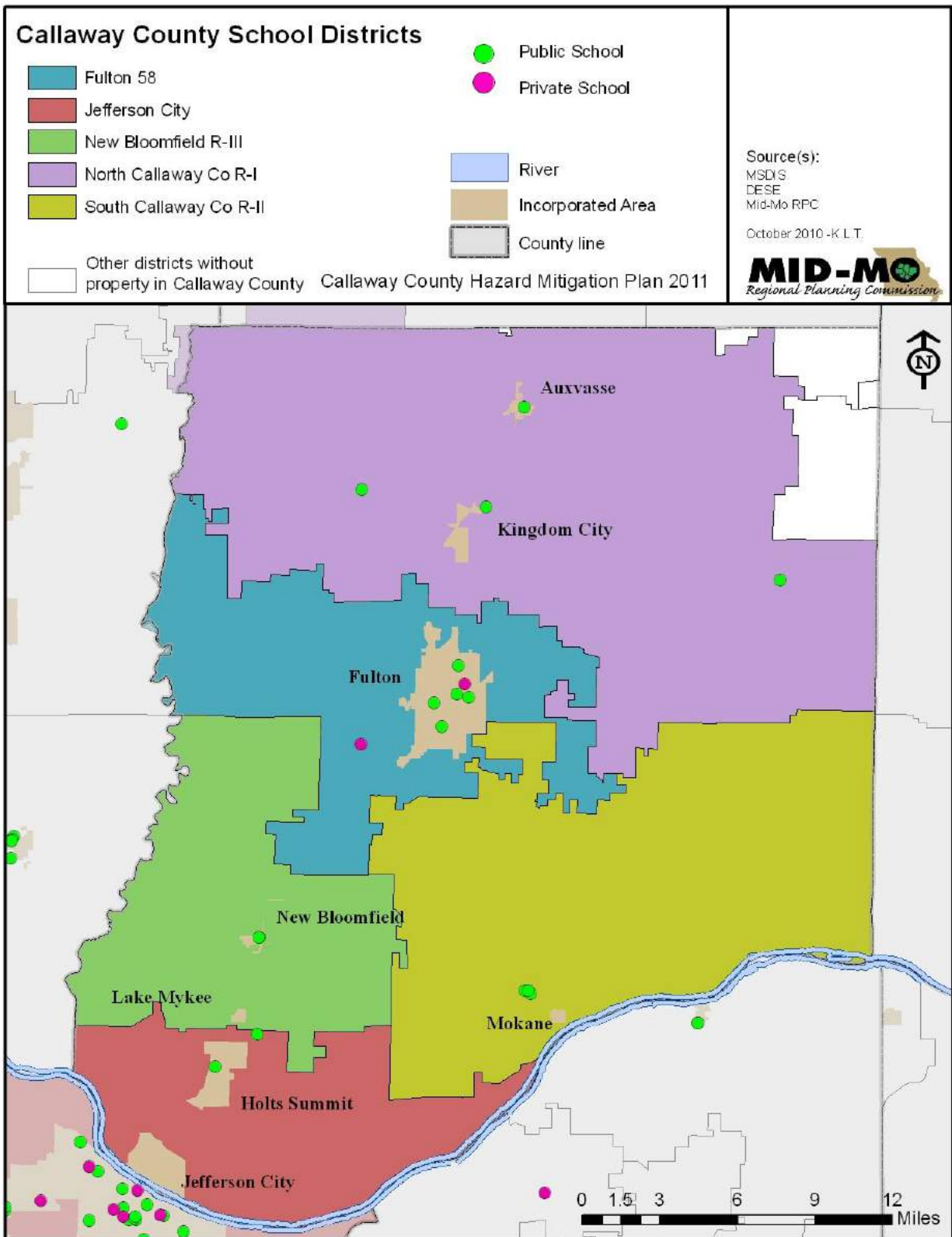
Figure 2.9.3	
School District 2010 Assessed Values	
Fulton Public Schools Assessed Values	
Real Estate: Residential	\$97,920,390
Real Estate: Agricultural	\$2,917,260
Real Estate: Commercial	\$50,475,810
Railroad & Utility Local Assessed	\$59,153
Personal Property	\$44,232,492
Railroad & Utility Local Assessed	\$158,052
(Tax Increment Financing)	-\$3,141,090
Total	\$192,622,067
Source: Callaway County Clerk's Office	
Structural Assets	
Buildings	Replacement Cost (building and contents)
High School	\$21,887,234
Middle School	\$12,812,377
Sports Annex building	\$1,087,984
Bartley Elem.	\$6,116,890
Bush Elem.	\$7,164,669
McIntire Elem.	\$7,231,991
Vo Tech	\$1,519,886
Fulton Education Ctr.	\$1,763,347
Other buildings	\$4,505,252
Total	\$64,089,630
Source: Fulton Public Schools	
New Bloomfield R-III Assessed Values	
Real Estate: Residential	\$30,580,180
Real Estate: Agricultural	\$2,405,710
Real Estate: Commercial	\$3,156,060
Railroad & Utility State Assessed	\$141,350
Personal Property	\$11,968,032
Railroad & Utility State Assessed	\$3,030
Total	\$48,254,362
Source: Callaway County Clerk's Office	
Structural Assets	
Buildings	Replacement Cost (building and contents)

Elem. /Central Office	\$10,569,610
Jr./Sr. High Bldg.	\$11,657,527
Other buildings	\$741,704
Total	\$22,968,841
Source: New Bloomfield R-III Public Schools	
North Callaway R-I Assessed Values	
Real Estate: Residential	\$38,145,170
Real Estate: Agricultural	\$11,427,340
Real Estate: Commercial	\$17,482,660
Railroad & Utility Local Assessed	\$452,712
Personal Property	\$26,327,643
Railroad & Utility Local Assessed	\$809,529
Total	\$94,645,054
Source: Callaway County Clerk's Office	
Structural Assets	
Buildings	Replacement Cost (building and contents)
Hatton-McCredie Elem.	\$6,312,816
Auxvasse Elem.	\$7,271,686
Williamsburg Elem.	\$5,819,210
High School	\$11,746,958
Total	\$31,150,670
Source: North Callaway R-I Public Schools	
South Callaway R-II Assessed Values	
Real Estate: Residential	\$28,184,780
Real Estate: Agricultural	\$4,118,510
Real Estate: Commercial	\$2,939,870
	\$195,009,558
Personal Property	\$12,876,941
	\$73,705,138
Total	\$316,834,797
Source: Callaway County Clerk's Office	
Structural Assets	
Buildings	Replacement Cost (building and contents)
Elem./Middle School	\$15,158,578
High School	\$16,063,198
Other buildings	\$10,504,907
Total	\$41,726,683
Source: South Callaway R-II Public Schools	

The following school districts do not have any buildings within Callaway County, but do receive taxes from the county: Audrain Community R-VI, Mexico #59, Montgomery County R-II, and Wellsville-Middletown R-I. Figure 2.9.4 shows the total assessed values for these school districts. These figures include both real estate and personal property. Figure 2.9.5 depicts school locations and district boundaries for each district.

Figure 2.9.4	
Surrounding School Districts' Total Assessed Values	
Audrain Community R-VI School District	\$1,130,770*
Mexico #59 School District	\$44,168*
Montgomery County R-II School District	\$1,714,425*
Wellsville-Middletown R-I School District	\$53,510*
Total	\$2,942,873*
Source: Callaway County Clerk's Office	
* Includes real estate and personal property	

Figure 2.9.5



Higher Education

Callaway County is home to two institutions of higher education, Westminster College and William Woods University, both in Fulton. Both campuses offer four-year undergraduate programs (William Woods University also offers graduate program) and have on-campus housing. William Woods University usually has more than 2000 students attending its main campus, while Westminster College holds a little less than 1,000 students.

The Callaway County Emergency Management Agency works closely with both institutions on matters of public safety, and hazard awareness.

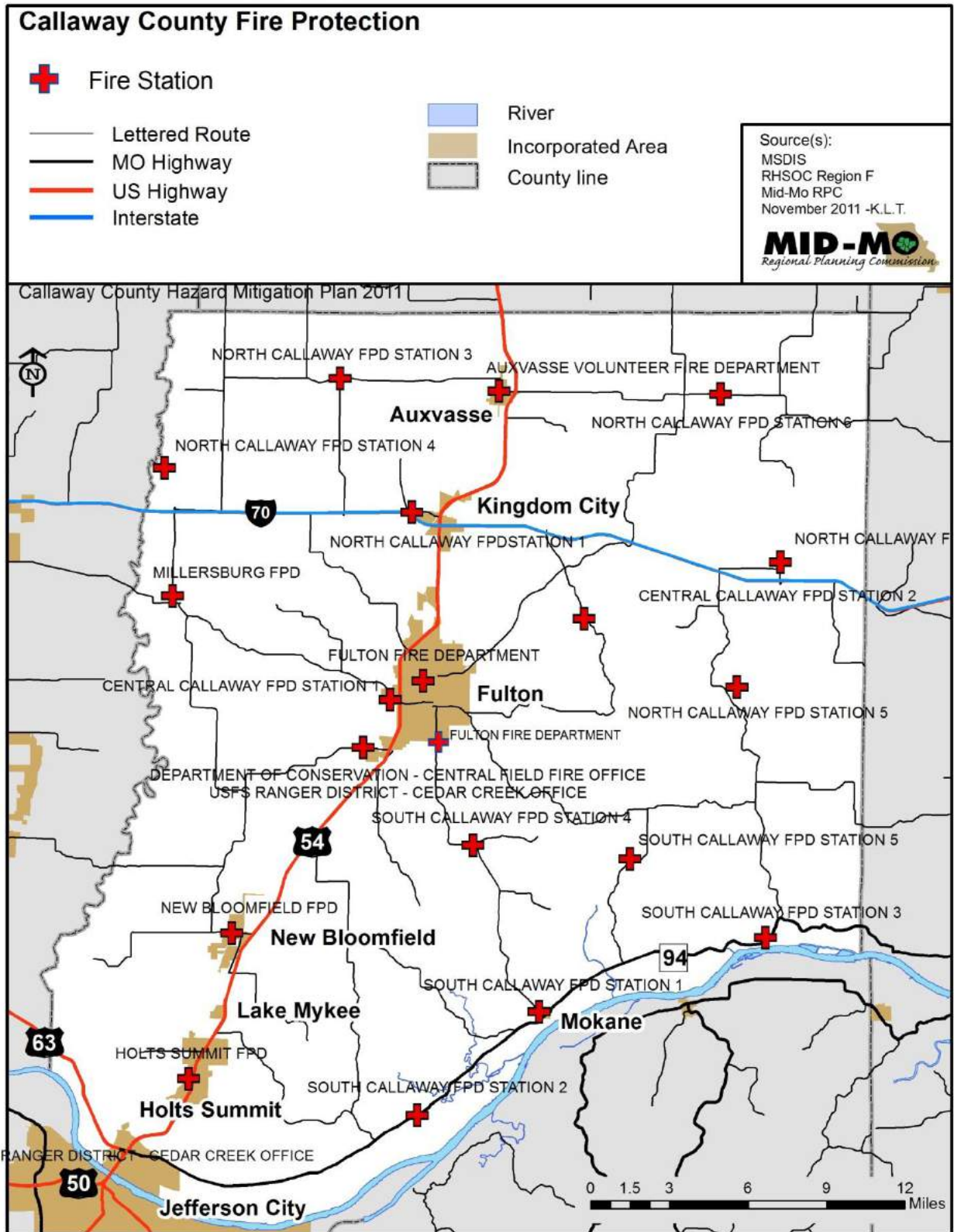
Fire Protection Districts

There are nine fire protection districts which respond to fires, accidents, and other emergencies within the Planning Area (see Figures 2.9.6-2.9.7). Mutual aid agreements exist between all the departments and also with surrounding county departments. The fire districts have been proactive in public education campaigns, updating training, and general outreach efforts to ensure the community at large is safe. The fire districts are key players in hazard mitigation and preparedness activities.

Figure 2.9.6							
Callaway County Fire Protection							
Fire Protection District	Type	# Fire Stations	Firefighters			Other Employees	Other Volunteers
			Career	Volunteer	Paid-per-Call		
Auxvasse	Volunteer	1	0	10	0	0	0
Callaway Plant	Career	N/A					
Central Callaway	Volunteer	2	0	33	0	0	0
Fulton	Mostly Career	2	24	6	15	0	0
Holts Summit	Volunteer	2	0	30	0	0	8
Millersburg	Volunteer	1					
New Bloomfield	Volunteer	2	0	13	0	0	0
North Callaway	Volunteer	6	0	25	0	2	0
South Callaway	Volunteer	5	0	23	0	2	4

Source: <http://missouri.firedepartments.net/county/MO/CallawayCounty.html>, Callaway County Fire Chiefs

Figure 2.9.7



Callaway Energy Center

The following information was taken from Annex J of the 2013 Missouri Hazard Analysis:

The Callaway Plant consists of one unit with a pressurized water reactor capable of providing 1360 megawatts of electricity. The plant is located in Callaway County, Missouri, and is owned and operated by Ameren Missouri, St. Louis. It is located 10 miles southwest of Fulton, 25 miles northeast of Jefferson City, 5 miles north of the Missouri River, and 80 miles west of St. Louis. The population within the 2.5-mile radius of the plant is low (approximately 90 residents). Approximately 8,000 people reside within a 10-mile radius of the plant. The plume exposure pathway has been expanded beyond the 10-mile radius to include the City of Fulton (population 12,000). Thus, the population within the plume exposure pathway is approximately 20,000. The plant site consists of 7,200 acres of land at the site, 6,800 of which are administered by the Missouri Department of Conservation as the Reform Conservation Area. Under this program, part of the area continues to be farmed, with income from farming providing funds for wildlife management and public recreation activities. Land within a 5-mile radius of the plant site is rural, consisting of 60 percent forest, 20 percent farm/crop land, and 20 percent pasture.

While there is a threat posed by the Callaway Nuclear Plant, it has been constructed to withstand most natural hazards and is positioned on a site which has been chosen specifically for its low risk location. More information on the Callaway Nuclear Plant is in Appendix E of this plan.

Water Districts

There are 14 drinking water providers located in the Planning Area. In addition, the Callaway County Water Supply District #1 supplies water to the Callaway portion of Jefferson City. Of these water providers, three are Public Water Supply Districts (see Figure 2.9.8-2.9.9). Each water district is composed of an elected board. The districts are responsible for maintaining existing water supply infrastructure and developing new infrastructure.

Water Districts and providers are primarily related to mitigation activities focused on drought, wildfire, and flood. Connecting water supplies so that areas have multiple water supplies is an important mitigation strategy. The areas served and interconnections of all water providers in the Planning Area are shown in Figure 2.9.8.

Protecting water supply infrastructure from floodwaters is another important task also under the purview of the Districts. Critical facilities belonging to the water districts are included in the Section 2.8

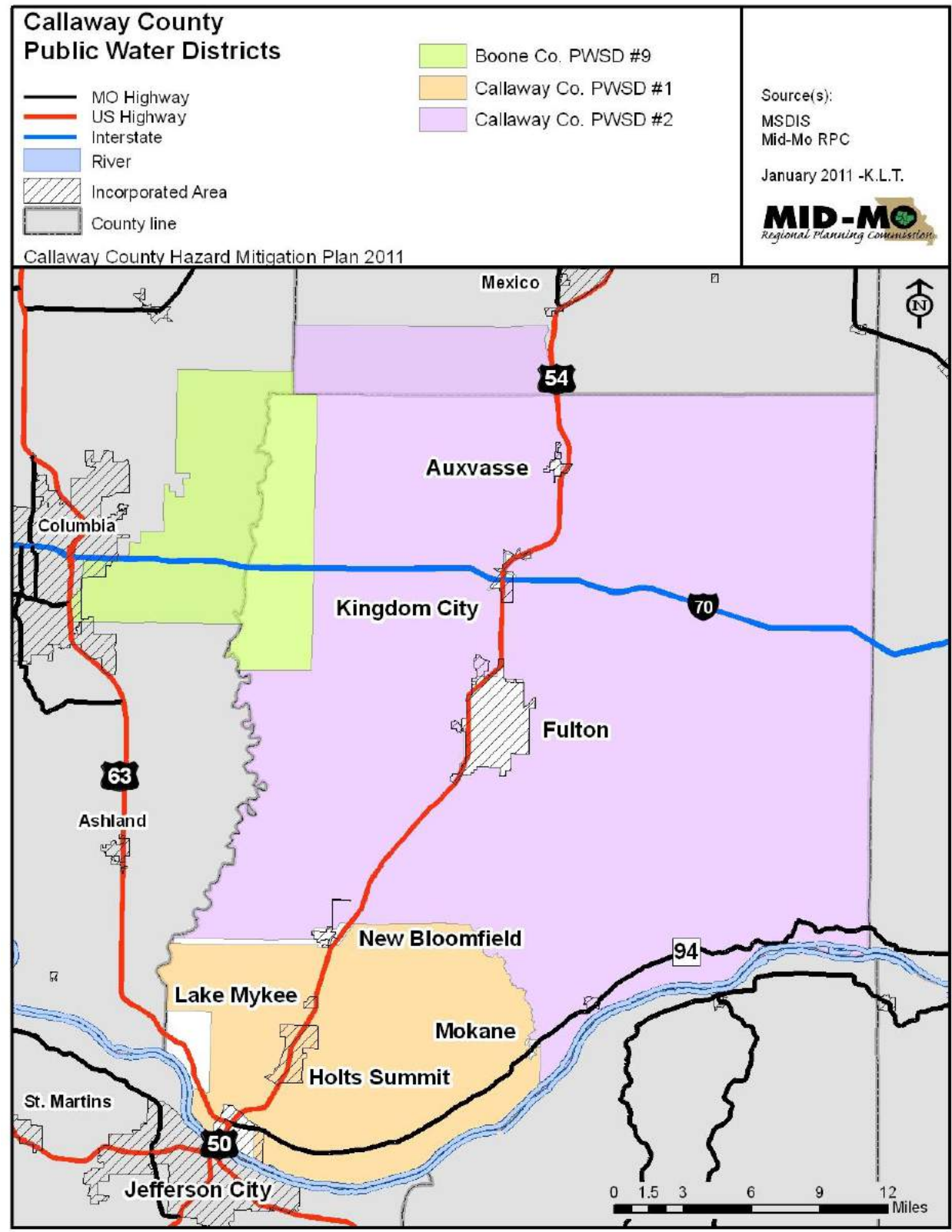
Figure 2.9.8

Water Providers Serving Planning Area

Provider	Area Served	Interconnections
Auxvasse	Auxvasse	Callaway #2 Water District
Boone Co. PWSD #9	NE Callaway County (unincorp.), Boone County (unincorp.), eastern portions of the City of Columbia in Boone County.	City of Columbia-3 locations PWSD#4 of Boone Co-1 location PWSD#2 of Callaway Co-2 locations
Callaway Co PWSD #1	Southern Unincorporated Callaway County, Holts Summit, Jefferson City	Missouri American Water
Callaway #2 Water District	Northern Unincorporated Callaway County, Fulton	Communities of Auxvasse, Fulton, Kingdom City, New Bloomfield (future plans to interconnect with PWSD #9)
Fulton	Fulton	Callaway #2 Water District
Fulton State Hospital	Fulton State Hospital	N/A
Hatton Hills Mobile Home Park	Hatton Hills Mobile Home Park	N/A
Kingdom City	Kingdom City	Callaway #2 Water District
Mokane Water Co Op	Mokane	N/A
New Bloomfield	New Bloomfield	Callaway #2 Water District
New Christian Life Fellowship	Fulton	N/A
Riverview Nursing Center	Riverview Nursing Center	N/A
Scotchman Place Mobile Home Park	Scotchman Place Mobile Home Park	N/A
Seges Mobile Home Park	Seges Mobile Home Park	Callaway #2 Water District

Sources: PWSDs, Missouri American Water, community surveys

Figure 2.9.9



Boone County Public Water Supply District No. 9 (PWSD#9)

Boone County Public Water Supply District #9 (PWSD#9) is located on the border between eastern Boone County and northwestern Callaway County (see Figure 2.9.10). Their main office is located in Boone County where they employ more than 20 staff. The PWSD#9 was started in 1965 by a group of citizens who wanted to organize a public water supply system to serve rural people in Boone and Callaway Counties in an area east of the Columbia city limits. The water district is run by a five person board, each representing a specific sub-district within the PWSD#9 boundary (see Figure 2.9.11).

PWSD#9 serves the following critical facilities within their service area:

- Boone County Fire Protection District Station 12-980 S El Chaparral Ave.
- Millersburg Fire Protection District Fire Station-4285 State Road J.
- North Callaway Fire protection District Fire Station-1505 County Road 276.
- Two Mile Prairie Elementary School-5450 N Route Z in Boone County.
- Cedar Ridge Elementary School-1100 S Roseta in Boone County.
- New Haven Elementary School-3301 E New Haven Rd in Boone County.
- Battle High School-7575 E St Charles Rd in Boone County. (Under construction)

Figure 2.9.10 Boone County Public Water Supply District #9 boundary

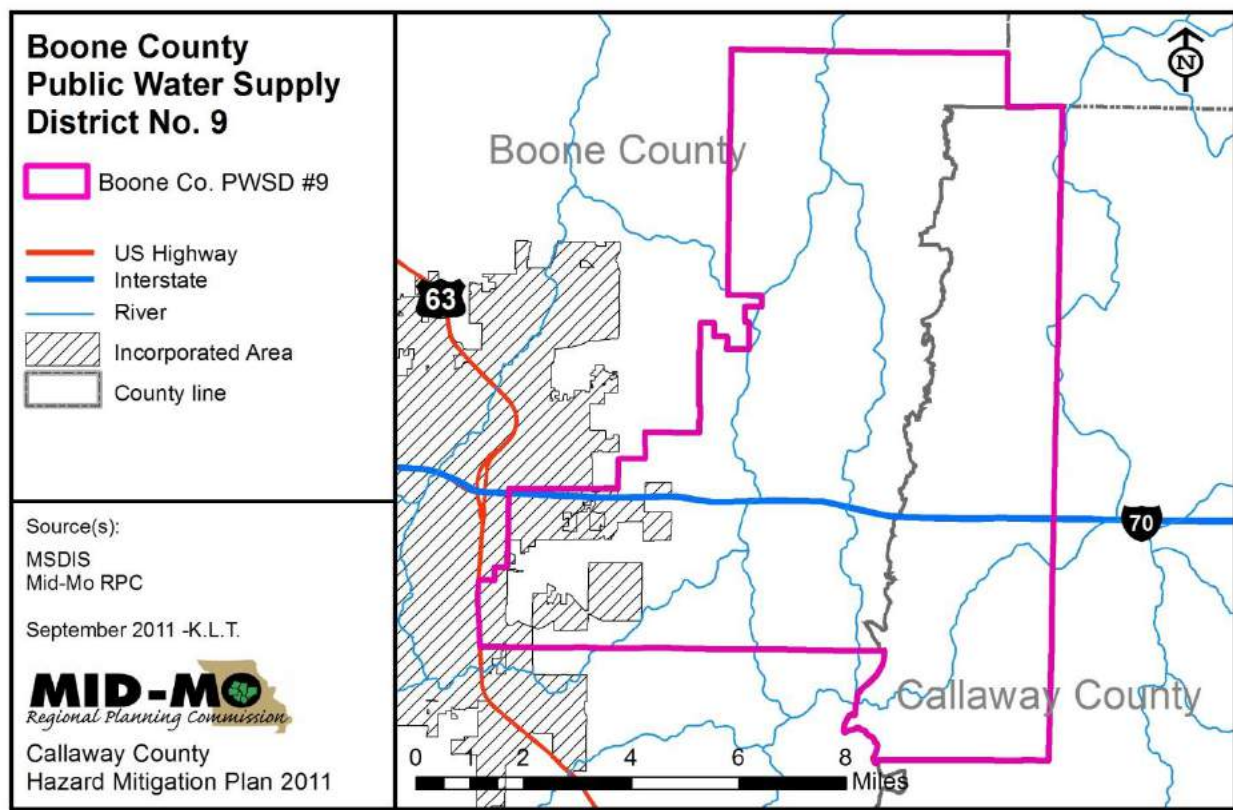
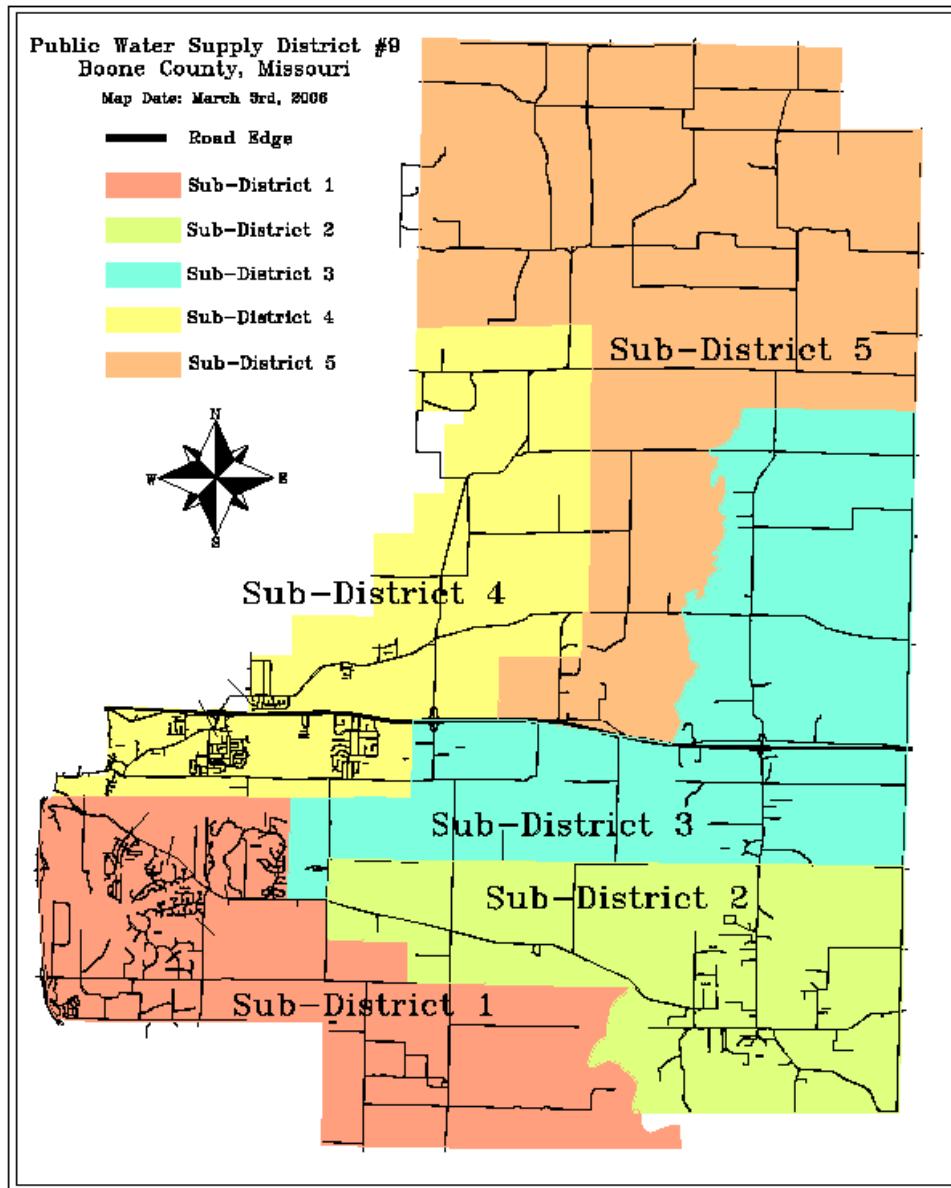


Figure 2.9.11 PWSD#9 Sub-Districts



2.10 Policy, Planning, and Program Capabilities

This part of the capability assessment is designed to summarize and evaluate existing plans, policies, programs, and ordinances in the Planning Area which are involved in some way with hazard mitigation. A summary of the plans and regulations in the Planning Area is shown in Figure 2.10.1.

Figure 2.10.1

**Plans and Regulations
Callaway County and Incorporated Communities**

	Callaway County	Auxvasse	Fulton	Holts Summit	Lake Mykee	New Bloomfield
Master plan						
Emergency Operations Plan						
Building regulations						
Zoning regulations						
Subdivision regulations						
Storm water regulations						
NFIP participation						
Floodplain regulations						

Callaway County Emergency Operations Plan (2009)

The *Callaway County Emergency Operations Plan* is a comprehensive document which covers emergency response and recovery. The foreword states that the “EOP lays a framework that will allow Callaway County to save lives, minimize injuries, protect property and the environment, preserve functioning civil government, insure constituted authority, and maintain economic activities essential to the survival and recovery from natural and man-made disasters.”

Areas covered in the plan which relate to mitigation are: communications and warning systems, media points of contact, acquisition of resources and supplies in preparation for emergency events, evacuation plans for flood, dam failure, levee failure; and sheltering procedures.

Building Regulations

Building regulations and codes can have a large impact on mitigating the effects of natural hazards. Periodic evaluation is important to ensure that the codes are appropriate to the area; enforcement is essential for the codes to be effective.

Callaway County does not currently have a planning and zoning commission or building codes. The County does have a floodplain ordinance in place to maintain compliance with NFIP. They

have a sewer ordinance concerning installation of septic systems. There are various health code ordinances within the county which have an impact on development in regards to where sewer lines can be placed.

Planning and Zoning

Appropriate zoning regulations can be an effective mitigation strategy; zoning guides development in such a way as to keep the general population and property safe.

Zoning ordinances can be a tool to discourage development in areas where desired services cannot be provided in a cost-effective manner and/or the safety of citizens could be jeopardized due to the fact that the area is not readily accessible to fire protection, law enforcement, and ambulance services.

Callaway County does not currently have a Planning or Zoning department. With the growth and development of populations in the county it may be prudent to form such a department. It is not feasible to add this to the list of mitigation actions due to the political infeasibility of establishing county wide zoning laws.

Zoning ordinances in the planning area exist in the City of Fulton.

Subdivision Regulations

Subdivision regulations serve to protect the public health and general welfare of the community by keeping development out of hazard prone areas. Subdivision regulations do this by providing specific guidelines that new developments must meet in order to be in compliance with safety and management decisions. Policy additions such as subdivision regulations are one of the more effective mitigation tools because they allow the community to design hazard-resistant places and avoid late costly retrofits or property buyouts.

Callaway County does not have any subdivision regulations, although they do exist in the City of Fulton.

Storm Water Regulations

Storm water regulations, similar to other policy related mitigation strategies, can help the community design disaster resistant communities.

Callaway County currently has storm water regulations which are available for review on the Callaway County website. The purpose of these regulations is to safeguard persons, protect property, prevent damage to the environment and promote the public welfare by guiding, regulating, and controlling the design, construction, use and maintenance of all storm water facilities and development. These regulations apply to the portion of the County designated as an “urbanized area” by the United States Bureau of the Census. A map of this area is available from the County Highway Administrator.

Auxvasse, Fulton, Holts Summit, and New Bloomfield all have storm water regulations.

National Flood Insurance Program (NFIP)

The following description from FEMA describes the history of the NFIP:

“The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for State and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.”

The jurisdictions in the Planning Area which participate in the NFIP are shown in Figure 2.10.2.

Figure 2.10.2		
Callaway County Participation in NFIP		
Jurisdiction	Date of Entry	Effective Map
Callaway County	1-03-1985	9-5-2012
Fulton	6-15-1983	9-5-2012
Kingdom City	2-18-2005	9-5-2012
Mokane	9-18-1986	9-5-2012
Holts Summit	2-18-2005	9-5-2012
New Bloomfield	2-18-2005	9-5-2012

Source: <https://www.fema.gov/cis/MO.pdf>

Legal Authority and Political Willpower

Callaway County has at its disposal a variety of powers given to it by the State of Missouri relevant to mitigation activities. A brief review of these powers is listed below.

- **Police Powers** - The police are responsible for protecting the overall public; local governments can add requirements pertinent to hazard mitigation.
- **Land Use and Building Codes** - The State of Missouri has given local governments the right to create and enforce planning and zoning regulations around construction and development including areas within designated floodplains and subdivisions.
- **Acquisition** - Local governments may find the most effective method for completely “hazard-proofing” a particular piece of property or area is to acquire the property (either in fee or a lesser interest, such as an easement); this removes the property from the private market and eliminates or reduces the possibility of inappropriate development. Missouri legislation empowers cities, towns, and counties to acquire property for public purpose by gift, grant, devise, bequest, exchange, purchase, lease or eminent domain.
- **Taxation** - The power to levy taxes and special assessments is an important tool delegated to local governments by Missouri law. The power of taxation extends beyond the collection of revenue, and impacts the pattern of development in the community.

Local units of government also have the authority to levy special assessments on property owners for all or part of the costs of acquiring, constructing, reconstructing, or improving protective structures within a designated area. This can serve to increase the cost of building in such areas, thereby discouraging development. Special assessments seem to offer little in terms of control over land use in developing areas. They can, however, be used to finance the provision of necessary services within municipal or county boundaries. In addition, they are useful in distributing to the new property owners the costs of the infrastructure required by new development. The major constraint in using special assessments is political.

- **Spending** - Local governments have the power to make expenditures in the public interest. A community can control its growth to some extent by tentatively committing itself to a timetable for the provision of capital to extend services, especially when the provision of on-site sewage disposal and water supply to the surrounding area is unusually expensive. A local community can also regulate the extension of and access to services. This tactic can help guide development away from hazard prone areas.

Political Willpower

Callaway County has seen firsthand the effects of natural hazards, most notably during the flood of 1993. Citizens are well aware of the potential impacts to life and property of such events. Due to this high degree of awareness, it is expected that the current and future political climates are favorable for supporting and advancing the suggested mitigation strategies in the Planning Area.

Community and Regional Partnerships

The Callaway County government has working relationships with the towns and cities located within the county as well as with neighboring counties. This is particularly evident in mutual aid agreements that exist between fire and law enforcement jurisdictions.

Callaway County jurisdictions have partnered successfully through and with the Mid-MO RPC on regional transportation planning and multiple local grant applications; local governments have representation on Mid-MO RPC transportation and economic development advisory committees.

Regional Homeland Security Oversight Committee

Callaway County participates in the Region F Homeland Security Oversight Committee (RHSOC). This committee addresses homeland security initiatives in a thirteen county region. A Mass Care Coordinator funded through the RHSOC has worked to increase the number of shelters throughout the region. In addition, there are three Homeland Security Response Teams available for emergency response incidents, both manmade and natural.

Non-Governmental and Volunteer Organizations

After the floods in 1993 the non-profit agencies in Missouri organized the **Missouri Voluntary Organizations Active in Disaster (MOVOAD)**. The main goal of MOVOAD is to increase cooperation, coordination, communication, education, and to pass local, county and state disaster legislation. Their mission is to bring together National Voluntary Organizations Active in Disaster to foster more effective service through mitigation and response for the benefit of people affected (imperiled and impacted) by disaster through:

1. Cooperation: To create a climate of cooperation at all levels (including grass roots) to provide information.
2. Coordination: To coordinate policy among member organizations and to serve as a liaison, advocate and national voice.
3. Communication: To disseminate information through the newsletter, the director, research and demonstration, case study and critique.
4. Education: To increase mutual awareness and understanding of each organization.
5. Convention Mechanisms: To arrange for such meetings and conferences as necessary to accomplish the purpose of MOVOAD.
6. Legislation: To encourage effective disaster relief legislation and policy.

Organizations in Callaway County such as the American Red Cross, church agencies, and other non-profits are active in supporting the work of MOVOAD. This collaborative effort ensures that Callaway County non-profits are well prepared to respond to a natural disaster. Through their legislative efforts, they also work to help make Missouri and Callaway County as disaster resistant as possible.

Communication and Media

The ability to distribute timely and reliable information to the public in the event of an emergency is vital. The nationwide Emergency Alert System (EAS), jointly coordinated by the Federal Communications Commission (FCC), FEMA, and the NWS, provides a link between the government agencies monitoring potential hazards/emergencies and local broadcasters who can inform the public in a timely manner. The Planning Area is located in the Jefferson City EAS Operational Area.

Local media outlets can also provide avenues for educating the public about emergency preparedness and the need for certain mitigation actions. The media points of contact as indicated on the Callaway County Emergency Management Agency website are shown in Figure 2.10.3.

Figure 2.10.3		
Media Points of Contact		
Radio Stations	Frequency	Location
KJMO	101.1 FM	Jefferson City
KFAL	105.5 FM	Fulton
KTXY*	106.9 FM	Columbia
TV Station	Channel	Base City
KRCG (CBS)	13	Holts Summit
KOMU (NBC)	8	Columbia (Boone County)
KMIZ (ABC)	17	Columbia (Boone County)
KNLJ (Independent)	25	New Bloomfield (Callaway County)
Newspaper		
Fulton Sun		Fulton
Jefferson City News Tribune		Jefferson City
St. Louis Post Dispatch		Jefferson City (local bureau)
* LP1 - Primary Emergency Alert System (EAS) station ** Secondary EAS station; has emergency power and redundant facilities		
Source: Callaway County/City of Jefferson Emergency Operations Plan, 2017		

In addition to the media, Callaway County can also initiate the use of 24 outdoor warning sirens that are associated with the Callaway Nuclear Power Plant within the county and one siren in neighboring Osage County, across the river. According to the Callaway County EOP the sirens are activated through the emergency operations center and any 911 dispatcher has the authority to activate these sirens. These warning sirens can be activated as one group, individually, or customized to a specific area. Testing of the sirens is set on the first Tuesday of every month, weather permitting. These sirens, while instrumental in warning the public of incoming natural disasters, are also used as a first alert in warning of incidents occurring at the Callaway Nuclear Power Plant. There are two communities without warning sirens: Mokane and New Bloomfield.

Weather Radio

The Planning Area is within range of broadcasts of the NOAA Weather Radio network, operated by the National Weather Service (NWS). Transmitters and towers are located in Fulton (Callaway County), Columbia (Boone County), Bellflower (Montgomery County), and Jamestown (Moniteau County). Special radio units which receive this transmission can be purchased from many local retail stores. Severe weather updates, flash flood warnings, and other 24-hour weather advisories from the NWS are broadcast over the network.

Missouri Uniform Law Enforcement System (MULES)

MULES is a law enforcement computer data network operated by the Missouri Highway Patrol primarily for law enforcement operations. It is also used to disseminate information emergency information such as weather conditions, flood stages, and road conditions. A MULES terminal is located in the Callaway County 911 communications center.

Callaway County Local Emergency Planning Committee (CCLEPC)

The Callaway County LEPC Committee acts as a tool for both industry, public and is the central point for information, education and planning regarding hazardous material (HAZMAT) issues. It also gives this information to neighboring counties who are emergency responders that need to plan a safe and timely response should the need arise. The committee is comprised of elected officials, industry, emergency responders, media, emergency management, private sector and others in the community that feel the need to assist in the planning and education of the citizens.

Community Emergency Response Team (CERT)

The Community Emergency Response Team (CERT) Program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Using the training learned in the classroom and during exercises, CERT members can assist others in their neighborhood or workplace following an event when professional responders are not immediately available to help. CERT members also are encouraged to support emergency response agencies by taking a more active role in emergency preparedness projects in their community.

County Text Alerts

The Callaway County Emergency Management Agency has the ability to text citizens with alert notifications in an emergency situation. Individuals can opt-in to the alerts on the county webpage and these alerts are sent by the EMA when notifications of severe weather are necessary.

2.11 Development Trends

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 community so that mitigation options can be considered in future land use decisions.

Participating jurisdictions in this planning process may undergo development in the coming years in the form of annexations, zoning, landuse, and changes in infrastructure. Because of the lack of planning and zoning in the Planning Area, there is not a very accurate way of anticipating changes in landuse.

The communities of Auxvasse, Fulton, and Holts Summit are experiencing growth in population and construction of new homes and businesses. With growing populations it would be expected that there will be a need to increase critical facilities such as fire stations, police stations, and medical facilities.

Section 3: Risk Assessment

Methodology

Risk assessment is a process of estimating the potential for injury, death, property damage, or economic loss which may result from a hazard. A risk assessment is only as valuable as the thoroughness and accuracy of the information on which it is based. The Risk Assessment for the Planning Area is comprised of the following:

- Identification of Hazards
- Profiling Hazards
- Inventory of Assets
- Assessment of Vulnerability

Identification of Hazards

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

The following natural hazards have been identified as posing potential risk in the Planning Area:

- Dam Failure
- Drought
- Earthquake
- Extreme Heat
- Flood (includes riverine flooding, flash flooding, and storm water flooding)
- Levee Failure
- Severe Winter Weather (Snow, Ice, and Extreme Cold)
- Wildfire
- Windstorm
- Tornado
- Hailstorm

The *Missouri State Hazard Mitigation Plan (2013)* indicates that expansive soils, landslides, and rock falls are recognized as hazards in Missouri but occur infrequently and with minimal impact. For this reason, those hazards were not profiled in the state plan nor will they be profiled in the Callaway County Plan. Land Subsidence/Sinkholes will not be profiled due to very minimal existence in Callaway County. The Technical Steering Committee concluded that there was no threat from this hazard and has had it removed.

There are certain other natural hazards which FEMA requires to be addressed in Hazard Mitigation Plans if they are applicable to the Planning Area. Avalanches and volcanoes have not

been included in this plan as they do not pose a threat due to Callaway County's topography and geology. Coastal erosion, coastal storms, hurricanes, and tsunamis do not pose a threat to the county due to its inland location. Land subsidence/Sinkhole has not been included in the plan due to the minimal existence of such areas in the planning area. Sinkhole locations were evaluated by the technical steering committee and were found to be a non-threat in the planning area.

Nuclear Hazard

Callaway County is home to the Callaway Nuclear Plant, which is owned and operated by Ameren UE. This is one of two fixed nuclear facilities that lie in the Mid-Missouri region and is located ten miles southwest of the City of Fulton. While an incident at this facility has the potential to pose a threat to citizens of Callaway County and neighboring areas, a general overview can be found in Section 4 of this plan. The Nuclear Hazard Section of this plan is general information about nuclear hazards. More information about this hazard can be found in Annex J of the *2013 Missouri Hazard Analysis*, which is written by the State Emergency Management Agency (SEMA). This annex has been included in Appendix E of this plan as a reference. Ameren UE also has its own set of redundancy plans in place and works closely with local agencies. Mitigation activities regarding nuclear hazard are taken very seriously by Ameren UE and they are maintained internally by the company.

Profiling of Hazards

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 of the natural hazards identified as posing a risk to the Planning Area has been studied and analyzed; this information has been organized in the following way for each hazard profile (Sections 3.1-3.9):

- Description of Hazard
- Geographic location
- Previous occurrences
- Measures of Probability and Severity
- Existing mitigation strategies

The assessments of probability and severity included in each profile were based on the following definitions from the *Missouri State Hazard Mitigation Plan (2013)*:

Measure of Probability – The likelihood that the hazard will occur.

- Low – The hazard has little or no chance of happening (less than 1 percent chance of occurrence in any given year)
- Moderate – The hazard has a reasonable probability of occurring (between 1 and 10 percent chance of occurrence in any given year).
- High – The probability is considered sufficiently high to assume that the event will occur (between 10 and 100 percent chance of occurrence in any given year).

Measure of Severity – The deaths, injuries, or damage (property or environmental) that could result from the hazard.

- Low – Few or minor damage or injuries are likely; death is possible, but not likely.
- Moderate – Injuries to personnel and damage to property and the environment is expected.
- High – Major injuries/death and/or major damage will likely occur.

The Measures of Probability and Severity are summarized in chart form in Figure 3.1.1.

Figure 3.1.1		
Measures of Probability and Severity		
	Probability	Severity
	Chance of occurrence in any given year	Potential injuries/death/damage
Low	Less than 1%	Few or minor damage/injuries likely
Moderate	Between 1% and 10%	Injuries, property damage, and environmental damage expected
High	Greater than 10%	Deaths/major injuries and/or major damage will likely occur.

Inventory of Assets

An inventory of the assets in the Planning Area is included in Sections 2.8 and 2.9.

Vulnerability Assessment

Requirement §201.6(c)(2)(ii) (A):	<i>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 area....</i>
Requirement §201.6(c)(2)(ii) (B):	<i>[The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c) (2) (11) (A) of this section and a description of the methodology used to prepare the estimate...</i>
Requirement §201.6(c)(2)(ii) (C):	<i>[The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.</i>

An assessment of structures, equipment, and populations in the Planning Area which are vulnerable to a specific hazard is included after each hazard profile in Sections 3.1-3.10. As prescribed by FEMA guidelines, critical structures, building counts, and assessed values are included. All people, structures, and equipment are vulnerable to one or more hazards in the Planning Area. This assessment can be used to identify potential areas where mitigation activities are needed.

Impact on future development is not addressed with every hazard because of the unpredictable nature of some hazards and development trends are not always identifiable in each community.

Overview of Vulnerability

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)(iii):

For multi-jurisdictional plans, the risk assessment must assess each jurisdiction's risks where they vary from the risks facing the entire planning area.

Vulnerability is defined by FEMA as the extent to which people will experience harm and/or property will be damaged from a hazard. Vulnerability is closely linked to the probability that the hazard event will occur (Measure of Probability) and to the severity which is expected (Measure of Severity).

For each identified hazard, a Vulnerability Rating was determined for the Planning Area as a whole and for each participating jurisdiction. These Vulnerability Ratings were based upon the previously determined Measures of Probability and Severity in the following manner:

- Numeric values were assigned to the Measures of Probability and Severity and the Vulnerability Rating Scale in the following manner: Low = 1, Moderate = 2, High = 3
- For each hazard in each jurisdiction, the corresponding Measure of Probability and Measure of Severity were averaged. If necessary, the average was rounded up to a whole number.
- The appropriate Vulnerability Rating was assigned based on the calculated numeric average of the Measures of Probability and Severity.

The following Vulnerability Rating Scale description was developed to be compatible with the Measures of Probability and Severity from which the Vulnerability Ratings are derived.

Rating	Property Damage	Injury or Death
NA	not applicable	not applicable
L	0-5%	little or none
M	5-10%	injuries and/or death possible
H	10-100%	major injuries and/or death likely

The vulnerability ratings for each of the identified hazards are shown in Figure 3.0.1. The Planning Area as a whole received a rating for each hazard and individual ratings were assigned for each participating jurisdiction. When the rating for a participating jurisdiction varies from the overall vulnerability of the Planning Area, the rating is highlighted in green. Figure 3.0.2 shows Measures of Probability and Severity and Vulnerability Ratings for each jurisdiction.

Figure 3.0.1 Participating Jurisdictions' Vulnerability											
Rating	Property Damage						Injury or Death				
NA	not applicable						not applicable				
L	0-5%						little or none				
M	5-10%						injuries and/or death possible				
H	10-100%						major injuries and/or death likely				
Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Hailstorm	Levee Failure	Severe Winter Weather	Tornado	Wildfire	Windstorm
Planning Area	H	M	M	M	M	M	L	M	H	L	H
Callaway County	H	M	M	M	M	M	L	M	H	L	H
Auxvasse	NA	L	M	M	L	M	NA	M	H	L	H
Fulton	M	L	M	M	L	M	NA	M	H	L	H
Holts Summit	NA	L	M	M	L	M	NA	M	H	L	H
Mokane	NA	L	M	M	M	M	NA	M	H	L	H
New Bloomfield	NA	L	M	M	L	M	NA	M	H	L	H
Fulton Public Schools	NA	NA	M	M	NA	M	NA	M	H	L	H
New Bloomfield R-III Schools	NA	NA	M	M	NA	M	NA	M	H	L	H
North Callaway R-I Schools	NA	NA	M	M	NA	M	NA	M	H	L	H
South Callaway R-II Schools	NA	NA	M	M	NA	M	NA	M	H	L	H
Callaway PWSD#1	L	M	M	NA	L	NA	NA	M	H	L	H
Callaway PWSD#2	L	M	M	NA	L	NA	NA	M	H	L	H

Figure 3.0.2

Participating Jurisdictions' Probability, Severity, and Vulnerability Overview

Probability = P	High = H																																
Severity = S	Medium/Moderate = M																																
Vulnerability = V	Low = L																																
	Dam Failure			Drought			Earthquake			Extreme Heat			Flood			Hailstorm			Levee Failure			Severe Winter Weather			Tornado			Wildfire			Windstorm		
Participating Jurisdiction	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V	P	S	V
Planning Area	L	H	M	M	M	M	L	M	M	H	L	M	H	M	H	H	L	M	M	L	M	H	M	H	H	H	H	H	L	L	L	H	H
Callaway County	L	H	M	M	M	M	L	M	M	H	L	M	H	M	H	H	L	M	M	L	M	H	M	H	H	H	H	H	L	L	L	H	H
Auxvasse				L	L	L	L	M	M	H	L	M	L	L	H	L	H	L	M				H	M	H	H	H	H	L	L	L	H	H
Fulton	L	L	L	L	L	L	L	M	M	H	L	M	H	L	M	H	L	M					H	M	H	H	H	H	L	L	L	H	H
Holts Summit	L	H	M	L	L	L	L	M	M	H	L	M	L	L	L	H	L	M					H	M	H	H	H	H	L	L	L	H	H
Mokane				L	L	L	L	M	M	H	L	M	H	M	H	H	L	M					H	M	H	H	H	H	L	L	L	H	H
New Bloomfield				L	L	L	L	M	M	H	L	M	L	L	L	H	L	M					H	M	H	H	H	H	L	L	L	H	H
Fulton Public Schools							L	M	M	H	L	M				H	L	M					H	M	H	H	H	H	L	L	L	H	H
New Bloomfield R-III Schools							L	M	M	H	L	M				H	L	M					H	M	H	H	H	H	L	L	L	H	H
North Callaway R-I Schools							L	M	M	H	L	M				H	L	M					H	M	H	H	H	H	L	L	L	H	H
South Callaway R-II Schools							L	M	M	H	L	M				H	L	M					H	M	H	H	H	H	L	L	L	H	H
Callaway PWSD#1	L	L	L	M	M	M	L	M	M				H	L	H								H	M	H	H	H	H	L	L	L	H	H
Callaway PWSD #2	L	L	L	M	M	M	L	M	M				H	L	H								H	M	H	H	H	H	L	L	L	H	H

3.1 Dam Failure

Description of Hazard

A dam is defined by the National Dam Safety Act as an artificial barrier which impounds or diverts water and: (1) is more than 6 feet high and stores 50 acre feet or more, or (2) is 25 feet or higher and stores more than 15 acre feet (an acre foot is defined as the amount of water covering one acres to a depth of one foot). Based on this definition, there are over 80,000 dams in the United States. Over 95% are non-federal, with most being owned by state governments, municipalities, watershed districts, industries, lake associations, land developers, or private citizens. Dam owners have primary responsibility for the safe design, operation and maintenance of their dams. They also have responsibility for providing early warning of problems at the dam to necessary officials, for developing an effective emergency action plan, and for coordinating that plan with local officials. The State has ultimate responsibility for public safety, and many states regulate construction, modification, maintenance, and operation of dams, and also ensure a dam safety program. The State of Missouri has a Dam and Reservoir Safety Program under the direction of the Missouri Department of Natural Resources.

Dams can fail for many reasons. The most common are:

- **Overtopping:** inadequate spillway design, debris blockage of spillways, or settlement of the dam crest.
- **Piping:** internal erosion caused by embankment leakage, foundation leakage and deterioration of pertinent structures appended to the dam.
- **Erosion:** inadequate spillway capacity causing overtopping of the dam, flow erosion, and inadequate slope protection.
- **Structural Failure:** caused by an earthquake, slope instability or faulty construction.

These four types of failures are often interrelated. For example, erosion, either on the surface or internal, may weaken the dam or lead to structural failure. Similarly a structural failure may shorten the seepage path and lead to a piping failure.

Dam construction varies widely throughout the state. A majority of dams are of earthen construction. Missouri's mining industry has produced numerous tailing dams for the surface disposal of mine waste. These dams are made from mining material deposited in slurry form in an impoundment. Other types of earthen dams are reinforced with a core of concrete and/or asphalt. The largest dams in the state are built of reinforced concrete, and are used for hydroelectric power.

Dam Hazard Classification

Dams pose a hazard to human life and property through faulty operation and outright failure. Dams in Missouri have been classified according to both a federal and state system with regards to potential hazard posed.

The **federal classification system** is based upon the probable loss of human life and the impact on economic, environmental and lifeline interests from dam failure. It should be noted that there is always the possibility of loss of human life when a dam fails; this classification system does not account for the possibility of people occasionally passing through an inundation area which is usually unoccupied (e.g. occasional recreational users, daytime user of downstream lands, etc.).

The **state classification system** is based upon the type and number of structures downstream from a dam. An inventory of all the dams of the state was done in the late 1970s and early 1980s, according to Glenn Lloyd, Civil Engineer and Dam Safety Inspector with the Dam Safety Program of the MO Department of Natural Resources (DNR) (2012). All of the known dams were classified by the state at that time.

Dam Regulation in Missouri

According to the Association of State Dam Safety Officials, there are 5,243 recorded dams in Missouri and only 682 (about 13%) are regulated by the state (2013 MO Hazard Mitigation Plan). Pursuant to Chapter 236 of the Revised Statutes of Missouri, a dam must be 35 feet or higher to be state regulated; regulation makes a dam subject to permit and inspection requirements. For regulated dams, the state classification system dictates the required inspection cycle; unregulated dams do not have required inspections. Missouri House Bill 603 (1979) created exemptions for certain dams: Dams less than 35 feet high, those primarily used for agricultural purposes, and those regulated by other state or federal agencies (Missouri State Hazard Mitigation Plan 2013). There are also 66 federally-regulated dams in Missouri. All federally-regulated dams fall outside the regulatory authority of the Missouri Dam and Reservoir Safety Program.

The inspection cycle for regulated dams allows for a regulated dam's classification to be updated when appropriate. Classification is a dynamic system; development can easily change the situation downstream. A regulated dam in Missouri would have its classification appraised at least once every 5 years.

One must use caution in assuming the classifications of unregulated dams is currently accurate. It is very probable that, for most of the unregulated dams, the classification does not take into account almost 30 years of development and change in Callaway County. As stated in the 2013 State Hazard Mitigation Plan, "Many of Missouri's smaller dams are becoming a greater hazard as they continue to age and deteriorate." This is the case across the state, including Callaway County. Unregulated dams today may be a higher risk than they were during the initial dam assessment 30-40 years ago. The county attempts to mitigation this fact by inspecting all of the county's dams each year with an engineer from Missouri Department of Natural Resources, including those not regulated by the state.

In addition, the DNR database of dams in Missouri reflects only the known dams; a dam less than 35 feet in height which was built since the inventory was taken some 30 years ago may not appear in the database.

A summary of the federal and state classification systems, how the two systems relate to each other, and inspection requirements for regulated dams is shown in Figure 3.1.1.

Limitations of Dam Maintenance

Private land owners are responsible for the necessary maintenance and repairs of dams, which can lead to issues if they either do not repair or maintain the dam. If there is an urgent issue with a dam, and the county has resources available, the county will attempt to assist the property owner mitigate any danger posed by the dam. Though this is not a reliable source due to the limitations of county resources and the liability associated. The cost of dam repair and maintenance is the dam owner's responsibility.

Grants may be available, but these are not guaranteed and pursuing them would be the responsibility of the dam owner.

Figure 3.1.1

Dam Hazard Classification Systems

Federal Classification	Federal Criterion	State Classification	Downstream Environment	Inspection Requirement (Regulated Dams)
High hazard	Probable loss of human life	Class 1	10 or more permanent dwellings; or any public building	Every 2 years
		Class 2	1-9 permanent dwellings; or 1 or more campgrounds with permanent water, sewer and electrical services; or one or more industrial buildings	Every 3 years
Significant hazard	No probable loss of human life but potential economic loss, environmental damage, disruption of lifeline facilities or other impact of concern	Class 3	Everything else	Every 5 years
Low hazard	No probable loss of human life; low economic and/or environmental loss; loss principally limited to owner's property			

Sources: Federal Guidelines for Dam Safety, Hazard Potential Classification System for Dams, April 2004, <http://www.fema.gov/library/viewRecord.do?id=1830>; <http://www.sos.mo.gov/adrules/csr/current/10csr/10c22-2.pdf>; Glenn Lloyd, Civil Engineer/Dam Safety Inspector, MO DNR, Water Resources Center, Dam Safety Program

There are currently 108 dams in Callaway County according to the Department of Natural Resources database. Of these, only 20 are regulated by the state (see Figure 3.1.2). It should be noted that during the course of this planning process there were found to be several unregulated dams not in the database that are apparent via aerial imagery.

Figure 3.1.2

Hazard Categories of Callaway County Dams

State Hazard Category	Regulated Dams	Unregulated Dams	All County Dams	Percentage of Total Dams
Class 1 (high)	1	3	4	3.7%
Class 2 (high)	8	18	26	24.1%
Class 3 (significant/low)	11	67	78	72.2%
Total	20	88	108	100%

Source: <http://dnr.mo.gov/geology/wrc/dam-safety/damsinmissouri.htm>

Specific information for each of the 20 regulated dams and 88 unregulated dams can be found in Figures 3.1.6 – 3.1.7. Again it is important to note that, according to information from Missouri DNR, much of this data, perhaps most of it, for the unregulated dams has not been updated since the dam survey was first conducted in the late 1970s and early 1980s. The heights of the unregulated dams may be, in some cases, the only currently reliable information.

Geographic Location

The dams in the Planning Area are located in unincorporated Callaway County, Fulton, and Holts Summit (see Figure 3.1.3). Since the last update, Lake Mykee has been annexed into Holts Summit. The regulated Lake Mykee Dam is now located in Holts Summit.

Dam failure is not an issue for Auxvasse, New Bloomfield, Fulton Public Schools, New Bloomfield R-III Schools, North Callaway R-I Schools, and South Callaway R-II Schools. Even though the Fulton School District encompasses the City of Fulton where there are dams, the structures of these educational institutions are not within the projected inundation areas of the dams. The unregulated dam located within Holts Summit does not pose a threat to any structures within the city.

The following three figures (Figures 3.1.3 - 3.1.7) show the locations and pertinent information for regulated and non-regulated dams that are currently in the state database for Callaway County. It is critical to note that Callaway County has several dams that are not accounted for in the state database. These dams are visible in 2010 NAIP imagery. The future addition of these undocumented dams into the state database would be a prudent step forward in mitigating for the effects of dam failure.

Figure 3.1.3

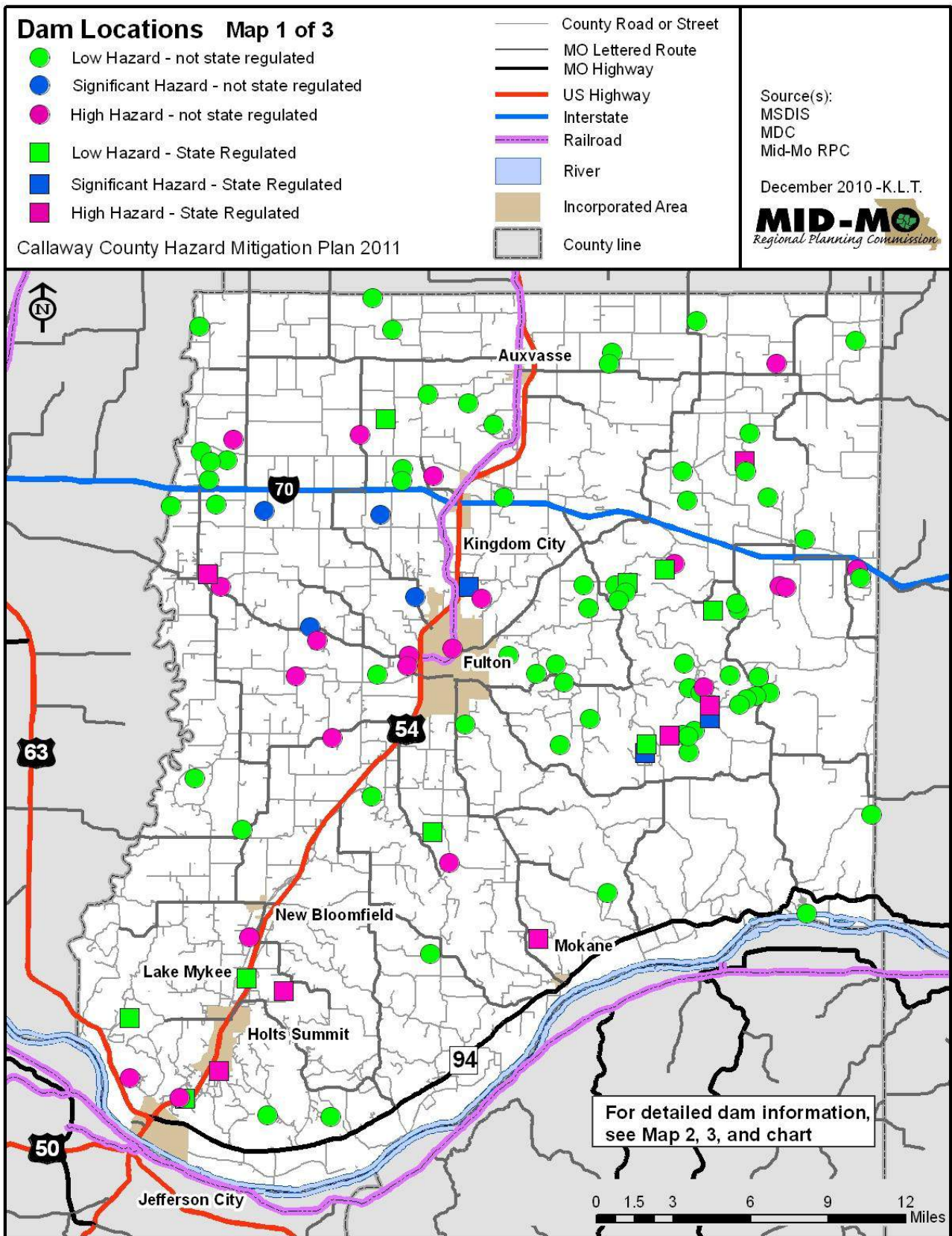


Figure 3.1.4

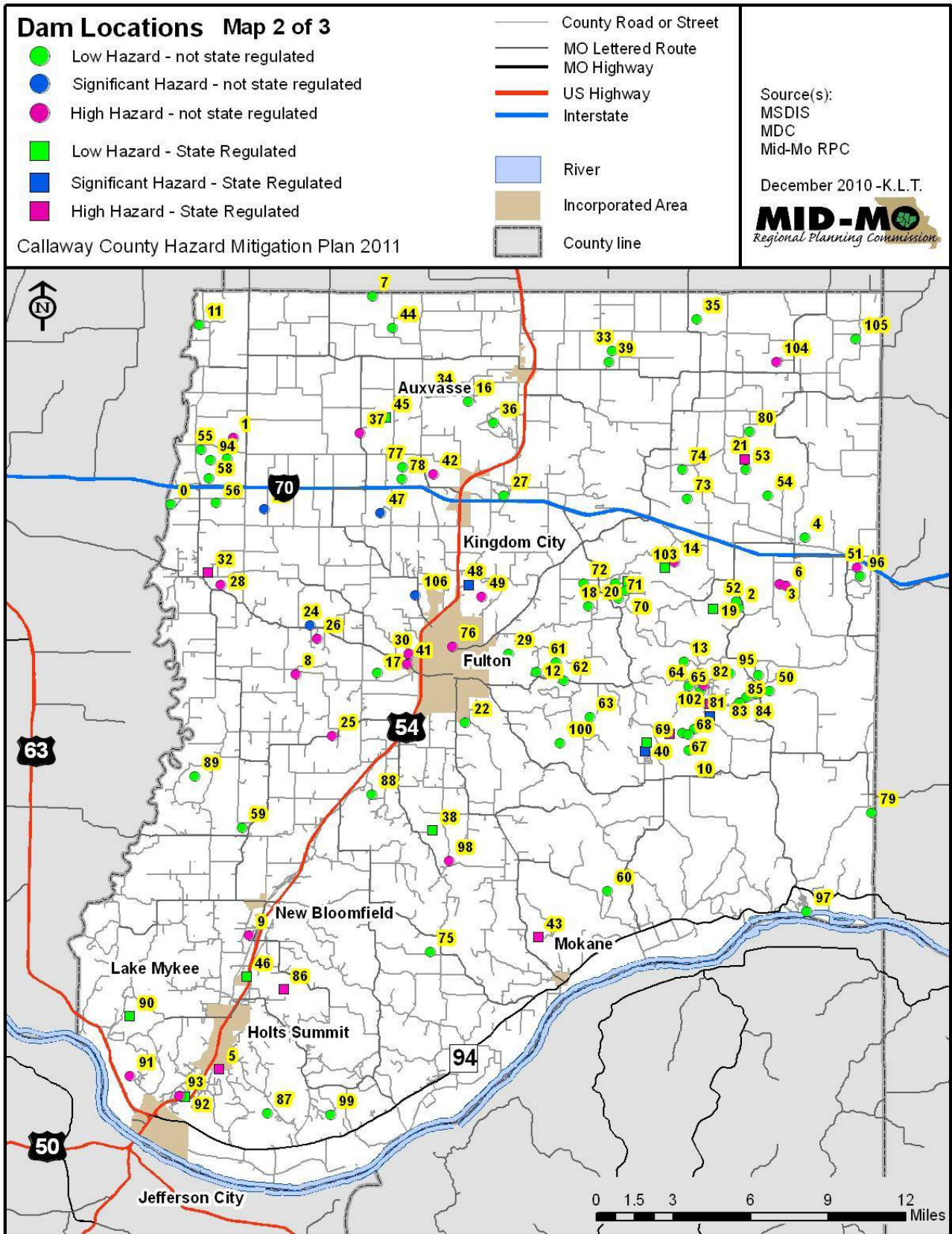


Figure 3.1.5

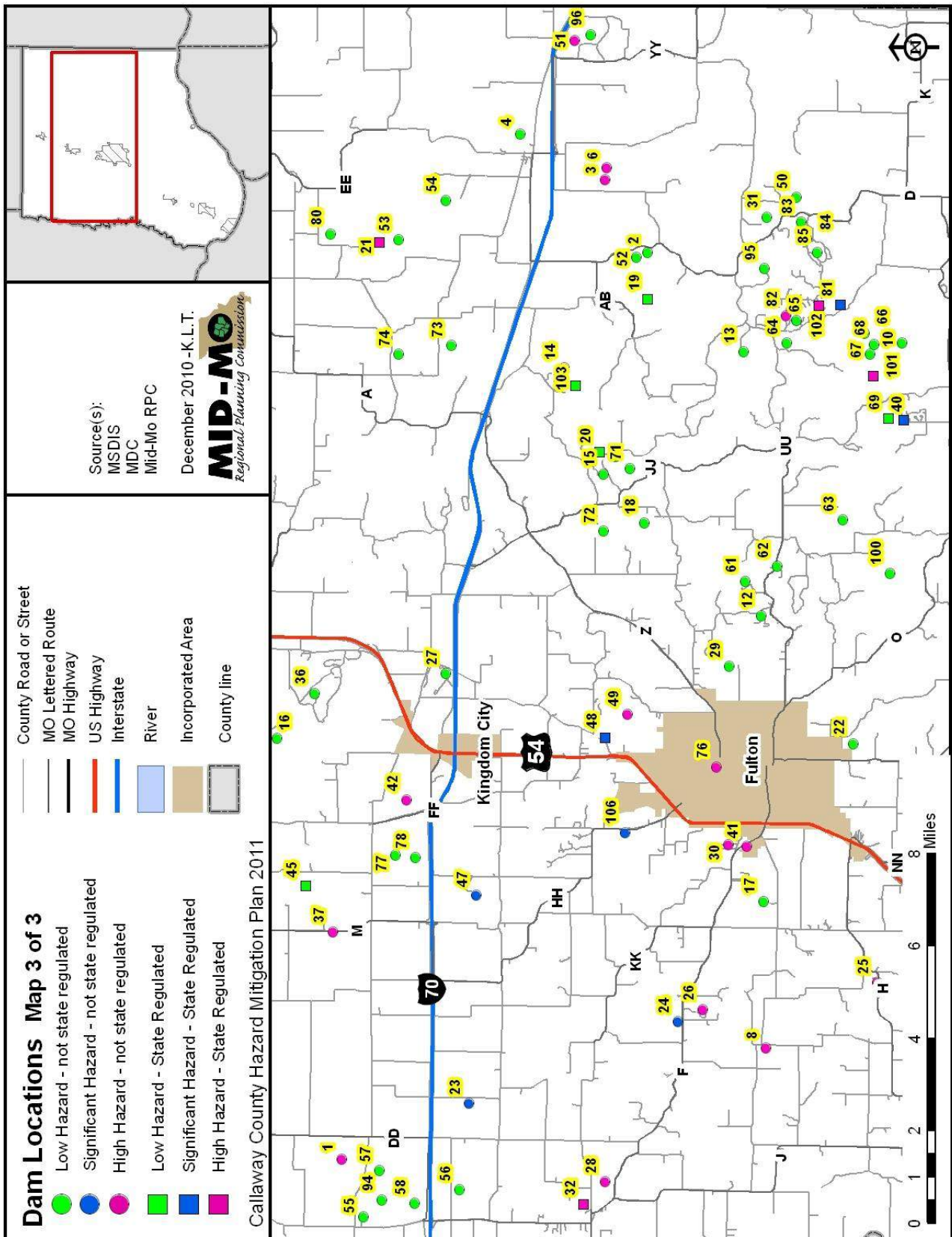


Figure 3.1.6 Regulated Callaway County Dams

REGULATED Callaway County Dams						
ID#	Name	Year Built	Height (Ft)	Reservoir Area (Acres)	Drainage Area (Acres)	Hazard Class
MO10062	FOREST LAKE DAM	1959	38	9	59	2
MO10736	GLOVER SPRING LAKE DAM	1954	38	28	3774	3
MO10873	HEINRICHSMEYER DAM	1965	37	24	314	3
MO10874	LEISURE LAKE MAIN DAM	1960	58	46	690	3
MO10876	WHETSTONE CREEK BIG LAKE DAM	1956	47	26	355	2
MO10888	LITTLE DIXIE LAKE DAM	1958	41	196	2310	1
MO10914	HERRING LAKE DAM	1968	50	46	2930	3
MO10988	LAKE THUNDERBIRD UPPER DAM	1967	49	19	643	3
MO11048	KATY LAKE DAM	1905	44	14	575	2
MO11162	LEHENBAUR LAKE DAM-SECTION 25	1977	45	37.1	2900	3
MO11170	LAKE MY-KEE DAM	1977	44	34	153	2
MO11194	BACKER LAKE DAM	1976	38	9	85	3
MO11426	LAKE THUNDERBIRD LOWER DAM	1968	68	20	916	3
MO12101	SELFLEISCH DAM	1980	49	55	450	3
MO20008	HOWARD LAKE DAM	1966	40	10	240	3
MO30319	TRIMBLE LAKE DAM-EAST	1958	48	4	70	2
MO31274	LOWER CANYON LAKE DAM	1973	58	43	1792	2
MO31276	LAKE LAHWEENODAM	1972	46	45	760	2
MO31279	SULLIVAN LAKE DAM	1977	41	9	85	3
MO12278	BAUMGARTNER LAKE DAM	1991	61.5	30	2106	2

Source: <http://dnr.mo.gov/geology/wrc/dam-safety/damsinmissouri.htm>

Figure 3.1.7 Non-Regulated Callaway County Dams

UNREGULATED Callaway County Dams						
ID#	Name	Year Built	Height (Ft)	Reservoir Area (Acres)	Drainage Area (Acres)	Hazard Class
MO11419	HERRING LAKE DAM	1957	30	3	141	3
MO11420	MIRTS LAKE DAM	1955	25	4	80	3
MO11421	KONRAD DAM	1973	25	8	36	3
MO11422	WINFIELD INVESTMENT LAKE DAM	0000	33	6	40	3
MO11423	LOST CANYON LAKES DAM-SECTION 25 UPPER	0000	30	2	43	3
MO11424	LOST CANYON LAKES DAM-SECTION 26 WEST	0000	30	3	19	3
MO11425	LOST CANYON LAKES DAM-SECTION 26 EAST	0000	25	2	22	3
MO10074	G&G CATTLE CO DAM EAST	1962	25	12	115	2
MO11415	MILLER LAKE DAM	1976	20	12	350	3
MO11418	LAWRENCE DAM	1967	30	7	65	3
MO10023	VAUGHN DAM	1972	18	19	270	2
MO10030	KNITTEL LAKE DAM	1947	34	8	36	3
MO10031	G7G CATTLE CO DAM WEST	1964	30	25	575	2
MO10032	STAPLES LAKE DAM	1959	27	11	162	3
MO10014	NEWMAN LAKE #2 DAM	1968	20	17	464	3
MO10174	OFFUTT DAM	1971	20	16	162	3
MO10245	EVE LAKE DAM	1968	21	10	140	2
MO10293	MEADOW BROOK DAM	1960	22	7	98	2
MO10432	CANYON LAKE UPPER DAM	1973	25	13	1300	3
MO10723	LINN LAKE DAM	1954	25	13	45	3

MO10737	MUCKLER&SIELFLEISCHLAKEEDAM	1967	31	17	180	3
MO10739	HRINLAKEEDAM	1959	25	17	350	2
MO10740	LEISURELAKEEDAM-WEST	1960	30	10	170	3
MO10745	LEHENBAURLAKEEDAMSECT28	1969	25	10	43	3
MO10854	REEDLAKEEDAM	1946	15	10	90	3
MO10856	DOLNICKLAKEEDAM	1960	30	11	110	3
MO10877	RICHARDSONLAKEEDAM	1963	28	15	210	3
MO10878	LOCHWINNOCHDAM	1967	24	7	225	3
MO10879	HEADACHELAKEEDAM	1971	21	1	19	3
MO10880	ALTHISERLAKEEDAM	1967	25	7	130	2
MO10881	REEDS LAKEEDAM	1932	20	25	446	2
MO10882	MCCREDIEEXPERIMENTSTATION	1940	25	36	1071	3
MO10883	BAUMGARTNERDAM	1968	29	7	60	1
MO10885	HARBISON-WALKERREFRACTORYLAKEEDAM	1960	30	10	42	3
MO10886	LACPIETEDAM	1967	22	3	34	1
MO10887	EMBREE LAKEEDAM	1958	25	8	60	3
MO10900	WOODSDAMNORTH	1973	15	16	270	3
MO10902	LAMERSLAKEEDAM	1973	28	20	380	3
MO10903	WHALENDAM	1973	25	13	85	3
MO10910	BAKERLAKEEDAM	1965	30	16	50	3
MO10912	LEHENBAUERLAKEEDAM-SECT35	1974	20	45	460	2
MO10915	WOODSDAMSOUTH	1971	32	25	125	3
MO10989	HAUCKLAKEEDAM	1974	23	14	289	2
MO10990	GUTHRIELAKEEDAM	1976	26	11	182	2
MO11049	VANDERKAMPLAKEEDAM	1976	24	5	85	3
MO11193	ATKINSONLAKEEDAM	1976	15	5.3	224	3
MO11195	RENNERDAM	1974	28	12	124	2
MO11303	GROSSDAM	1976	30	9	97	3
MO11312	AMERICANCENTCORPUPPERDAM	0000	30	3	19	2
MO11314	KNITTEL DAM#2	1973	27	9	32	3
MO11316	WHETSTONECREEKWLDLFAREA-SEC6-UPPER	1956	19	12	169	3
MO11317	WHETSTONECREEKWLDLFAREAEDAM-SEC8	1941	26	5	96	3
MO11320	DALYDAM	1945	20	4	69	3
MO11410	CASTLELAKEEDAM	1977	20	11	211	3
MO11411	DAVISLAKEEDAM	0000	20	13	55	3
MO11412	DISCWASHERINC.DAM	1955	25	3	43	3
MO11413	DAVISLAKEEDAM	1969	33	20	70	3
MO11438	LEISURELAKEEDAM-EAST	0000	25	7	49	3
MO11439	LEISURELAKEEDAM-SOUTH	0000	28	7	110	3
MO11440	PHILLIPSLAKEEDAM	0000	27	6	65	3
MO11450	MARTILAKEEDAM	1963	30	8	50	3
MO11451	WILSONLAKEEDAM	1977	26	6	41	3
MO11525	HELD DAM	1966	20	12	367	3
MO11526	JUNIORLAKEEDAM	1960	13	18	1900	1
MO11527	BORMANLAKEEDAM	1976	20	1.7	13	3
MO11528	ATKINSON,TERRYLAKEEDAM	1971	20	5.8	256	3
MO12073	MATHEWSLAKEEDAM	1960	25	11	55	3
MO12087	WHETSTONECREEKWLDLFAREAEDAMSEC-32	1969	22	9	65	3
MO12213	BASSLAKEEDAM	1980	33	30	528	2
MO12217	SHRANDLAKEEDAM	0000	27	3	34	3
MO12218	BRUSHLAKEEDAM	0000	28	3	35	3

MO12219	WINFIELD LAKE DAM	0000	25	3	30	3
MO20007	DR WINDMILLER	1958	20	7	65	3
MO30009	GURWIT & LEWIS LAKE DAM	1964	30	6	256	2
MO30323	TRIMBLE LAKE DAM-WEST (DRY)	1955	30	5	50	2
MO30523	SMITH DAM	1965	25	7	215	3
MO30657	WRIGHT LAKE DAM	1958	27	10	159	3
MO30915	HENKE LAKE DAM	1970	33	25	4200	2
MO30918	SHADOW VALLEY LAKE DAM	1960	25	10	450	3
MO30947	LEE SUALTS	1960	16	7	30	3
MO30846	AMERICAN CENTRAL CORP LOWER DAM	0000	30	7	265	3
MO30914	PARADISE LAKE DAM	1954	18	1	250	3
MO31461	COVINGTON LAKE DAM	0000	30	8	150	2
MO31466	ZANDER LAKE DAM	1977	25	7	24	3
MO12373	GRAHAM LAKE DAM	1984	33	5	0	3
MO12387	BLUE BIRD LAKE DAM	1980	28	8	0	3
MO50054	VERNON E CHELMEIER DAM	1979	17	7	269	3
MO51531	LARRY HENDRIX DAM	2009	22.6	1	96	3
Source: http://dnr.mo.gov/geology/wrc/dam-safety/damsinmissouri.htm						

Previous Occurrences

Dam failure continues to be an issue throughout Missouri, the issue was highlighted most recently in the mid-Missouri region by a dam failure in Callaway County in 2016, in neighboring Boone County in 2008, and a near failure in Cole County in 2009.

The dam failure in Callaway County occurred in the period between the previous hazard mitigation plan update (2012) and the current update (2017). The Glover's Spring Lake Dam failed in August 2016 after two days of heavy rainfall causing flash flooding that swept away parts of the road and bridge on County Road 101¹. According to a *Columbia Tribune* article, prior to the dam's failure, homes near the dam experienced flooding due to the rising waters within the lake.² Following the failure, there was no reported injuries or property damage, but there was damage to the land around the dam that can be seen in Figure 3.1.8. The before and after photos of the aerial photography in Figure 3.1.8 show the area downstream of the dam and the area affected by the dam failure. This was a non-regulated dam.

¹ <http://turnto10.com/news/nation-world/dam-break-causes-flash-flooding-in-missouri>

² <http://www.columbiatribune.com/0f7e8a64-68fe-511a-a69b-af0905d08b96.html>

Figure 3.1.8- Glover’s Spring Lake Dam Failure



Image source: Google Earth Pro. September 2017.

The Moon Valley Lake Dam in Columbia (Boone County) failed in March 2008. This 18-foot high unregulated dam had been built in 1964; it drained 2,100 acres and had a 13-acre reservoir, according to the DNR database. Moon Valley Lake Dam was classified as high hazard, but there was no loss of life with the dam failure. This may be partially attributable to the fact that Moon Valley Lake was silted in and the main release from the dam failure was silt which went down the Hominy Branch into the Hinkson Creek. The added silt has caused greater flooding problems on the Hinkson Creek since the time of the dam failure. The City of Columbia estimated the cost of removing the sediment and stabilizing about 2,000 feet of the stream bank to be in the vicinity of \$400,000.

Failure of the Renn’s Lake Dam in Jefferson City (Cole County) was averted in late October/early November 2009 through the work of emergency crews and volunteers who relieved pressure on the earthen dam by pumping thousands of gallons of water from 7-acre Renn’s Lake. The 30-foot high unregulated dam, built in 1950, had been weakened by the growth of trees; heavy rainfall caused a 15-foot section to erode. Renn’s Lake is located immediately to the west of U.S. Highway 54 and the failure of the dam would have threatened the highway. The deed to Renn Lake was subsequently transferred to Cole County with plans to breach the dam and drain the lake.

Cole and Boone Counties are not the only counties in Missouri to experience dam failures. According to the *Missouri State Hazard Mitigation Plan (2013)*, the Stanford University’s National Performance of Dams Program documented 82 dam incidents in Missouri between 1975 and 2013, of which, 17 (21%) were failures, not including the two known incidents of Taum Sauk failure in 2005 and Moon Valley Lake Dam failure in 2008 (since the database isn’t updated since 2001).

In 2015, there was a dam failure which destroyed Johnson Shut-Ins State Park in Reynolds County. On December 14, 2005, Ameren UE's Taum Sauk reservoir dam at their hydroelectric complex failed; 1.5 billion gallons of water were released into the park in 10 minutes. There was no loss of life, even though the superintendent's family was swept out of their home. However, if this failure had occurred during the summer when the popular park has many visitors, it could have resulted in a catastrophic loss of life.

All of these dam failures indicated that this is a serious problem which needs attention. Many of Missouri's smaller dams are becoming a greater hazard as they continue to age and deteriorate. Hundreds of dams need to be rehabilitated, but lack of available funding and often questions of ownership loom as obstacles difficult to overcome.

Measure of Probability and Severity

Probability: Low

Severity: High

30 dams in Callaway County are considered to pose high or significant hazard should there be a dam break. Of these dams, 21 of them are not regulated by the state and thus not subject to inspection requirements. These numbers were taken from the total Class 1 and Class 2 dams; the Class 3 dams could still pose a significant hazard. Especially the unmaintained Class 3 dams. Although there has been an incidence of dam failure, it is still an unlikely occurrence.

Existing Mitigation Strategies

State regulated dams are inspected, according to classification, through the Dam Safety Program of the DNR. Non-regulated dams are voluntarily visited by the Callaway County Emergency Management Agency and a Missouri Department of Natural Resources engineer annually.

Dam Failure Vulnerability

Jurisdictions: Unincorporated Callaway County, Fulton, Holts Summit, and Boone Co. PWSD #9

Overview

The unincorporated areas of Callaway County are most vulnerable to the effects of dam failure. A dam failure in Callaway County could range from very minimal environmental damage to a significant loss of life and infrastructure. All impacts are dependent upon several variables: water, debris, people, and structures. A dam failure would include the breach of a dam wall or embankment allowing the water and/or debris to flow downstream from the dam.

The Dam Inventory for the state of Missouri was compiled in the late 1970's to early 1980's. The state has classified 30 of Callaway County's dams as "High Hazard". Of the 30 High Hazard dams in Callaway County, 21 are unregulated. Only 6 of those 21 High Hazard, unregulated dams have ever been documented as having been inspected. (This is apart from the annual visit from the Callaway County Emergency Management Director.) This presents two main problems. First, it has been more than 20 to 30 years since any of the unregulated High Hazard dams have been inspected beyond the annual review done by the Callaway County Emergency Management Director; this does not include the ones that were never initially inspected. Second, because these are *unregulated* dams, the state has no jurisdiction over maintenance and there is no authority within the local government to enforce dam maintenance and repairs. These issues lead to the overall problem of dam location and development downstream.

State regulated dams are classified by what lies downstream of the dam and what will be impacted by the failure of that dam. Unregulated dams received their classifications nearly 30 years ago or more and development that occurs downstream is not monitored by any agency; this potentially puts the public at risk. Also, development upstream that might increase the contents held by the dam can cause failure. Because there is no entity in charge of unregulated dams, the original classifications for these dams may not be correct in 2017. Some dams may not exist anymore while others may pose a greater downstream threat than their classifications indicate. Unregulated dams may have significant weakness or maintenance neglect unknown to those responsible for ensuring dam safety and nearby development.

While evaluating the state dam inventory list and comparing it to 2010 aerial images of the Planning area several locations were found to be inconsistent with the Missouri Department of Natural Resources database. As stated previously, it is critical to note that Callaway County has several dams that are not accounted for in the state database. The future addition of these undocumented dams into the state database would be a prudent step forward in mitigating for the effects of dam failure.

Potential Impact on Existing Structures

The cities of Fulton and Holts Summit have dams inside, or within a mile upstream of, their corporate boundaries. Structures downstream of these dam locations could potentially be at risk if a failure were to occur depending on the size of the reservoir behind the dam. Throughout the county several other dams lie upstream of structures that have the potential of being impacted.

The City of Holts Summit has one dam located on the southern boundary of the community. Upon evaluation of the downstream side of the dam, the City has deemed this dam to be of no risk to life or property. Lake Mykee Dam is also a part of Holts Summit after the annexation of Lake Mykee into Holts Summit. Although there are not a significant number of properties below this dam, Highway 54 and Baumgartner Dam are in the path of a potential dam failure. As stated in the Lake Mykee Dam Emergency Action Plan, Baumgartner Dam would likely fail if Lake Mykee Dam failed; Baumgartner Dam is a state regulated high hazard dam.

Boone County Public Water Supply District #9 (PWSD#9) has identified Dam Failure as a potential hazard for their districts infrastructure. A dam failure could result in the subsidence of soil or rock around water pipes which could break those pipes and cause loss of the use of that service. A breach of Vaughn Dam or Little Dixie Lake Dam could result in such a subsidence and cause damage to water infrastructure. County Road 228 downstream from Little Dixie Lake has water distribution lines that run under it and could be impacted by a dam failure. County Road 276 also runs over water lines that could be impacted by a breach of Vaughn Dam. PWSD#9 has addressed this potential for damage in their mitigation strategy in Section 4 of this plan.

The potential impact on structures and human life downstream from a dam failure directly correlates to the amount of water and/or debris that is behind the dam. As stated in the hazard profile, it is important to take into account the age of the data that has been compiled on state regulated and unregulated dams in the county and in the state. Because data on unregulated dams was collected in the late 1970's and early 1980's it is not always reliable to use when looking at possible areas of impact.

Because official inundation information is not available at this time it is not possible to know exactly the severity or distance of a dam failure. (These maps should be available within the next year and will be added to the plan following their release.) The Missouri State Hazard Mitigation Plan 2013 offered the following vulnerability statistics for *State Regulated* dam failure in Callaway County:

Callaway County Dam Failure Vulnerability State Regulated Dams	
Estimated Number of Buildings Vulnerable	40
Average Exposure Value per Structure (\$)	106,696
Estimated Total Potential Building Exposure (\$)	6,711,773
Estimated Total Population Exposure	130
Estimated Building Losses (\$)	3,355,887
Source: 2013 MO Hazard Mitigation Plan	

Figures 3.1.8 through 3.1.21 depict the downstream areas, and parcels that are within a half mile any high hazard dams in Callaway County. All figures were created using the same scale. The following is a list of the high hazard dams and their correlating figure number:

High Hazard State Regulated Dams:

Dam	Figure	Dam	Figure
Althiser Lake Dam	3.1.13	Henke Lake Dam	3.1.17
American Cent Corp Upper Dam	3.1.13	Hrin Lake Dam	3.1.18
Bass Lake Dam	3.1.10	Junior Lake Dam	3.1.18
Baumgartner Dam	3.1.14	Lac Piete Dam	3.1.17
Covington Lake Dam	3.1.14	Lehenbauer Lake Dam Sect 35	3.1.19
Eve Lake Dam	3.1.15	Meadow Brook Dam	3.1.19
G&G Cattle Co Dam East	3.1.16	Reeds Lake Dam	3.1.20
G&G Cattle Co Dam West	3.1.16	Renner Dam	3.1.20
Gurwit & Lewis Lake Dam	3.1.16	Trimble Lake Dam-West (Dry)	3.1.21
Guthries Lake Dam	3.1.15	Vaughn Dam	3.1.21
Hauk Lake Dam	3.1.17		

High Hazard Dams (not state regulated):

Dam	Figure	Dam	Figure
Baumgartner Lake Dam	3.1.8	Little Dixie Dam	3.1.11
Forest Lake Dam	3.1.8	Lower Canyon Lake Dam	3.1.9
Katy Lake Dam	3.1.9	Whetstone Creek Wildlife Dam	3.1.12
Lake Wahweeno Dam	3.1.10		

Figure 3.1.8

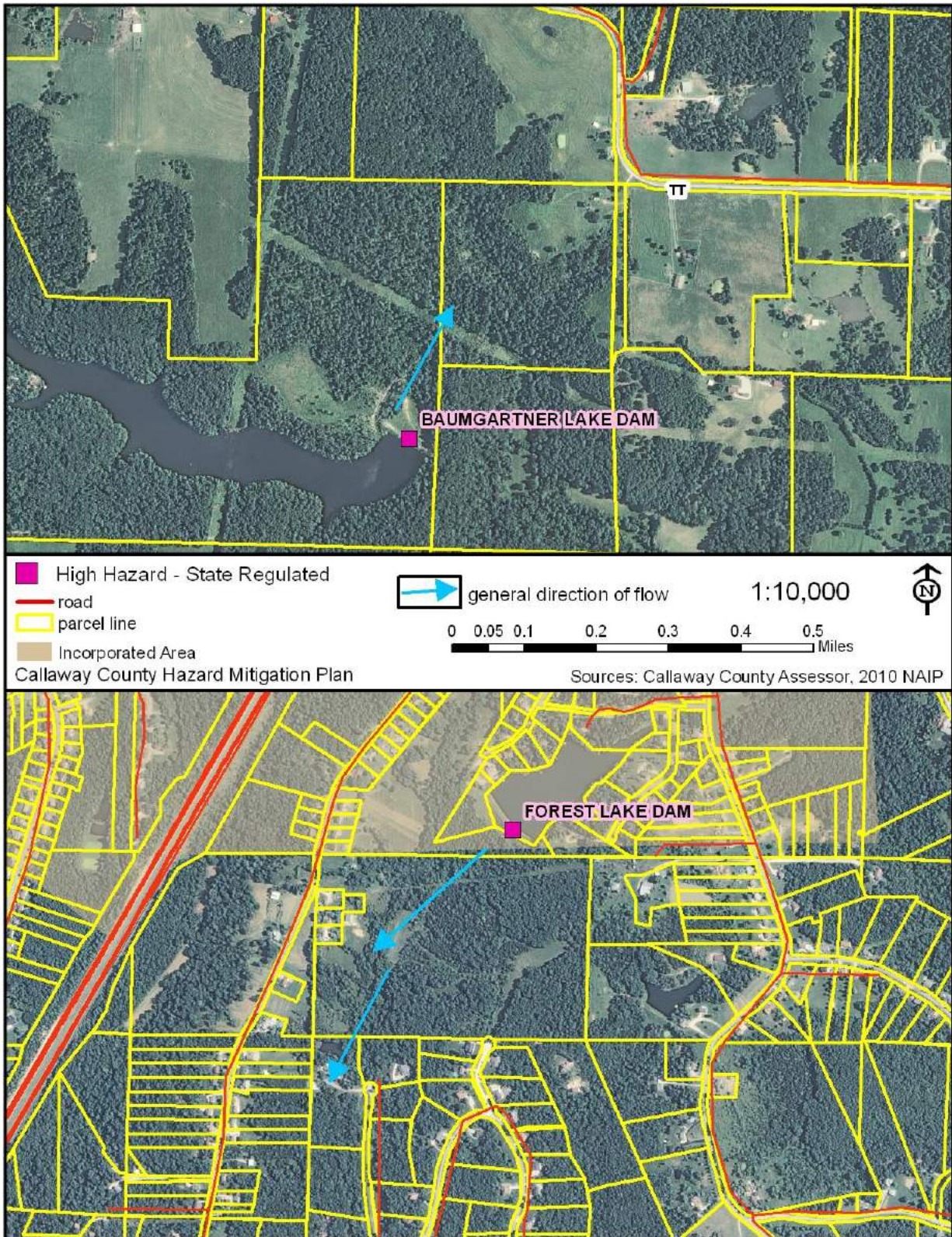


Figure 3.1.9

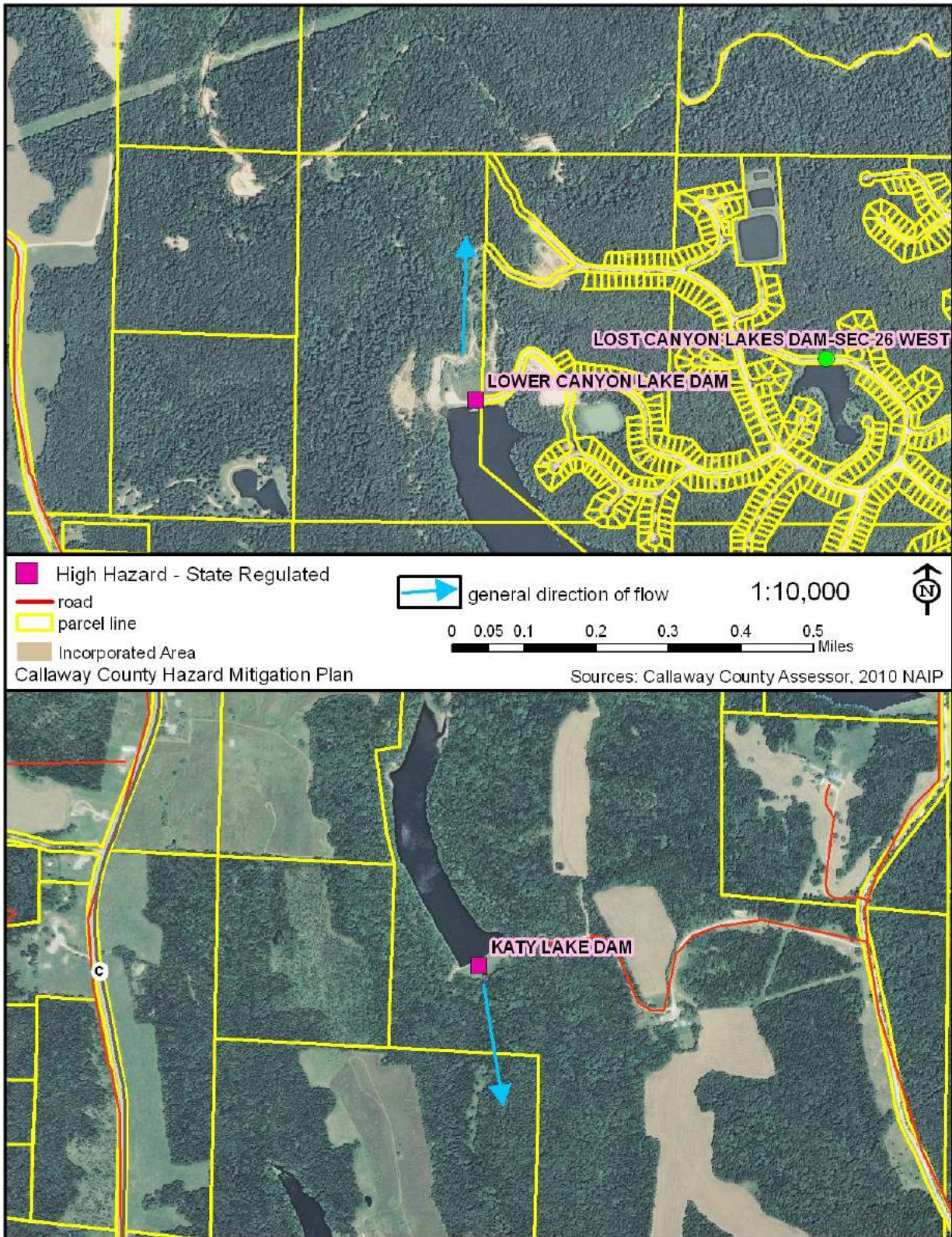


Figure 3.1.10

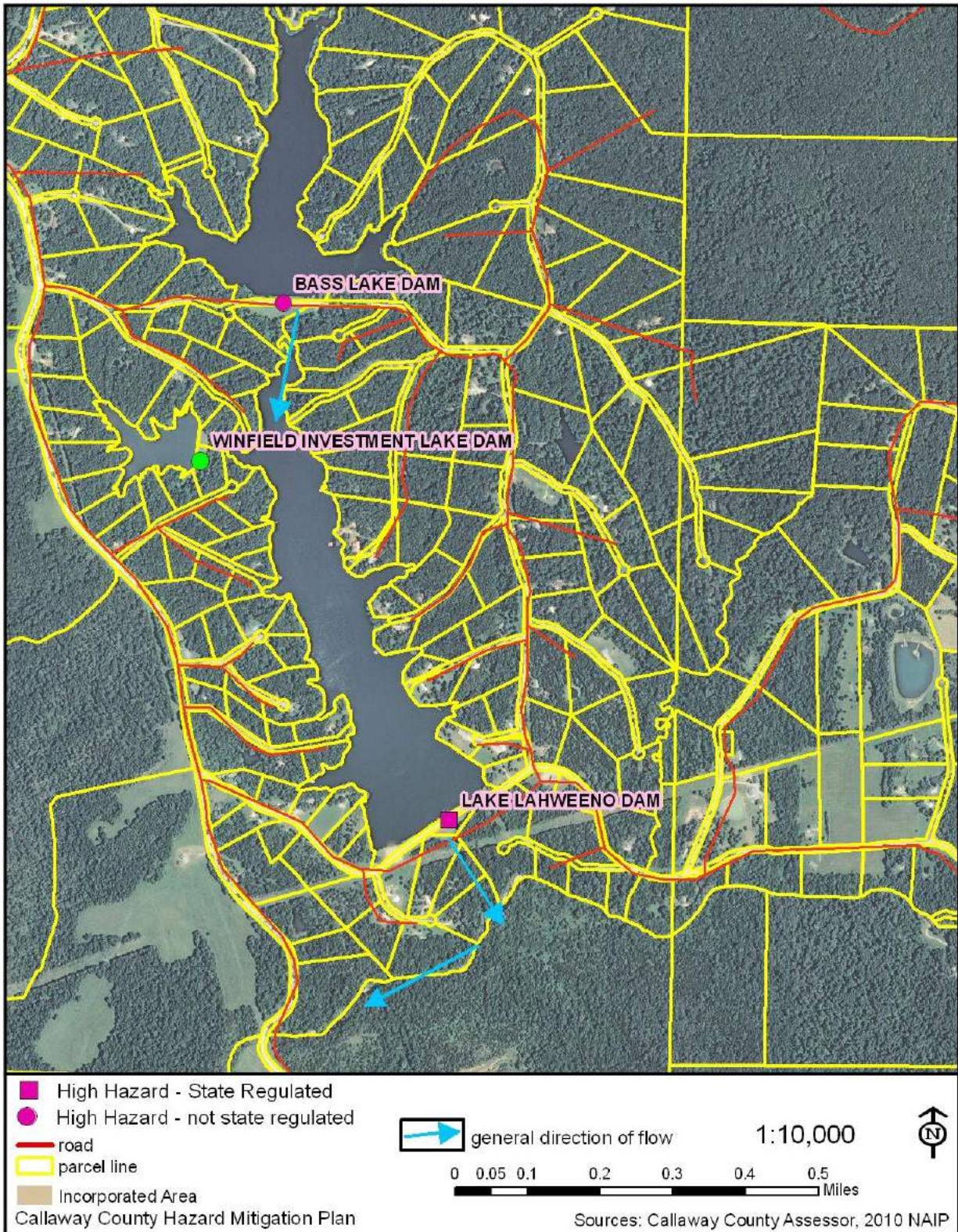


Figure 3.1.11

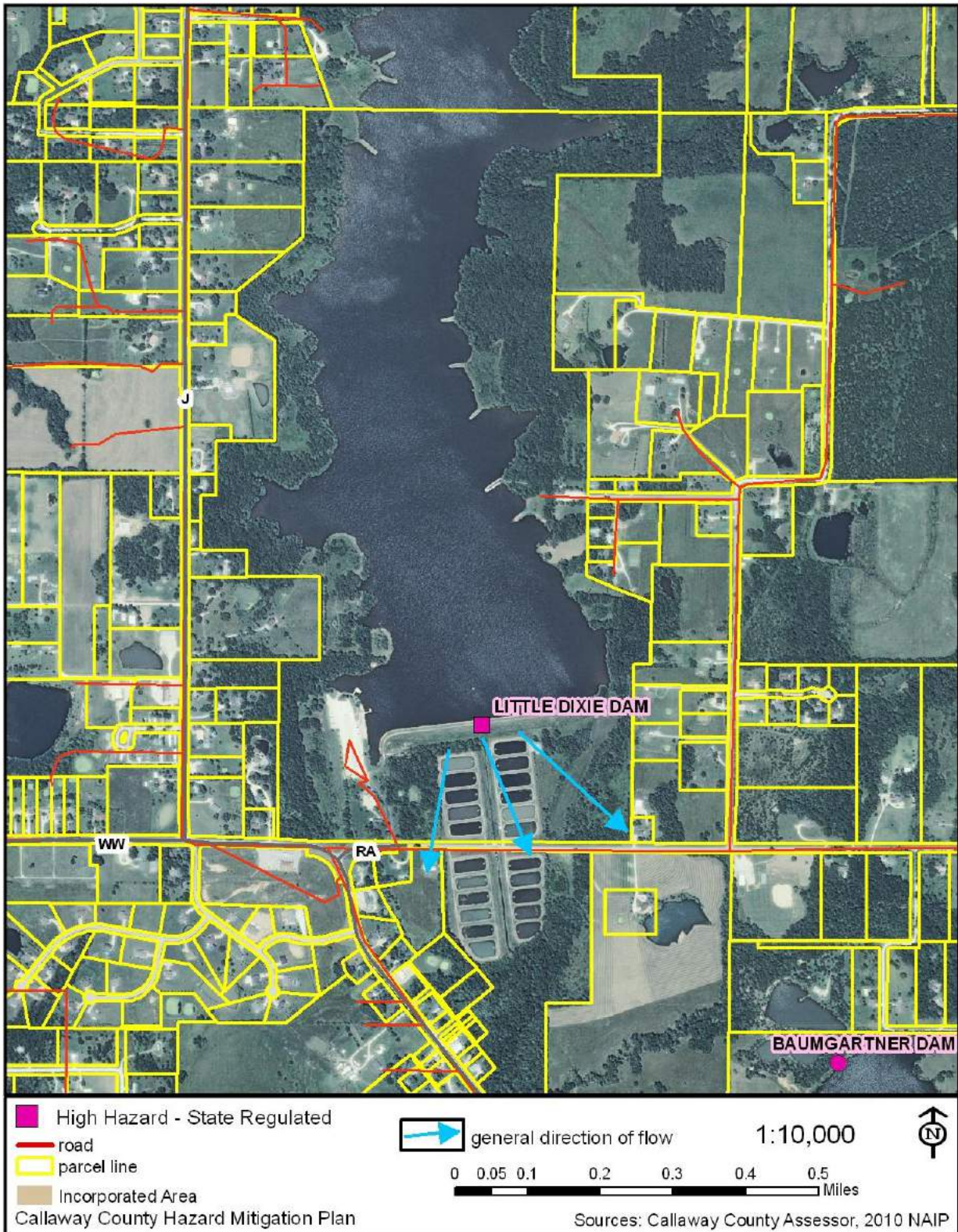


Figure 3.1.12

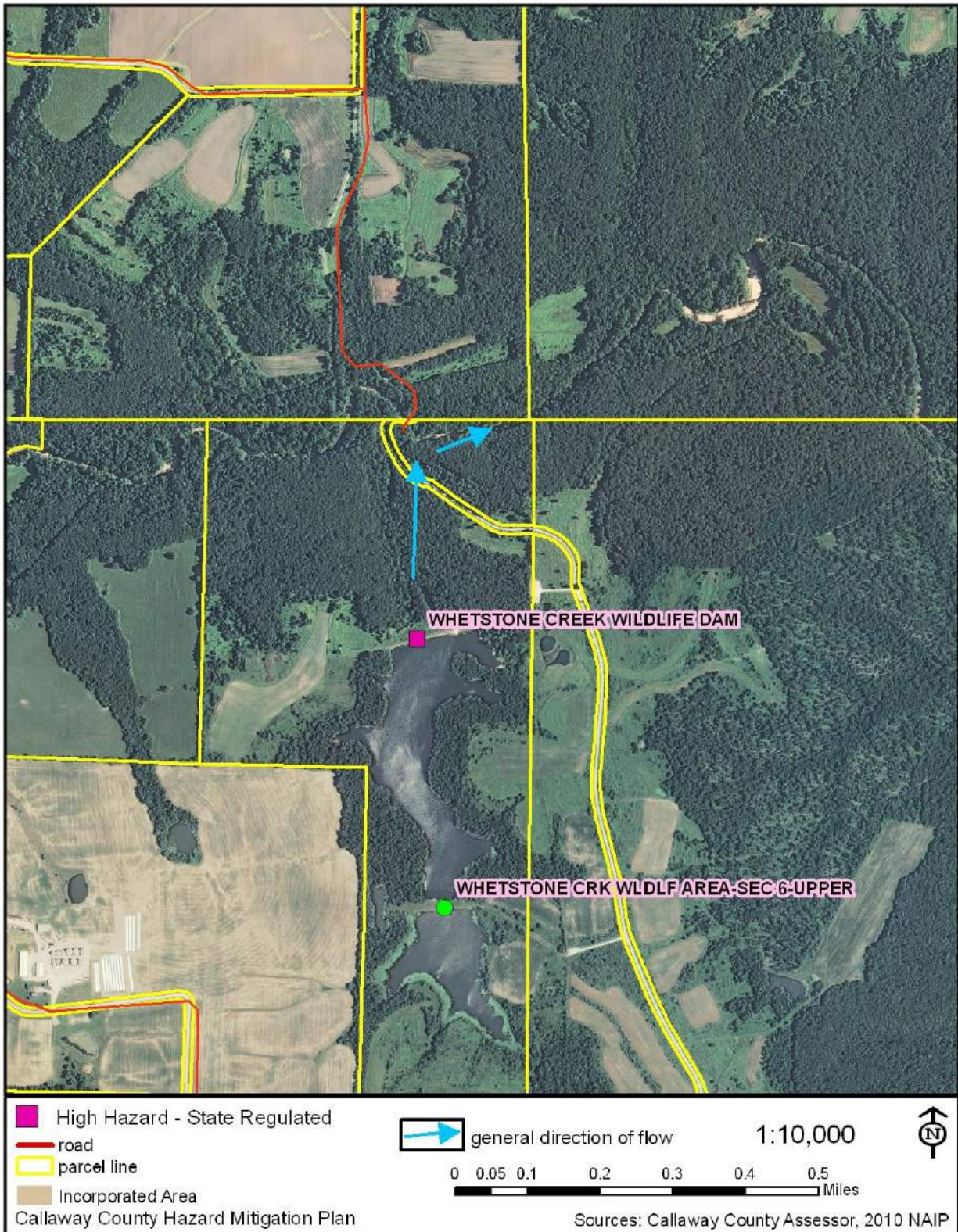


Figure 3.1.13

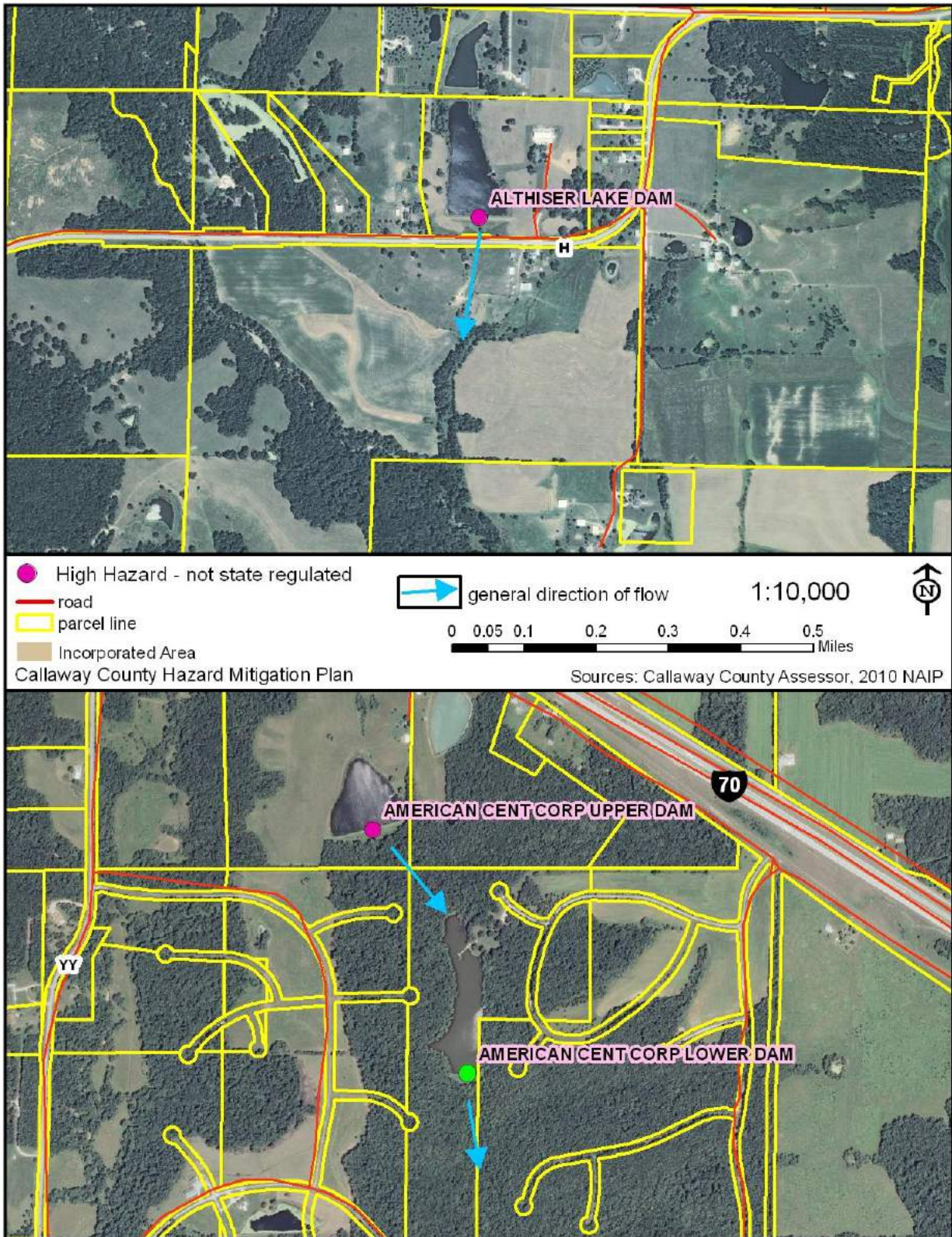


Figure 3.1.14

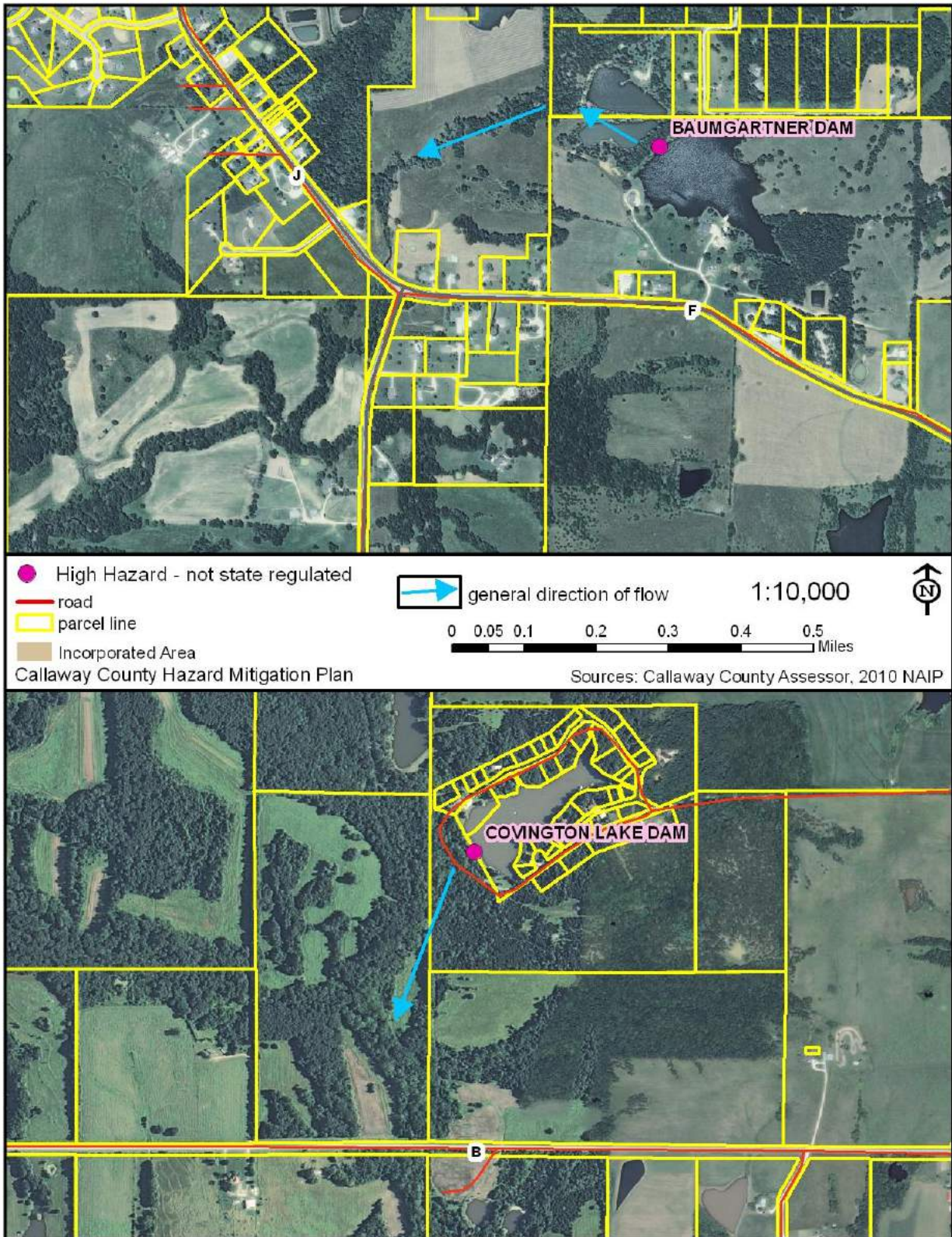


Figure 3.1.15

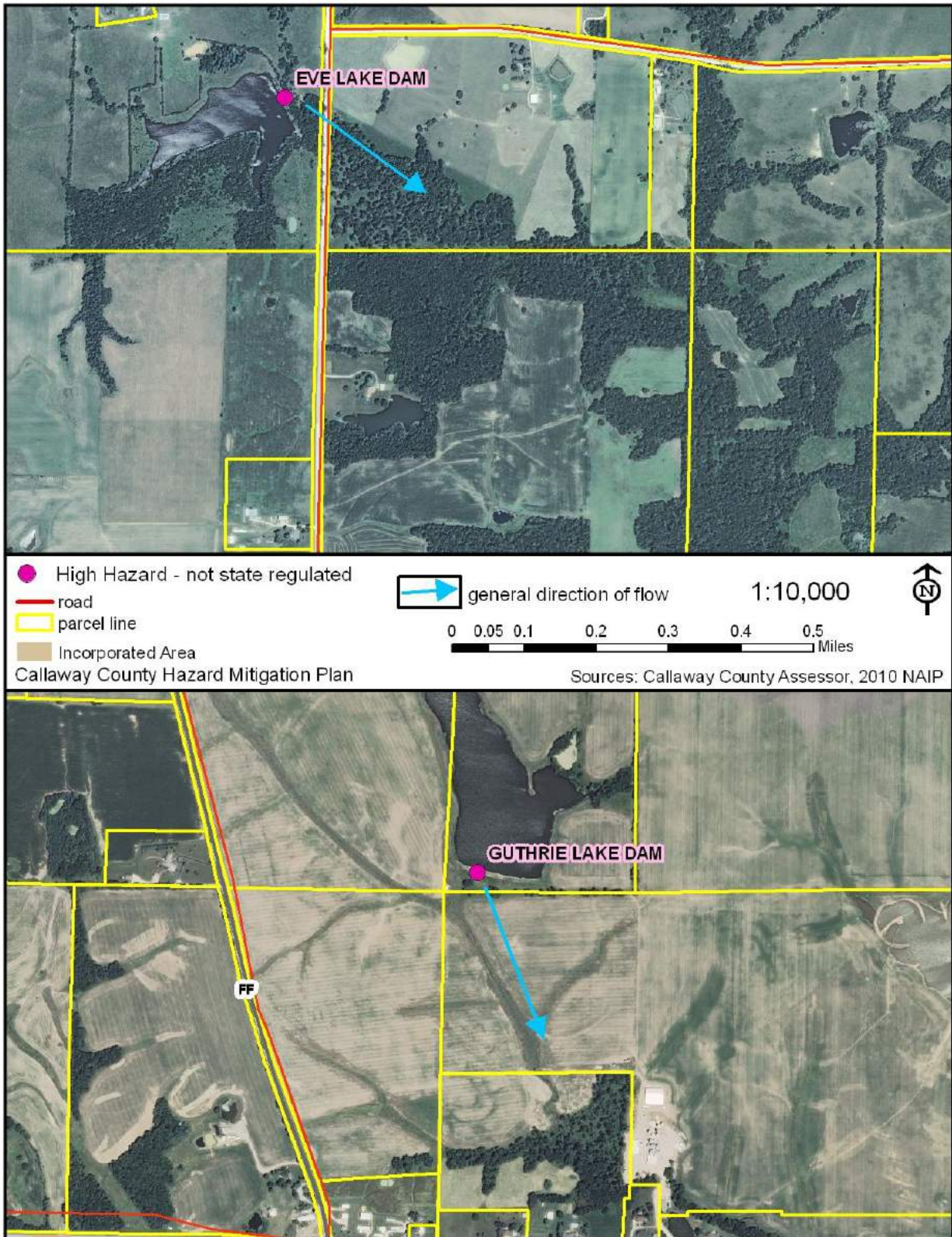


Figure 3.1.16

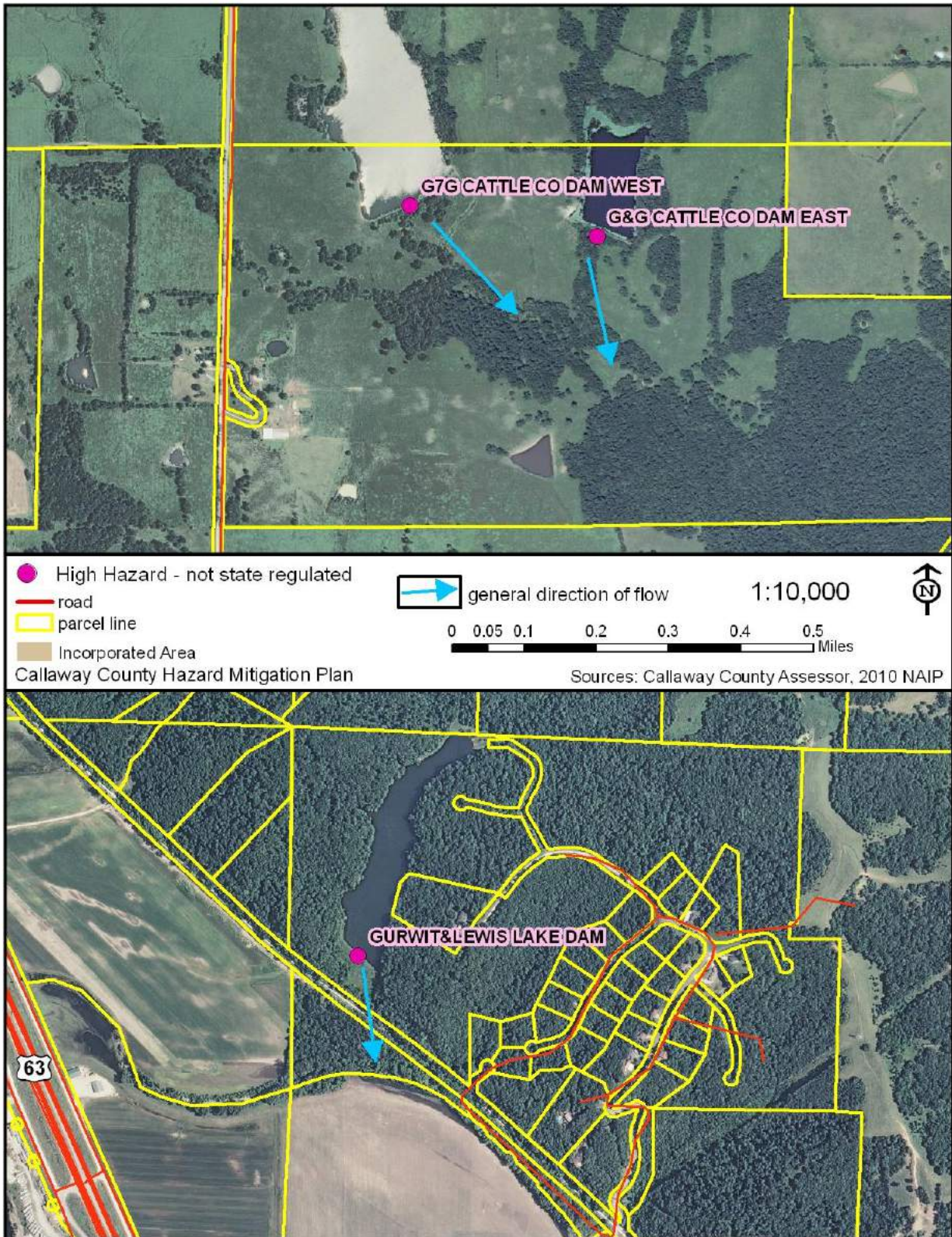


Figure 3.1.17

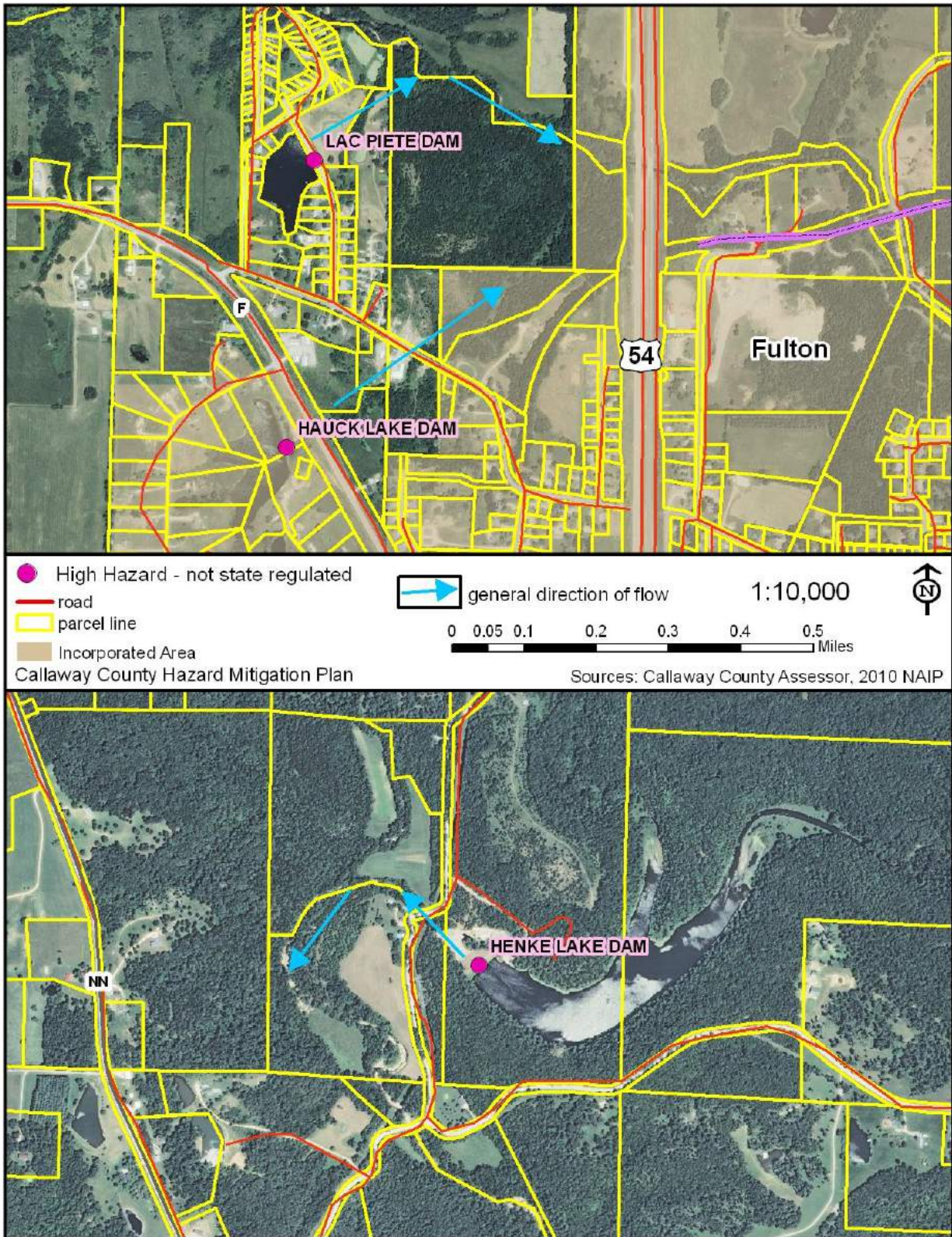


Figure 3.1.18

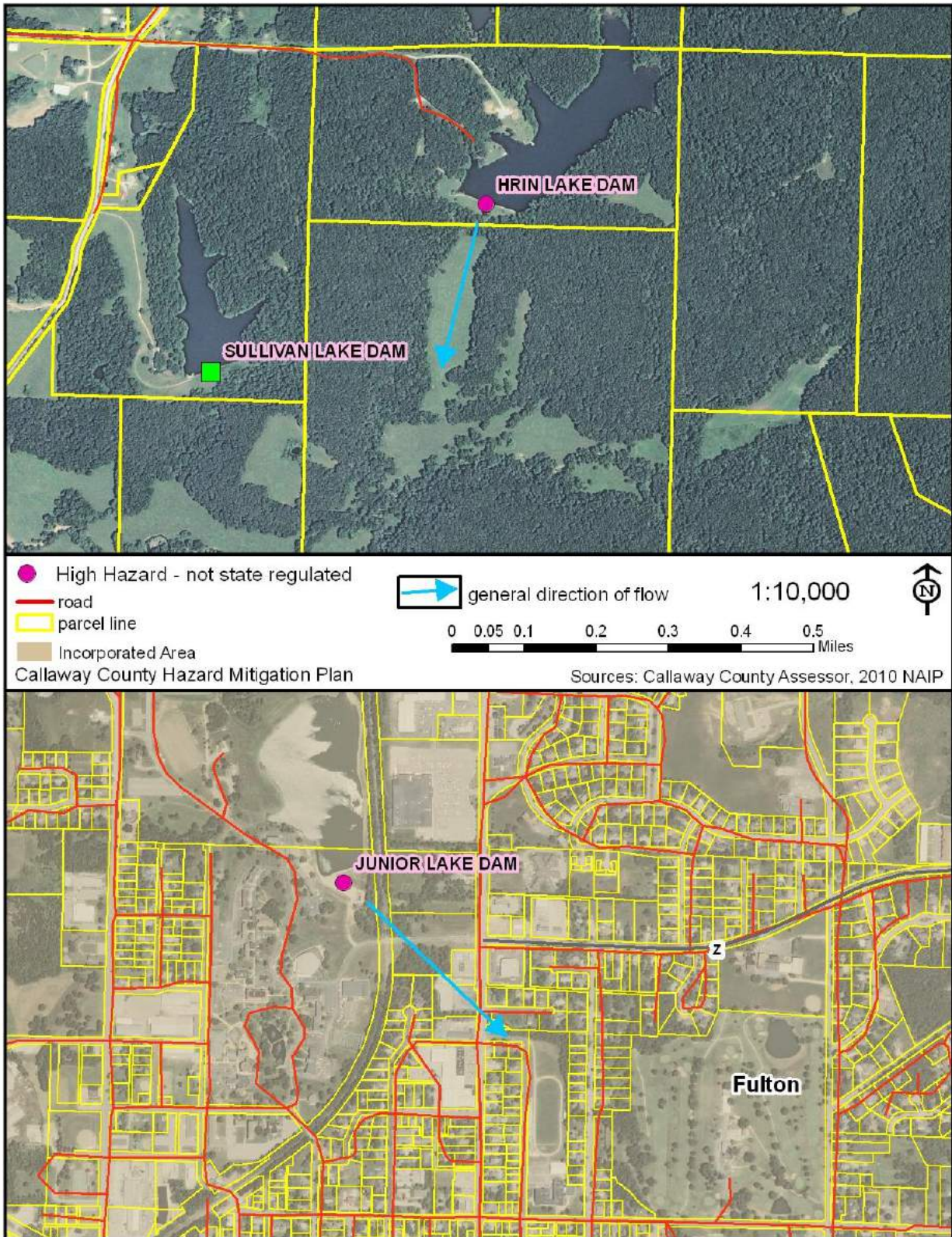


Figure 3.1.19

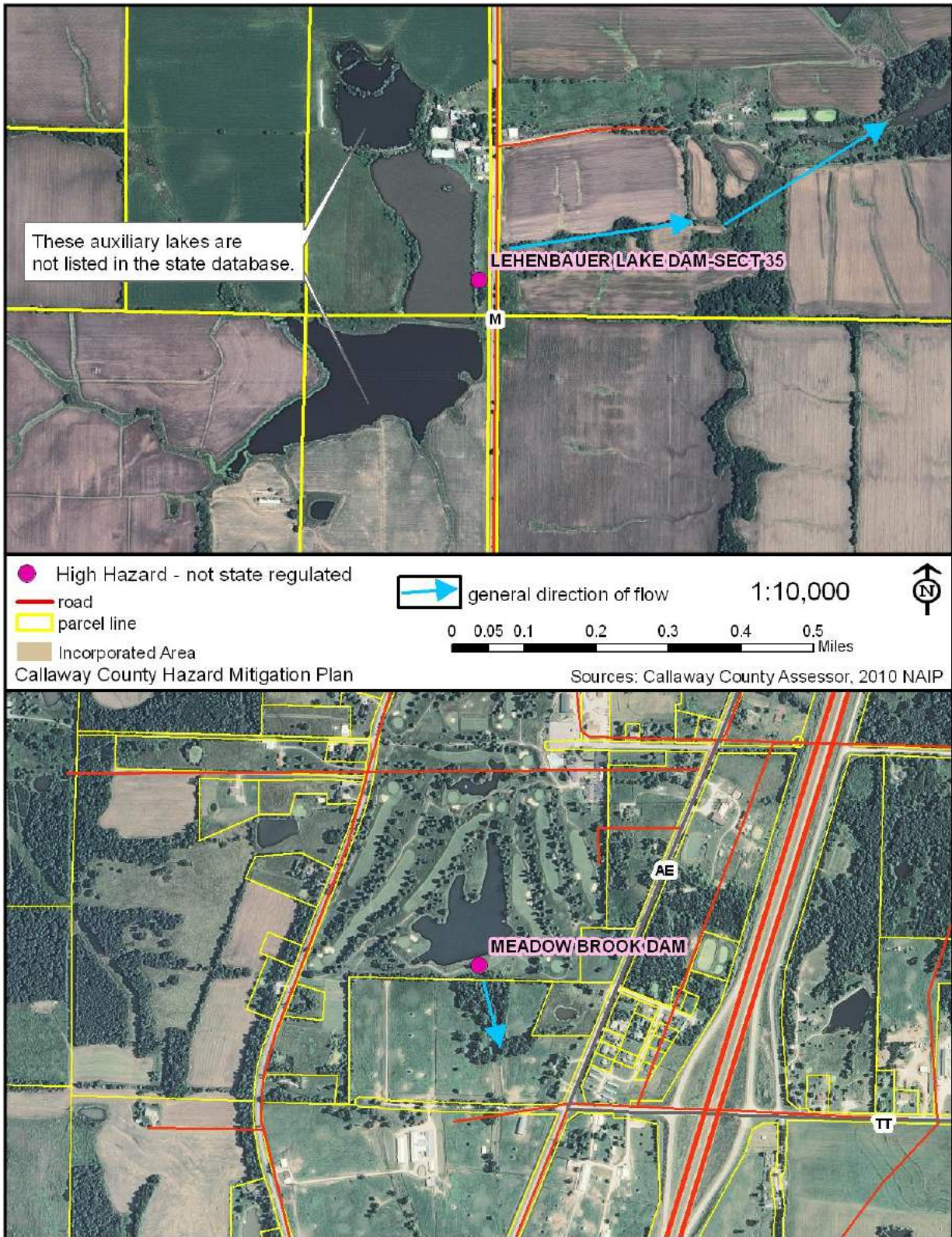


Figure 3.1.20

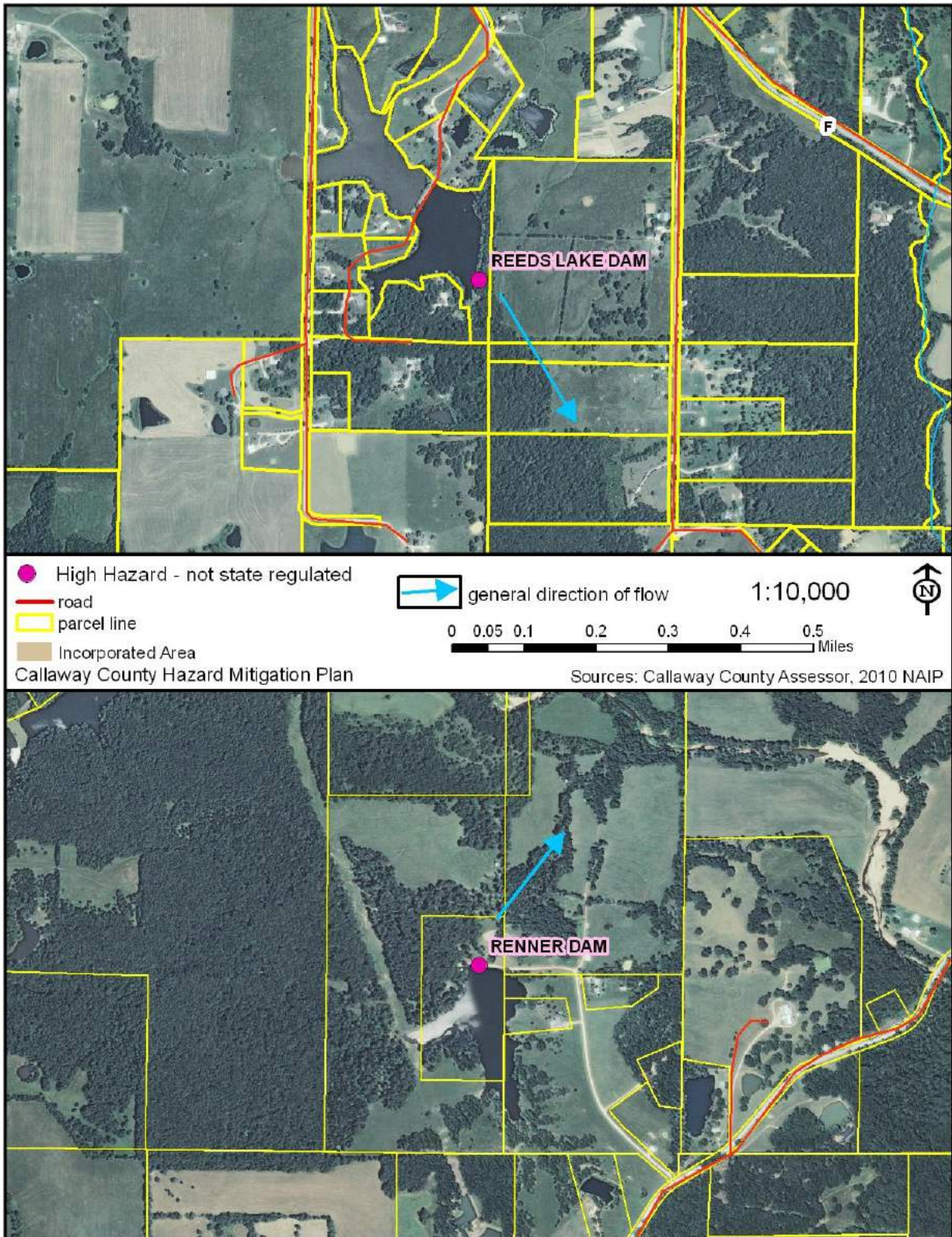
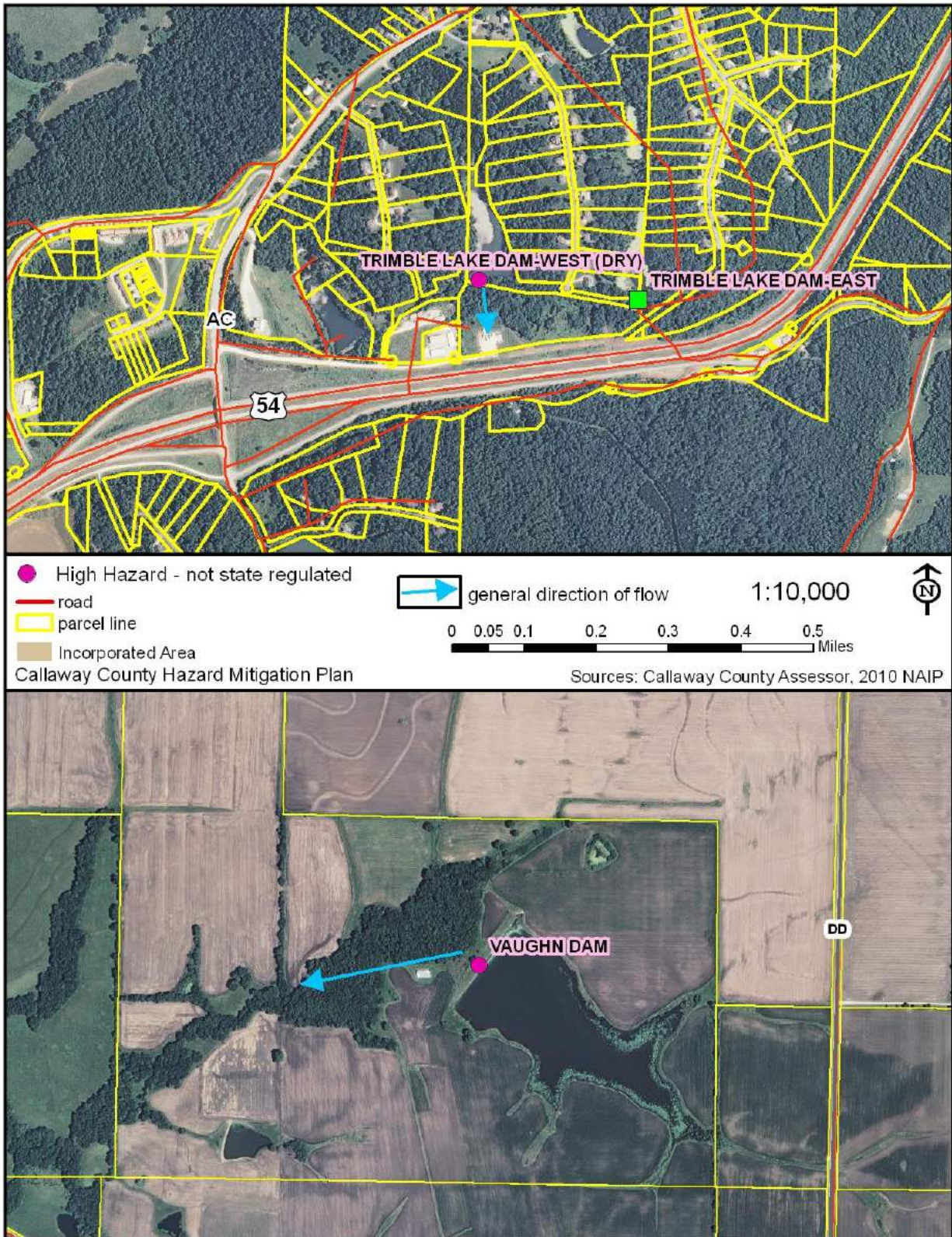


Figure 3.1.21



Potential Impact on Future Development

Dam Failure has the potential to impact future development in the county and its jurisdictions. Because many dams in Callaway County are privately owned and not regulated by the state the potential for development below aging or unsafe dams is an issue that needs to be addressed. If development occurs without knowledge of problem dam that may lie upstream, that development is put in jeopardy.

Future impacts may be addressed by inundation studies being done by the Natural Resources Conservation Service's Water Resources Center. The following is an excerpt from their website:

“The Water Resources Center has developed a methodology to complete dam breach inundation studies and produce inundation maps downstream of regulated dams.

The Federal Emergency Management Agency (FEMA) has indicated that future funding of state dam safety programs will be linked to the completion of Emergency Action Plans (EAPs) for regulated dams. The WRC's Dam and Reservoir Safety program has prioritized Missouri counties for completion of mapping.”

The mapping began in Missouri in September 2009; the timeframe for mapping all the regulated high hazards dams in the state is a little over three years. Based on recent conversations with Missouri State Emergency Management Agency, it is expected that the inundation maps of the regulated high hazard dams in Callaway County will possibly be available in 2018. After an inundation study on a dam is finished, it will be the responsibility of the dam owner to work with the County Emergency Management Director in developing an Emergency Action Plan for the dam.

Existing Mitigation Strategies

County

Evacuation - Centrally located and easily accessible staging areas have been identified by Callaway County Emergency Management in the event that an evacuation is ordered. Transportation will be provided from the staging areas to designated safe areas for those persons who do not have their own transportation. In addition, the staging areas can be used as drop-off and pick-up sites for resources and supplies.

The specific staging area(s) to be used would depend upon the event.

State

Inspection - State regulated dams are inspected every 2 to 5 years, based on classification, through the Dam Safety Program of the DNR.

Inundation Maps and Emergency Action Plans (EAPs)

(While these inundation maps and EAPs have not yet been completed for Callaway County, they are discussed in this section because they are a mitigation strategy which is currently underway statewide.)

All owners of state regulated dams in Missouri are required to complete an Emergency Action Plan (EAP). However, according to the *Missouri State Hazard Mitigation Plan (2013)*, "...the State is still in the stages of a concentrated effort to have inundation maps and Emergency Action Plans completed for all high hazard potential dams..."

To address this issue, inundation studies are currently underway on state regulated dams, beginning with the high hazard dams (State Classes 1 and 2). In 2009, the State hired an outside firm to develop the inundation maps. They are being completed on a county by county basis, beginning with the counties with the greatest number of regulated high hazard dams.

In conjunction with the inundation mapping, Emergency Action Plans (EAPs) will be developed for state regulated dams under the lead of the Dam and Reservoir Safety Program of the MO DNR, working in conjunction with the dam owners, County Emergency Management Directors, and other state and federal officials.

The Missouri Dam and Reservoir Safety Program provides the following information about the importance and content of EAPS on their website:

Completion of Emergency Action Plans can help save lives and reduce property damage during a dam safety emergency. Plans increase preparedness by organizing emergency contact information and evacuation procedures into an official document and by providing enhanced communications between dam owners and local emergency management officials.

Emergency Action Plans will contain the following information:

- Guidance for evaluating emergency situations occurring at a dam.
- Notification charts and emergency contact information.
- A list of residents, businesses and entities within the downstream inundation zone.
- A list of resources available for responding to a dam emergency.
- An inundation zone map (estimated boundary of the maximum water elevation resulting from a dam breach.
- Basic physical and geographical data for the regulated dam.

3.2 Drought

Description of Hazard

The National Weather Service defines a drought as “a period of abnormally dry weather which persists long enough to produce a serious hydrologic imbalance (for example crop damage, water supply shortage, etc.) The severity of the drought depends upon the degree of moisture deficiency, and the duration and the size of the affected area.”

Droughts occur either through a lack of precipitation (meteorological droughts) or overuse of water (water use droughts). Meteorological or “Supply” droughts are natural phenomenon associated with lower than normal precipitation. Water use droughts are when the uses of water by humans outpace what the surrounding environment can naturally support. Water use droughts can theoretically happen anywhere but are generally seen in arid climates, not humid places such as Missouri. At the present time, Missouri is most vulnerable to agricultural or socioeconomic droughts brought on by a lack of precipitation.

The period of lack of precipitation needed to produce a drought will vary between regions and the particular manifestations of a drought are influenced by many factors. As an aid to analysis and discussion, the research literature has defined different categories of drought (see Figure 3.2.1). These types of drought are addressed by the Missouri Drought Plan.

Figure 3.2.1	
Drought Categories	
Agricultural drought	Defined by soil moisture deficiencies
Hydrological drought	Defined by declining surface and groundwater supplies
Meteorological drought	Defined by precipitation deficiencies
Hydrological drought and land use	Defined as meteorological drought in one area that has hydrological impacts in another area
Socioeconomic drought	Defined as drought impacting supply and demand of some economic commodity
Source: “Missouri Drought Plan,” Missouri Department of Natural Resources – Geological Survey and Resource Assessment, Water Resources Report No. 69, 2002	

According to the Missouri Climate Center, drought that occurs in Winter Months is important because it can affect the moisture levels during spring and summer months.³ Widespread crop damage, particularly to corn, is associated with agricultural drought in Missouri. The socioeconomic consequences of a drought can reach far beyond those immediately damaged.

³ <http://climate.missouri.edu/climate.php>

Measuring Drought

Droughts vary in severity. Numerous indices have been developed to measure drought severity; each tool has its strengths and weaknesses.

One of the oldest and most widely used indices is the Palmer Drought Severity Index (PDSI, see Figure 3.9), which is published jointly by NOAA and the U.S. Department of Agriculture (USDA). The PDSI measures the difference between water supply (precipitation and soil moisture) and water demand (amount needed to replenish soil moisture and keep larger bodies of water at normal levels.)

Figure 3.2.2

Palmer Drought Severity Index (PDSI)			
Score	Description	Score	Description
Greater than 4	Extreme moist spell	0 to -0.4	Near normal conditions
3.0 to 3.9	Very moist spell	-0.5 to -0.9	Incipient drought
2.0 to 2.9	Unusual moist spell	-1.0 to -1.9	Mild drought
1.0 to 1.9	Moist spell	-2.0 to -2.9	Moderate drought
0.5 to 0.9	Incipient moist spell	-3.0 to -3.9	Severe drought
0.4 to 0	Near normal conditions	Below -4.0	Extreme drought

Missouri is divided into six regions of similar climactic conditions for PDSI reporting; Callaway County is located in the Northeast Region, bordering the West Central region to the south and Northeast to the east.

The Missouri Department of Natural Resource's drought response system is based on the PDSI and has four phases of increasing severity:

- Phase 1: Advisory Phase - Water monitoring analysis indicates anticipated drought.
- Phase 2: Drought Alert - PDSI reads -10 to -20; and stream flow, reservoir levels and groundwater levels are below normal over a period of several months.
- Phase 3: Conservation Phase - PDSI reads between -2 to -4; stream flow, reservoir levels and groundwater levels continue to decline; and forecasts indicate an extended period of below-normal precipitation.
- Phase 4: Drought Emergency - PSDI reads lower than -4.

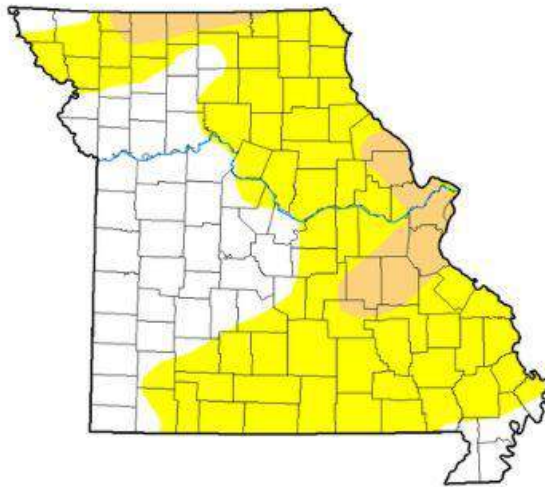
A newer index which is currently being used by The National Drought Mitigation Center (NDMC) is the Standardized Precipitation Index (SPI). This index is based on the probability of precipitation; the time scale used in the probability estimates can be varied and makes the tool very flexible. The SPI is able to identify emerging droughts months sooner than is possible with the PDSI.

The NDMC uses the PDSI, SPI, and three other indicators to classify the severity of droughts throughout the country on a 5-point scale ranging from D0 Abnormally Dry to D4 Exceptional Drought for reports on the U.S. Drought Monitor (Figure 3.2.2B).

Figure 3.2.2A- Missouri Drought Monitor

As of September 26, 2017

Author: Brad Rippey, U.S. Department of Agriculture



Drought Conditions (Percent Area)

Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 9/26/2017	35.49%	64.51%	8.80%	0.00%	0.00%	0.00%
Last Week 9/19/2017	35.48%	64.52%	7.47%	0.00%	0.00%	0.00%
Three Months Ago 6/27/2017	93.15%	6.85%	4.94%	0.00%	0.00%	0.00%
Start of Calendar Year 1/03/2017	10.49%	89.51%	26.62%	0.00%	0.00%	0.00%
One Year Ago 9/27/2016	99.74%	0.26%	0.00%	0.00%	0.00%	0.00%

Drought Intensities

None: No Drought
D0: Abnormally Dry

D1: Moderate Drought
D2: Severe Drought

D3: Extreme Drought
D4: Exceptional Drought



<http://droughtmonitor.unl.edu/>

Figure 3.2.2B

U.S. Drought Monitor - Drought Severity Classification

Category	Description	Ranges					Objective Short and Long-term Drought Indicator Blends (Percentiles)
		Possible Impacts	Palmer Drought Index	CPC Soil Moisture Model (Percentiles)	USGS Weekly Streamflow (Percentiles)	Standardized Precipitation Index (SPI)	
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9	21-30	21-30	-0.5 to -0.7	21-30
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9	11-20	11-20	-0.8 to -1.2	11-20
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9	6-10	6-10	-1.3 to -1.5	6-10
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	-4.0 to -4.9	3-5	3-5	-1.6 to -1.9	3-5
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	-5.0 or less	0-2	0-2	-2.0 or less	0-2

Source: <http://droughtmonitorunl.edu>

Geographic Location

The entire Planning area is potentially at risk for drought. However, since the most common drought in central Missouri is agricultural drought (*2013 MO Hazard Mitigation Plan*), the jurisdiction most at risk is the unincorporated agricultural area of Callaway County. This is the area where farmers are at risk for crop failure from drought and would suffer the most immediate and severe economic loss.

Previous Occurrences

Even though Callaway County averages about 38" of precipitation per year, it has been subject to droughts in the past. Between 1999 and 2008 Callaway County had \$6,172,160 in total crop insurance payments for drought damage.

Historical information concerning droughts prior to the 20th Century is difficult to find. However, tree-ring research at the University of Missouri, chronicling the years 912 to 2004, indicates a regular 18.6 year cycle of drought in the Midwest⁴.

More information is available for droughts in the 20th and current centuries. Missouri suffered drought in the 1930s and the early 1940s, along with most of the central United States. These were the Dust Bowl years in the southern plains.

The years 1953-1957 were actually drier years in Missouri than the Dust Bowl years. Missouri was specifically hit in 1954 and 1956 by an extreme decrease in precipitation. Crop yields were down by as much as 50%, leading to negative impacts on the agricultural and regional economies.

The last major nationwide drought was in the late 1980's. The 1980's drought hit the Northern Great Plains and Northern Midwest particularly hard. Missouri suffered economic losses due to decreased barge traffic and low water in the Missouri and Mississippi Rivers. Furthermore, some municipalities suffered from very low water resources and in some instances exhausted all of their normal water sources, according to the Missouri Hazard Analysis (SEMA, August 1997).

Most of Missouri was in a drought condition during the last half of 1999, according to the Missouri State Hazard Mitigation Plan (2013). In September 1999, the governor declared an agricultural emergency for the entire state. In October, all counties were declared agricultural disaster areas by the U.S. Secretary of Agriculture. By May of 2000, the entire state was under a Phase 2 Drought Alert. The drought continued through the summer of 2000 in various parts of the state.

Another drought hit western and northwestern Missouri in the years 2002 to 2004 but Callaway County was not in the drought area.

The county did not fare as well in the drought years of 2005-2006, however. Callaway County was one of 30 Missouri counties in Phase 3 Conservation in July 2005. In August, all 114

⁴ <http://faculty.missouri.edu/~stambaughm/mtrl/mor37.pdf>

Missouri counties and the City of St. Louis were designated as natural disasters for physical and/or production loss loan assistance from the Farm Service Agency (FSA); conditions began to improve in late August/September 2005. By September of 2006, however, the county was again in Phase 3 Conservation which persisted through most of November. In October, Callaway County was one of 85 Missouri counties designated by the USDA as primary natural disaster areas due to losses from the drought conditions of 2006. Conditions began to improve with a large snowstorm in late November/early December.

Callaway County was in a Phase 1 Drought Advisory in both February and October of 2007.

From July 2011 to November 2012, Callaway County experienced severe (D2) drought. August was the driest month throughout the drought and the depressed precipitation levels are visualized in Figure 3.2.2C. The drought caused significant agricultural and livestock losses and wildfires increased due to the dry conditions.⁵ Hydrological drought was also a problem during this period as “dry wells and stream beds, low river levels, and rural and urban water restrictions were commonplace.”⁶

Figure 3.2.2C

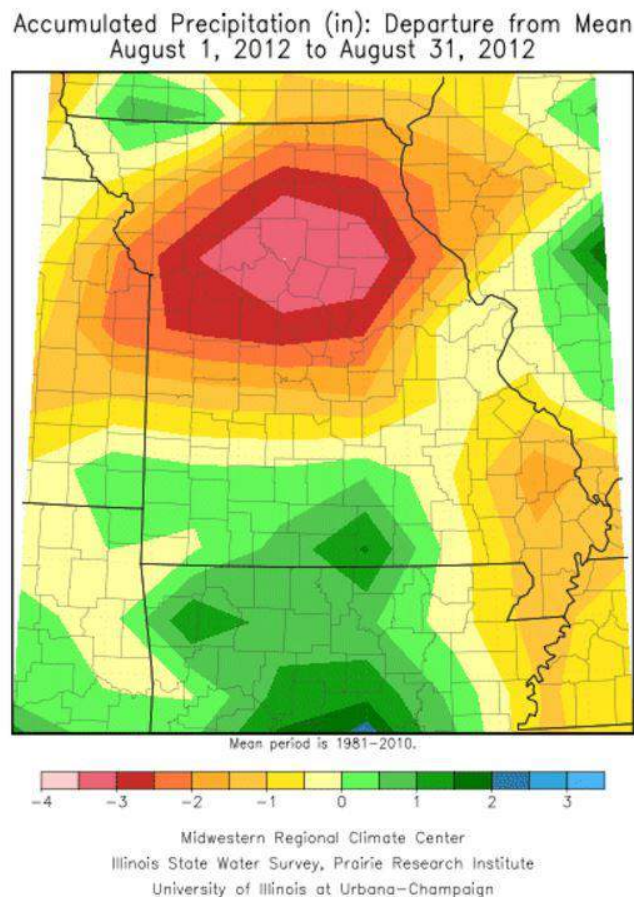


Image source: <http://climate.missouri.edu/news/arc/sept2012.php>

⁵ <http://climate.missouri.edu/news/arc/sept2012.php>

⁶ <http://climate.missouri.edu/news/arc/sept2012.php>

Figure 3.2.2D Drought (2000-2017)				
Date	Deaths	Injuries	Property Damage	Crop Damage
8/1/2005	0	0	0.00K	0.00K
9/1/2005	0	0	0.00K	0.00K
8/1/2006	0	0	0.00K	0.00K
7/3/2012	0	0	0.00K	0.00K
8/1/2012	0	0	0.00K	0.00K
9/1/2012	0	0	0.00K	0.00K
10/1/2012	0	0	0.00K	0.00K
Source: http://www.ncdc.noaa.gov				

Data accessed from NOAA’s Storm Events Database listed periods of drought from 2005 and beyond. NOAA does not have data for Callaway County prior to 2005 although there are reported droughts. We can assume the data reporting did not start until after 2000. The crop damage listed in NOAA data does not match crop damage reported by USDA crop insurance payout data for drought.

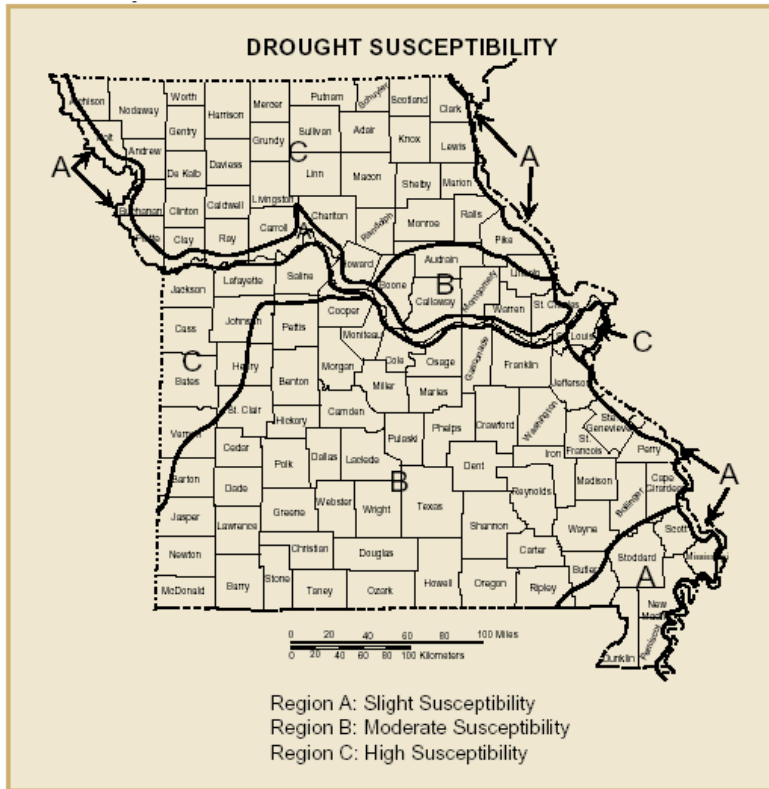
Based on that assumption, since 2000, there have been 7 months with reported drought. Out of the 198 months in the observation period (January 2000 to June 2017), there was 3.5% of those months in a drought. Using years as the probability assumption (16.5 years), there is an 18% chance that drought will happen in any given year. Because we are basing the probability on the likelihood that a drought event will happen in any given year, we can assume there is a probability of 18% that a drought will occur in Callaway County in any year.

Measure of Probability and Severity

Probability: Moderate - Planning Area, Callaway County
 Low - Auxvasse, Fulton, Holts Summit, and New Bloomfield
 Severity: Moderate - Planning Area, Callaway County
 Low - Auxvasse, Fulton, Holts Summit, and New Bloomfield

The Missouri Department of Natural Resources has defined different regions of drought susceptibility in the Missouri Drought Plan (2002). A map of the different regions is shown in Figure 3.2.3.

Figure 3.2.3



Most of Callaway County lies in Region B which is defined as "...moderate drought susceptibility. Groundwater resources are adequate to meet domestic and municipal water needs, but due to required well depths, irrigation wells are very expensive. The topography generally is unsuitable for row-crop irrigation."

The southern strip of the county which borders the Missouri River lies in Region A which is defined as having "...minor surface and groundwater supply drought susceptibility. It is a region underlain by saturated sands and gravels (alluvial deposits). Surface and groundwater resources are generally adequate for domestic, municipal, and agricultural needs."

Existing Mitigation Strategies

Drought Insurance

Data from the USDA Risk Management Agency indicates that 81.2% of crops in Missouri were insured for drought damage in 2011 (Missouri State Hazard Mitigation Plan (2013)). Data from the same agency indicates that \$22,660,371 was paid in Callaway County on claims for crop losses due to drought in the period 1998-2016.

The Missouri Department of Natural Resources publishes a weekly map from The Drought Monitor on their website at: <http://www.dnr.mo.gov/env/wrc/drought/nationalcondition.htm>. The Drought Monitor is a comprehensive drought monitoring effort involving numerous federal agencies, state climatologists, and the National Drought Mitigation Center. It is located at the National Drought Mitigation Center in Lincoln, Nebraska. The new Drought Monitor Map, based on analysis of data collected, is released weekly on Thursday at 8:30 a.m. Eastern Time. The map focuses on broad-scale conditions and is linked to the data sets analyzed.

The University of Missouri Extension has a number of publications for both farmers and homeowners to help mitigate the effects of drought. They are available at: <http://extension.missouri.edu/main/DisplayCategory.aspx?C=257>

The National Drought Mitigation Center (NDMC) is located at the University of Nebraska-Lincoln. The following is a description of their activities from their website (<http://drought.unl.edu/>):

“The National Drought Mitigation Center (NDMC) helps people and institutions develop and implement measures to reduce societal vulnerability to drought, stressing preparedness and risk management rather than crisis management. Most of the NDMC’s services are directed to state, federal, regional, and tribal governments that are involved in drought and water supply planning. The NDMC, established in 1995, is based in the School of Natural Resources at the University of Nebraska-Lincoln. The NDMC’s activities include maintaining an information clearinghouse and drought portal; drought monitoring, including participation in the preparation of the U.S. Drought Monitor and maintenance of the web site (<http://droughtmonitor.unl.edu>); drought planning and mitigation; drought policy; advising policy makers; collaborative research; K-12 outreach; workshops for federal, state, and foreign governments and international organizations; organizing and conducting seminars, workshops, and conferences; and providing data to and answering questions for the media and the general public. The NDMC is also participating in numerous international projects, including the establishment of regional drought preparedness networks in collaboration with the United Nations’ Secretariat for the International Strategy for Disaster Reduction.”

Public Water Supply Districts constantly monitor source water levels during both periods of drought and non-drought. They monitor water consumption levels during critical periods, such as during a drought. They are able to put water restrictions in place if necessary. The water supply districts are always looking to diversify their water supply to mitigate the effects of drought and water source deficiencies caused by over usage or drought conditions.

Drought Vulnerability

Jurisdictions: Unincorporated Callaway County, Auxvasse, Fulton, Holts Summit, and New Bloomfield

Overview

All jurisdictions in the planning area are vulnerable to the effects of drought; the unincorporated agricultural areas of Callaway County are most vulnerable to the effects of drought because of crop loss. In addition to damage to crops, produce, livestock, and soil, and the resulting economic consequences, the arid conditions created by drought pose an increased risk of fire.

Potential Impact on Existing Structures

Structural impact in regard to this hazard is minimal to non-existent. Drought does, however, have far reaching economic consequences in regard to crop failure and high economic loss. The economic loss incurred would heavily impact the agricultural industry and those businesses dependent upon that industry for products. The Missouri State Hazard Mitigation Plan 2013 offered the following vulnerability statistics for Drought in Callaway County:

Total Crop Insurance Paid For Drought Damage 1998-2012	\$20,726,613
Crop Claims Ratio Rating	2
Annualized Crop Insurance Claims/Drought Damage	\$1,381,774
Crop Exposure (2007 Census of Agriculture)	\$29,405,000
Annual Crop Claims Ratio	4.70%
Crop Loss Ratio Rating	3

Potential Impact on Future Development

Future development in the county can be at risk from the effects of drought. Good land management techniques are crucial in mitigating future impacts.

As previously mentioned, water supply districts continually monitor water levels on their sources throughout the county. If water levels are too low, they take steps to reduce citizen water usage. Development requiring large amounts of water usage (i.e. a production facility using water as a cooling mechanism) would need to consider the water supply districts and their ability to meet the county's needs. There would need to be a collaboration between those doing the development and the water supply districts.

3.3 Earthquake

Hazard Description

The United States Geological Society (USGS) describes an earthquake as “a sudden movement of the earth's crust caused by the release of stress accumulated along geologic faults or by volcanic activity.” Earthquakes can be one of the most widespread and destructive natural disasters causing death, destruction of property, and damage to infrastructure.

The New Madrid Seismic Zone (NMSZ), which runs through southeastern Missouri, is the most active seismic zone east of the Rocky Mountains. Any hazard mitigation planning in Missouri must, of necessity, take possible earthquakes into account.

Missouri and much of the Midwest can feel earthquakes from very far away because the geology of the area is amenable to ground shaking. New Madrid earthquakes can cover up to twenty times the area of typical California earthquakes because of the geology.

Measuring Earthquake Magnitude and Intensity

In any discussion of earthquakes, it is important to distinguish between two measurements: **magnitude** and **intensity**.

The **magnitude** of an earthquake is a measurement of the actual energy released by the quake at its epicenter. In the U.S., it is commonly measured by the Richter scale denoted with an Arabic numeral (e.g. 6.0).

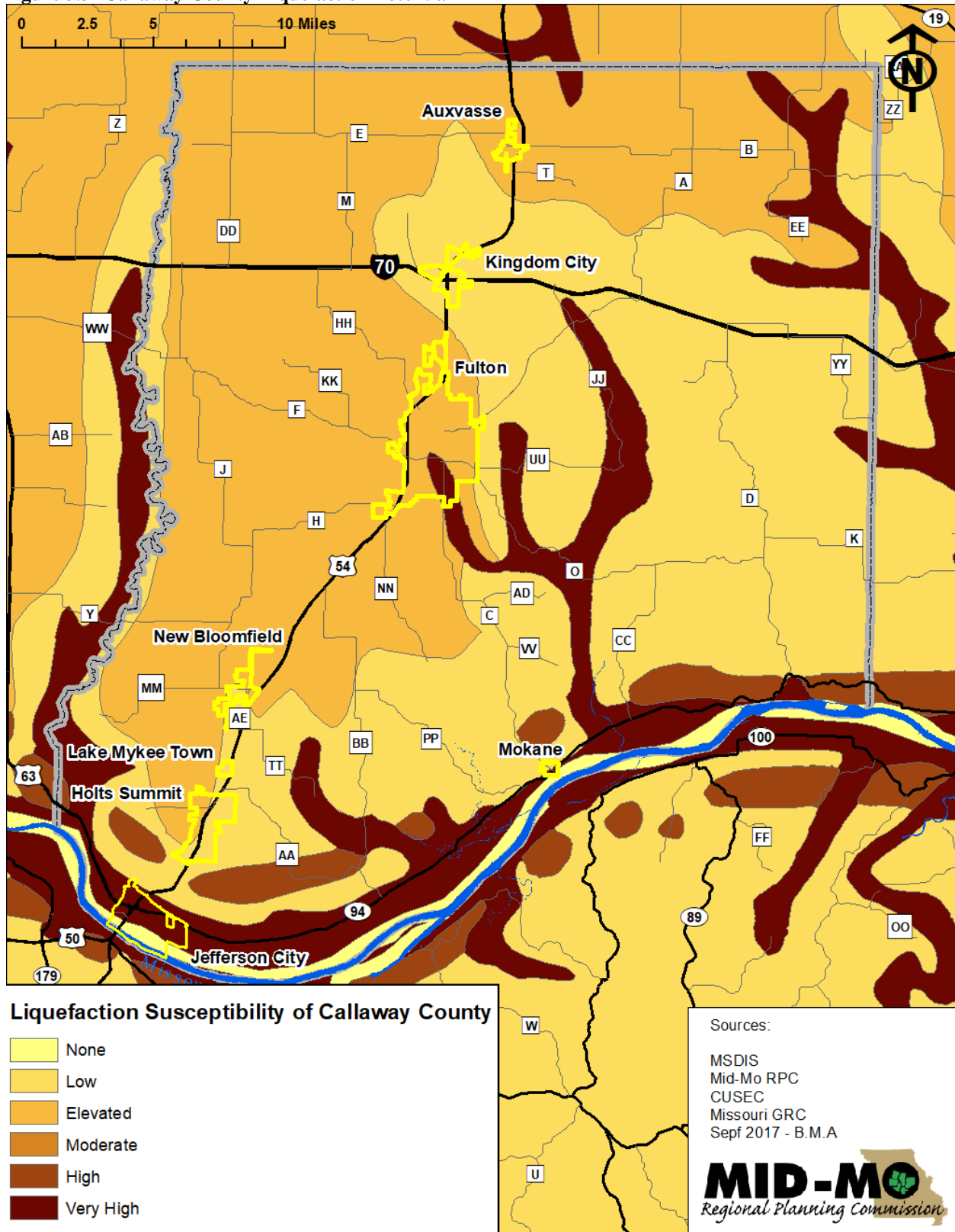
The **intensity** of an earthquake refers to the potentially damaging effects of a quake at any particular site. Intensity is measured by the Modified Mercalli Intensity Scale (MMI) and expressed by a Roman numeral (e.g. VI).

A single earthquake will thus have one magnitude but different intensities depending on a location's distance from the epicenter of the quake, intervening soil type, and other factors.

Geographic Location

The entire planning area is at risk for the effects of an earthquake along the New Madrid Seismic Zone. Areas close to the Missouri River may be particularly vulnerable. The soil, or alluvium, along river channels is especially vulnerable to liquefaction from earthquake waves; river alluvium also tends to amplify the waves. Southern Callaway County and parts of Fulton are susceptible to liquefaction based on liquefaction potential data from Missouri Department of Natural Resources Division of Geology and Land Survey. (See Figure 3.3)

Figure 3.3- Callaway County Liquefaction Potential



Previous Occurrences

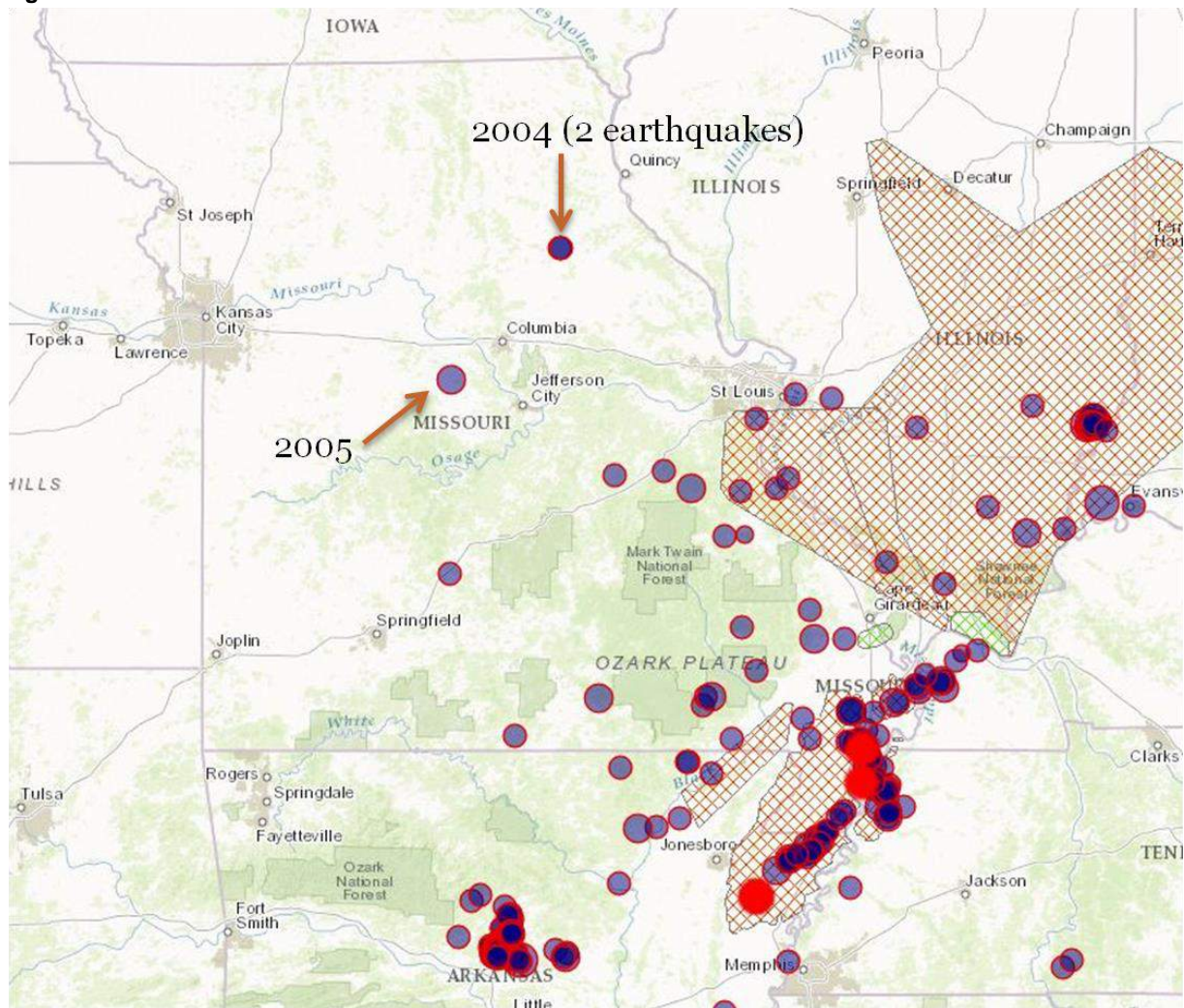
Historical quakes along the New Madrid Seismic Zone in southeastern Missouri have been some of the largest in U.S. history since European settlement. The Great New Madrid Earthquake of 1811-1812 was a series of over 2000 quakes which caused destruction over a very large area. According to information from Missouri SEMA's Earthquake Program, some of the quakes measured at least 7.6 in magnitude and five of them measured 8.0 or more.

The 1811-1812 quakes changed the course of the Mississippi River. Some of the shocks were felt as far away as Washington D.C. and Boston.

The first federal disaster relief act was a result of the Great New Madrid Earthquake of 1811-1812. President James Madison signed an act into law which issued "New Madrid Certificates" for government lands in other territories to residents of New Madrid County who wanted to leave the area.

Recent Earthquakes in the Region

Figure 3.2.5D



Source: <http://arcg.is/1m1y58>

There have been two earthquakes near Callaway County in the previous 13 years. In 2004, there were two earthquakes on February 8th in Monroe County. One earthquake had a magnitude of 2.30 and the other had a magnitude of 2.90. In 2005, an earthquake occurred in Cooper County with a magnitude of 3.30.

Measure of Probability and Severity

Probability: Low

Severity: Medium

How likely are earthquakes along the New Madrid Seismic Zone? In 2002, the U.S. Geological Survey (USGS) released the following expectations for earthquakes in the zone for the next 50 years⁷:

- 25 - 40% percent chance of a magnitude 6.0 and greater earthquake.
- 7 - 10% chance of a magnitude 7.5 - 8.0 quake (magnitudes similar to those in 1811-1812)

According to the USGS, Callaway County is one of the 47 counties in Missouri that would be severely impacted by a 7.6 magnitude earthquake with an epicenter on or near the New Madrid Seismic Zone.

The State Emergency Management Agency (SEMA) has made projections of the highest earthquake intensities which would be experienced throughout the state of Missouri should various magnitude quakes occur along the New Madrid Seismic Zone (see Figure 3.3.2), as measured by the Modified Mercalli Intensity Scale (see Figure 3.3.3). The pertinent information for Callaway County is summarized in Figure 3.3.1.

⁷ <https://pubs.usgs.gov/fs/fs-131-02/>

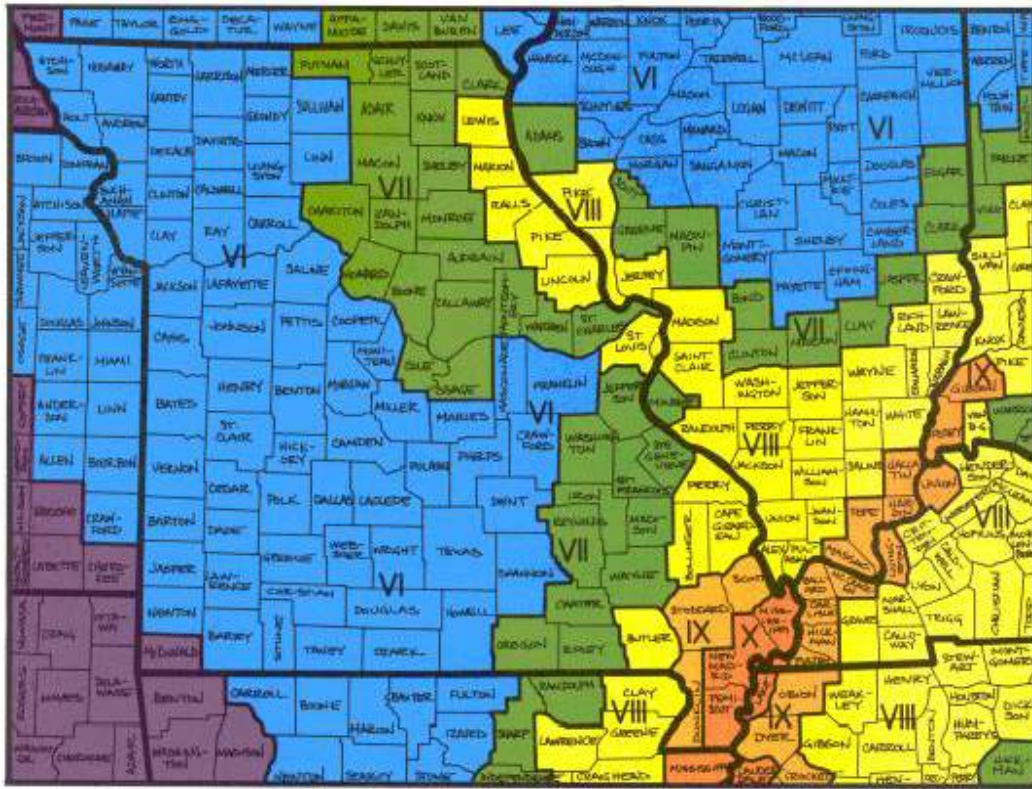
Figure 3.3.1				
Projected Earthquake Hazard for Callaway County				
Magnitude at NMSZ*	Probability of Occurrence (2002-2052)	Intensity in Planning Area (MMI**)	MMI** Descriptor	Expected Damage
6.7	25-40%	VI	"Strong"	Felt by all; many frightened and run outdoors, walk unsteadily. Windows, dishes, glassware broken; books fall off shelves; some heavy furniture moved or overturned; a few instances of fallen plaster. Damage slight.
7.6	7-10%	VII	"Very Strong"	Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by people driving motor cars.
* New Madrid Seismic Zone; ** Modified Mercalli Intensity Scale				
Source: http://dnr.mo.gov/geology/geosrv/geores/techbulletin1.htm http://sema.dps.mo.gov/docs/EQ_Map.pdf				

According to the USGS, Callaway County is one of the 47 counties in Missouri that would be severely impacted by a 7.6 magnitude earthquake with an epicenter on or near the New Madrid Seismic Zone. As noted above, the probability of an earthquake of this magnitude was between 7 and 10% over a 50 year period. This translates into a low probability for an earthquake of such magnitude impacting the planning area. However, should an earthquake of this magnitude occur, the consequences would be significant in the planning area, particularly for poorly constructed structures.

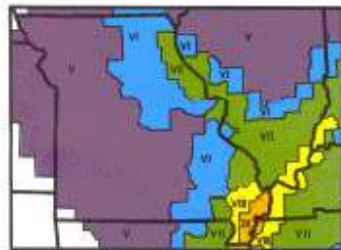
There is a 25-40% probability of the occurrence of an earthquake with “strong” effects felt in the planning area. The damages to structures from such a quake would be minimal but the psychological effects of having the earth move under one’s feet should not be underestimated.

Figure 3.3.2

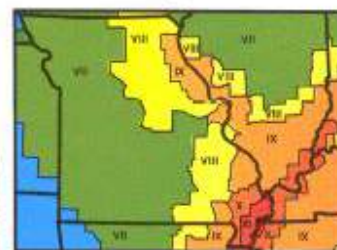
Highest Projected Modified Mercalli Intensities by County



As 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.



This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude - 6.7 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.



This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude - 8.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.

Source: http://sema.dps.mo.gov/docs/EQ_Map.pdf

Figure 3.3.3

Modified Mercalli Intensity Scale

I. Instrumental	Not felt by many people unless in favorable conditions.
II. Feeble	Felt only by a few people at best, especially on the upper floors of buildings. Delicately suspended objects may swing.
III. Slight	Felt quite noticeably by people indoors, especially on the upper floors of buildings. Many do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration similar to the passing of a truck. Duration estimated.
IV. Moderate	Felt indoors by many people, outdoors by few people during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rock noticeably. Dishes and windows rattle alarmingly.
V. Rather Strong	Felt outside by most, may not be felt by some outside in non-favorable conditions. Dishes and windows may break and large bells will ring. Vibrations like large train passing close to house.
VI. Strong	Felt by all; many frightened and run outdoors, walk unsteadily. Windows, dishes, glassware broken; books fall off shelves; some heavy furniture moved or overturned; a few instances of fallen plaster. Damage slight.
VII. Very Strong	Difficult to stand; furniture broken; damage negligible in building of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken. Noticed by people driving motor cars.
VIII. Destructive	Damage slight in specially designed structures; considerable in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture moved.
IX. Ruinous	General panic; damage considerable in specially designed structures, well designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X. Disastrous	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundation. Rails bent.
XI. Very Disastrous	Few, if any masonry structures remain standing. Bridges destroyed. Rails bent greatly.
XII. Catastrophic	Total damage - Almost everything is destroyed. Lines of sight and level distorted. Objects thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move position.

Source: http://sema.dps.mo.gov/docs/EQ_Map.pdf

Existing Mitigation Strategies

Multiple Jurisdictions

By law all schools in Callaway County must provide training and exercises to students in preparation for a large earthquake. According to the Revised Statues of Missouri:

The governing body of each school district which can be expected to experience an intensity of ground shaking equivalent to a Modified Mercalli of VII or above from an earthquake occurring along the New Madrid Fault with a potential magnitude of 7.6 on the Richter Scale shall establish an earthquake emergency procedure system in every school building under its jurisdiction. (*RSMo 160.451.1*)

This earthquake emergency system shall include 1) A school building disaster plan; 2) An emergency exercise to be held at least twice each school year whereby students and staff simulate earthquake emergency conditions and the procedures for safety and protection to be implemented under such conditions; provided the department of education shall not require any school district to perform more than two earthquake preparedness drills during any one school year; 3) Protective measures to be taken before, during, and following an earthquake; and 4) A program to ensure that the students and certified and noncertified employees of the school district are aware of, and properly trained in, the earthquake emergency procedure system. (*RSMo 160.453.1*)

At the beginning of each school year, each school district shall distribute to each student materials that have been prepared by the Federal Emergency Management Agency, SEMA, or by agencies that are authorities in the area of earthquake safety and that provide the following objectives: 1) Developing public awareness regarding the causes of earthquakes, the forces and effects of earthquakes, and the need for school and community action in coping with earthquake hazards; 2) Promoting understanding of the impact of earthquakes on natural features and manmade structures; and 3) Explaining what safety measures should be taken by individuals and households prior to, during and following an earthquake. (*RSMo 160.455.1*)

The Callaway County EMA meets all requirements as stated above.

Earthquake drills are done by county government agencies including the Callaway Public Health Department.

Earthquake Vulnerability Overview

Jurisdictions: All Jurisdictions

As discussed previously, the USGS in 2002 projected a fairly high chance of an earthquake in the New Madrid Seismic Zone in the next 50 years which, according to SEMA, would cause “Strong” (6.7 quake along NMSZ) or “Very Strong” (7.6 quake along NMSZ) effects in the Planning Area. “Strong” earthquake effects would result in minimal property damage but “Very

Strong” effects would cause slight to moderate damage in well-built ordinary structures and considerable damage in poorly built or designed structures.

As with any traumatic event, the potential for “emotional aftershocks” exists with any earthquake event. Major earthquake events require mental health services for people dealing with loss, stress, anxiety, fear, and other difficult emotions. Even a smaller quake, however, has the potential for emotional repercussions; the sudden movement of something normally experienced as stable (the earth itself) can be very traumatic.

Planning should take place for building and structure assessment after an earthquake to ensure that individuals are returning to structurally sound buildings and homes.

In the past decade, there has also been increased research into the connection between earthquakes and liquefaction of soils. According to the USGS, Liquefaction is a physical process which can occur during an earthquake. Clay-free soil deposits (primarily sands and silts) temporarily lose strength and behave as viscous fluids, resulting in ground failure. Soils in the planning area that would be most susceptible to this effect are those along the Missouri River.

Potential Impact on Existing Structures

The vulnerability to earthquakes across the state of Missouri was analyzed in the *Missouri State Hazard Mitigation Plan (2013)* using HAZUS-MH MR4, modeling software used by FEMA to compare relative risk from earthquakes and other natural hazards. The analysis used an enhanced Level 2 inventory database comprised of updated demographic and aggregated data based on the 2010 census. The site-specific essential facility data were updated based on 2011 HSIP inventory data. Two types of analysis were done: an Annualized Loss Scenario and a 2% Probability of Exceedance in 50 Years Scenario.

Annualized Loss Scenario

The *State Hazard Mitigation Plan* explains the annualized loss scenario that was run as follows:

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. (Editors note: 100, 200, 500, 750, 1000, 1500, 2000, and 2500 years.) Annualized loss is the maximum potential annual dollar loss resulting from various return periods averaged on a ‘per year’ basis. It is the summation of all HAZUS-supplied return periods multiplied by the return period probability (as a weighted calculation).

The results of the modeling for Howard County are shown in Figure 3.3.4.

Figure 3.3.4				
HAZUS-MH Earthquake Loss Estimation				
Annualized Loss Scenario for Callaway County				
Building Loss Total	Loss Ratio %*	Income Loss Total	Total Loss	Loss Ratio Rank**
\$201,000	0.00	\$72,000	\$273,000	104

* Loss ratio equals the sum of structural and nonstructural damage divided by the entire building inventory value within the county.
** Out of 115 (114 counties and the City of St. Louis)
Source: Missouri State Hazard Mitigation Plan (2013)

The loss ratio gives an indication of the potential economic impacts of an earthquake and the difficulty of recovery in the county. To put the estimated loss ratio for Callaway County in perspective, the highest loss ratio in Missouri was 0.13% in Pemiscot County which lies directly over the New Madrid Fault. The lowest loss ratio was 0.000% in Adair County in northwest Missouri.

In the map created from this Annualized Loss Scenario data, Callaway County lies adjacent to, but outside of, the delineation of high risk counties.

2% Probability of Exceedance in 50 Years Scenario

This analysis models a worst case scenario using a level of ground shaking recognized in earthquake design. The *Missouri State Hazard Mitigation Plan (2013)* gives the following explanation of the modeling:

The methodology is based on probabilistic seismic hazard shaking grids developed by the U.S. Geological Survey (USGS) for the National Seismic Hazard Maps that are included with HAZUS-MH. The USGS maps provide estimates of peak ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively, that have a 2% probability of exceedance in the next 50 years. The International Building Code uses this level of ground shaking for building design in seismic areas. This scenario used a 7.7 driving magnitude in HAZUS-MH, which is the magnitude used for typical New Madrid fault planning scenarios in Missouri. While the 2% probability of exceedance in the next 50 years ground motion maps incorporate the shaking potential from all faults with earthquake potential in and around Missouri, the most severe shaking is predominately generated by the New Madrid Fault.

The results of the modeling for Callaway County are shown in Figure 3.3.5.

To put the estimated loss ratio for Callaway County for this scenario in perspective, the highest loss ratio in Missouri was 76.15% in Pemiscot County which lies directly over the New Madrid Fault. The lowest loss ratio was 0.32% in Worth County in northwest Missouri.

In the map created from this 2% Probability of Exceedance in 50 Years Scenario data, Callaway County also lies adjacent to, but outside of, the delineation of high risk counties. The 2% Probability model assumed a higher magnitude (7.7) and still did not include Callaway County in the high risk counties. Caution indicates that mitigation and preparedness be focused on the most conservative estimates (in this case, those which predict greater injury and damage) unless these have been shown to be incorrect.

Figure 3.3.5
HAZUS-MH Earthquake Loss Estimation
2% Probability of Exceedance in 50 Years Scenario for Callaway County

Structural Damage	Non-Structural Damage	Contents Damage and Inventory Loss	Loss Ratio*	Income Loss	Total Economic Loss to Buildings**	Loss Ratio Rank***
\$27,619,000	\$85,694,000	\$30,946,000	2.74	\$45,339,000	\$189,598,000	50
* Loss ratio equals the sum of structural and nonstructural damage divided by the entire building inventory value within the county.						
** Total economic loss includes inventory loss, relocation loss, capital-related loss, wages loss, and rental income loss						
*** Out of 115 (114 counties and the City of St. Louis)						
Source: Missouri State Hazard Mitigation Plan (2013)						

Social impacts have also been modeled through HAZUS-MH for this 2% Probability of Exceedance in 50 Years (Worst Case) Scenario. The modeling was done for displacement of households, sheltering needs, and the following four levels of casualty severity:

- Level 1 – Injuries will require medical attention but hospitalization is not needed
- Level 2 – Injuries will require hospitalization but are not considered life-threatening
- Level 3 – Injuries will require hospitalization and can become life threatening if not promptly treated.
- Level 4 – Victims are killed by the earthquake.

The data in Figure 3.3.6 shows the estimated social impact in Callaway County of an earthquake occurring at 2 a.m. when most people would be in their homes.

Figure 3.3.6					
Social Impact Estimates (HAZUS-MH Modeling)					
2% Probability of Exceedance in 50 Years Scenario for Callaway County					
2 a.m. Time of Occurrence					
Level 1	Level 2	Level 3	Level 4	Displaced Households	Short-Term Shelter Needs
41	7	1	1	61	40
Source: Missouri State Hazard Mitigation Plan (2013)					

Potential Impact on Future Development

Impacts on future development may be mitigated by following more stringent earthquake resistant building codes and ensuring buildings are built or retrofitted to current earthquake resistant codes. However, this type of mitigation activity may not be cost effective for most communities.

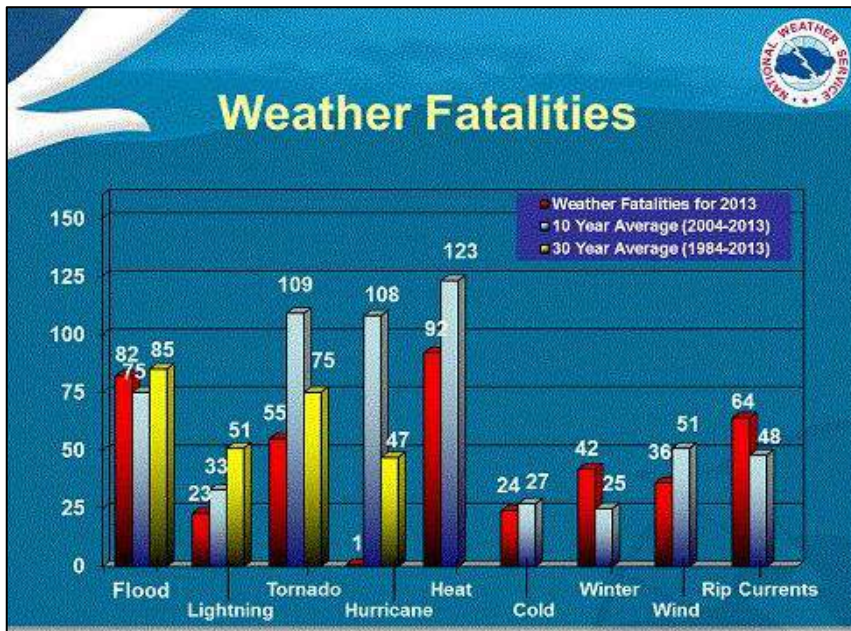
The potential impact of earthquakes on future development would be the same as for existing structures.

3.4 Extreme Heat

Description of Hazard

Extreme Heat is one of the top weather-related killer in the United States, according to National Oceanic and Atmospheric Administration⁸. In contrast to the visible, destructive, and violent nature of floods, hurricanes, and tornadoes, extreme heat is a silent killer. Heat kills by overloading the human body's capacity to cool itself. According to information from the Environmental Protection Agency, in 2014 roughly 765,233,180 people died with heat considered the underlying cause of death and between May to September 2014, 1,088,261,945 people died with heat being the underlying and contributing cause of death in the United States⁹.

Figure 3.4.1a



Air temperature is not the only factor to consider when assessing the likely effects of extreme heat. High humidity often accompanies heat in Missouri and increases the danger of heat. The human body cools itself by perspiring; the evaporation of perspiration carries excess heat from the body. High humidity makes it difficult for perspiration to evaporate and thus

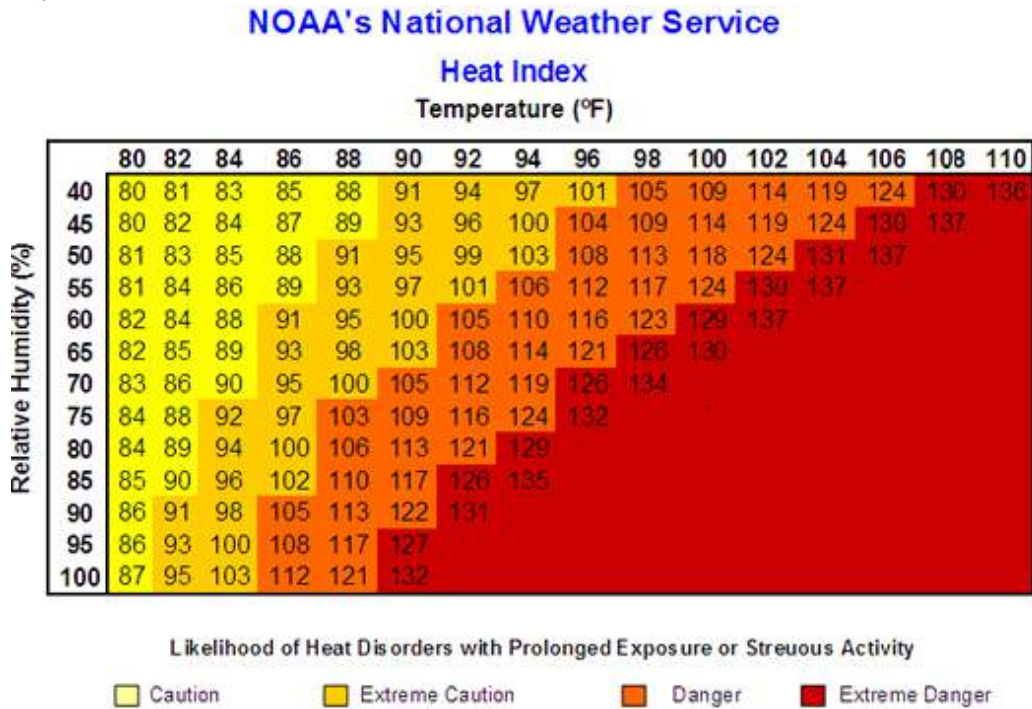
interferes with this natural cooling mechanism. There is a positive correlative relationship between heat and humidity on danger levels. As the two rise together, danger levels rise with them.

The Heat Index devised by the National Weather Service (NWS) takes into account both air temperature and relative humidity (See Figure 3.4.1). The Heat Index, also known as the apparent temperature, is a measure of how hot it really feels, and more accurately measures the danger posed by the combination of temperature and humidity. The color coding in the Heat Index Chart indicates the level of danger at the various heat index readings.

⁸ NOAA. <http://www.nws.noaa.gov/os/heat/>

⁹ EPA. https://www.epa.gov/sites/production/files/2016-08/heat-deaths_fig-1.csv

Figure 3.4.1b



Source: National Weather Service. http://www.nws.noaa.gov/os/heat/heat_index.shtml (May 2017)

The National Weather Service has put together information that correlates heat index temperatures with the effects on the human body (see Figure 3.4.2). These effects are based on the interaction of both heat and humidity levels.

Effects of Extreme Heat on the Human Body	
Heat Index	Heat Disorder
80 - 90° F	Fatigue possible with prolonged exposure or physical activity.
90 - 105° F	Sunstroke, heat cramps, and heat exhaustion possible with prolonged exposure or physical activity.
105 - 130° F	Sunstroke, heat cramps, and heat exhaustion likely, and heat stroke possible with prolonged exposure or physical activity.
130° F and higher	Heat stroke or sunstroke likely with continued exposure.

Source: National Weather Service. <http://www.wrh.noaa.gov/psr/general/safety/heat/heatindex.png> (May 2017)

Residents of both urban and rural areas are vulnerable to excessive heat. Some of the factors which increase the level of risk are:

- Age (infants, children, and seniors)
- Underlying medical conditions

- Physical activity or employment outdoors
- Lack of access to air conditioning, water, and shade
- Lack of access to public communication regarding heat hazards and protective measures

The elderly in particular are susceptible to complications from excessive and/or prolonged heat. According to the American Community Survey (2011-2015), the planning area has an estimated population of 6,195 citizens who are 65 years and older.

Geographic Location

The entire planning area is at risk from extreme heat events.

Previous Occurrences

Callaway County has had many periods of extreme heat in the last two decades (see Figure 3.4.3). The data indicates that extreme heat usually occurs in July and August.

When examining the data in Figure 3.4.3, it is important to take into consideration that the deaths, injuries, and economic losses represent all counties in Missouri affected by the period of extreme heat. The heat related death reported for 7/16/1999 was in Callaway County; high temperatures that day were in the mid-90s.

Figure 3.4.3 Periods of Extreme Heat in Callaway County, June 1994-June 2017						
Date	Heat Index	Deaths	Injuries	Property Damage	Crop Damage	Duration (days)
06/12/94	100+	4	55	0	50K	12
07/17/95	120	20	225	75K	400K	6
07/28/95	110+	0	120	15K	25K	4
08/01/95	110-120	9	230	0	400K	most of August
08/23/98	105	0	10	0	0	3
07/16/99	NA	1	0	0	0	1
07/18/99	105-115	42	397	0	0	14
08/28/00	105-110	1	125	0	0	4
07/07/01	105-110	5	61	0	0	4
07/17/01	110-115	0	19	0	0	1
07/21/01	105-115	3	71	0	0	4
07/29/01	105-115	0	4	0	0	3
08/01/01	105	0	34	0	0	2
08/07/01	102-110	1	10	0	0	3
08/21/01	105-110	0	14	0	0	2
06/01/02	NA	0	14	0	0	4
07/08/02	105-110	1	26	0	0	2
07/20/02	105-115	0	47	0	0	3
07/26/02	105-115	0	185	0	0	6

08/01/02	100+	1	59	0	0	6
07/03/03	105	3	93	0	0	7
08/15/03	105+	2	54	0	0	7
08/24/03	105-110	0	0	0	0	5
07/20/04	105-110	0	25	0	0	3
07/20/05	105-120	4	65	0	0	7
07/17/06	105-110	0	12	0	0	4
07/29/06	105-110	0	0	0	0	3
08/01/06	NA	0	59	0	0	2
08/05/07	105-110	0	0	0	0	12
06/21/09	100-107	0	0	0	0	7
07/14/10	105-110	0	0	0	0	1
07/17/10	105	0	0	0	0	1
07/22/10	105-110	0	0	0	0	2
08/02/10	110	0	0	0	0	2
08/08/10	110-115	0	0	0	0	6
07/01/11	105	0	22	0	0	3
07/10/11	105-110	1	60	0	0	3
07/17/11	105-110	8	389	0	0	15
08/01/11	105-115	0	52	0	0	3
08/06/11	105-110	0	10	0	0	2
08/31/11	105-110	0	2	0	0	1
09/01/11	105	1	15	0	0	3
06/27/12	105	2	215	0	0	4
07/01/12	105-110	17	172	0	0	8
07/16/12	105-110	3	53	0	0	4
07/22/12	110	0	75	0	0	6
08/01/12	105-110	0	6	0	0	2
08/31/13	105-110	0	0	0	0	2
08/20/14	105-110	0	56	0	0	8
07/12/15	110	0	50	0	0	3
07/17/15	105-110	0	0	0	0	2
07/25/15	110	0	0	0	0	5
06/15/16	105	0	0	0	0	2
06/22/16	105	0	9	0	0	1
07/18/16	110	1	70	0	0	7
TOTALS		130	3270	90K	875K	267
Source: https://www.ncdc.noaa.gov/stormevents/						

***Note the 130 deaths are per heat wave and not isolated to Callaway County.**

Based on the number of events, there is a 100% chance a heat event will occur each year. The data shows that a heat event did not occur in four of the 23 years in the dataset (June 1994 to

June 2017)*, which is 17.3% of the total observation period. We can say there is a probability of 82.6% that a heat event will occur.

*The hottest months of 2017 were not included in the data due to the availability of the data at the time collected. It will be 86.9% probability after July and August data are released (20 out of 23 years with a heat event).

Measures of Probability and Severity

Probability: High
Severity: Moderate

Existing Mitigation Activities

The following departments, agencies, and organizations all are involved in educating the public about the dangers of extremely hot weather and/ or issuing alerts when the threat of extreme heat is imminent:

The Missouri Department of Health and Senior Services announces statewide hot weather health alerts according to the following criteria:

- **Hot Weather Health Alert** – Heat indices of 105°F in a large portion of the state are first reached (or predicted)
- **Hot Weather Health Warning** – Heat indices have been 105°F or more for two days in a large portion of the state, or weather forecasts call for continued heat stress conditions for at least 24 to 48 hours over a large portion of the state.
- **Hot Weather Health Emergency** – When extensive areas of the state meet all of the following criteria:
 - High sustained level of heat stress (Heat Index of 105°F for 3 days)
 - Increased numbers of heat-related illnesses and deaths statewide
 - The NWS predicts hot, humid temperatures for the next several days for a large portion of the state.

The National Weather Service (NWS) has devised a method to warn of advancing heat waves up to seven days in advance. The new Mean Heat Index is a measure of how hot the temperatures actually feel to a person over the course of a full 24 hours. It differs from the traditional Heat Index in that it is an average of the Heat Index from the hottest and coldest times of each day.

The National Weather Service initiates alert procedures when the Heat Index is expected to exceed 105°- 110°F for at least two consecutive days. (The exact Heat Index temperature used depends on specifics of the local climate.) The following are released to the media and over NOAA All-Hazard Weather Radio:

- Heat Index values are included in zone and city forecasts.
- Special Weather Statements and/or Public Information Statements are issued which present a detailed discussion of the Heat Index Values, who is most at risk, and safety rules for reducing risk.
- In severe heat waves, state and local health officials are assisted in preparing Civil Emergency Messages which include Special Weather Statements and more detailed medical information, advice, and names and telephone numbers of health officials.

The Missouri Department of Health and Human Services also maintains a searchable online map/database of cooling centers throughout the state (<http://gis.dhss.mo.gov/Website/coolingCenter/coolingCenter.html#>).

As of August 2017, the following cooling centers are listed for Callaway County:

- Auxvasse City Hall, 104 Hwy 54, Auxvasse, MO
- Auxvasse Senior Center, 501 Senior Center Dr., Auxvasse, MO
- Callaway County Public Library, 710 Court Street, Fulton, MO
- Fulton City Hall, 18 E 4th St., Fulton, MO
- Fulton Senior Center, 531 Commons Drive, Fulton, MO
- Kingdom City – City Hall, 5846 Old Hwy 40, Kingdom City, MO
- Bank Star One, 100 State Rd AE, New Bloomfield, MO
- New Bloomfield City Hall, 501 Glenwood, New Bloomfield, MO

Individuals are able to go to public places not on the list as official cooling centers during normal business hours. For example, if the Callaway County Health Department is open, individuals are able to use the location as a cooling center. There will be an effort to expand this list as a new mitigation action.

The Missouri State High School Activities Association (MSHSAA) provides coaches with educational pamphlets on the dangers of excessive heat. They also send out advisories. Schools are contacted by the Health Department when advisories potentially impact students.

Weather Forecast Offices of the National Weather Service (NWS) can issue the following warnings about excessive heat:

- **Excessive Heat Outlook:** Potential exists for an excessive heat event in the next 3 to 7 days. An outlook is used to indicate that a heat event may develop. It is intended to provide information to those who need considerable lead time to prepare for the event, such as public utilities, emergency management and public health officials.
- **Excessive Heat Watch:** Conditions are favorable for an excessive heat event in the next 12 to 48 hours. A watch is used when the risk of a heat wave has increased, but its occurrence and timing is still uncertain. It is intended to provide enough lead time so those who need to set their plans in motion can do so, such as established individual city excessive heat event mitigation plans.

- **Excessive Heat Warning/Advisory:** An excessive heat event is expected in the next 36 hours. The warning is used for conditions posing a threat to life or property. An advisory is for less serious conditions that cause significant discomfort or inconvenience and, if caution is not taken, could lead to a threat to life and/or property.

Extreme Heat Vulnerability

Jurisdictions: All Jurisdictions (excluding Boone Co. PWS#9)

Overview

All jurisdictions are vulnerable to the effects of extreme heat. While heat-related illness and death can occur due to exposure to intense heat in just one afternoon, heat stress on the body has a cumulative effect. The persistence of a heat wave increases the danger. Loss of life is the most significant consequence of extreme heat. The elderly and those active or employed in outdoor settings are most vulnerable. According to the World Health Organization, “elderly” is defined as those over the age of 65. Elderly are the most susceptible to complications from excessive and/or prolonged cold or heat. According to the American Community Survey (2011-2015), Callaway County has an estimated population of 6,195 citizens who are 65 years and older. Residents without access to air conditioning, water, and shade are most vulnerable.

In addition to the human toll, the Midwestern Climate Center, in a paper on the 1999 heat wave, points out other possible impacts such as electrical infrastructure damage and failure, highway damage, crop damage, water shortages, livestock deaths, fish kills, and lost productivity among outdoor-oriented businesses¹⁰. These damages are also connected to drought when there are prolonged and/or recurrent periods of excessive heat.

Crop claims totaling \$762,724 were paid in Callaway County in the period 1998-2016 for losses due to heat, according to data from the USDA Risk Management Agency¹¹. This is separate from the \$22,660,371 paid in that period for losses due to drought.

Potential Impact on Existing Structures

While loss of life is of the most concern with this hazard, limited structural impacts also exist. Although impacts exist, they are limited and dependent on how prolonged the heat wave is. Failure of road surfaces, electrical infrastructure, and crop damage may all occur.

Potential Impact on Future Development

¹⁰ Michael A. Palecki, Stanley A. Changnon, and Kenneth E. Kunkel, “The Nature and Impacts of the July 1999 Heat Wave in the Midwestern United States: Learning from the Lessons of 1995,” *Bulletin of the American Meteorological Society* 82, no. 7 (July 2001): 1353-1367.

¹¹ <https://www.rma.usda.gov/data/cause.html>

Thoughtful future development has the potential to include mitigation for extreme heat into its design. This is true on all levels ranging from actions by individual homeowners to larger redevelopment projects planned by cities and towns.

Properly placed shade trees can greatly contribute to lowering temperatures indoors and the load placed on cooling systems.

In addition, developers would be wise to minimize the amount of earth that is paved over with concrete or asphalt when planning any new development. Surface material significantly affects the ambient air temperature above it. The inclusion of naturally vegetated areas contribute to mitigation for both extreme heat and stormwater problems.

3.5 Flood

Description of Hazard

Callaway County is at significant risk for flooding because the southern border of the County is situated on the bank of the Missouri River, the longest river in the United States. The Missouri River drains approximately one-sixth of the area of the continental United States, according to the USGS. Based on the Missouri State Hazard Mitigation Plan (2013), Missouri River drains over half the state of Missouri as it flows eastward to join the Mississippi River at St. Louis. Since Callaway County is located less than 200 miles upstream from the mouth of this 2,540 mile river, flooding is a major concern for the county. There are also numerous creeks throughout the county with year-round water flows draining into the Missouri River.

Flooding is defined as partial or complete inundation of usually dry areas. Riverine flooding refers to when a river or creek overflows its normal boundaries. A rapid accumulation or runoff of surface waters may impact smaller rivers and creeks and cause flash flooding. Flash flooding can also occur as a result of dams being breached or overtopped. Flash floods can develop in just a matter of hours and are responsible for more flood related deaths than any other type of flooding.

The areas adjacent to rivers and stream banks that serve to carry excess floodwater during rapid runoff are called floodplains. A floodplain is defined as the lowland and relatively flat areas adjoining rivers and streams. The term base flood, or 100-year flood, is the area in the floodplain that is subject to a one percent or greater chance of flooding in any given year, based upon historical records.

In some cases, however, flooding may not be directly attributable to a river, stream or lake overflowing its banks. It may simply be the combination of excessive rainfall and/or snowmelt, saturated ground, and inadequate drainage. With no place else to go, 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 (Missouri State Hazard Mitigation Plan (2013)).

Storm water flooding can result when a flow of water occurs due to large rain events and it does not have adequate drainage or a path to flow off of infrastructure such as roads and pavement. Flooding due to inadequate storm water removal can create public safety issues due to flooded roadways and drainage structures.

Most flooding in Callaway County occurs in spring and summer but floods can occur during any season.

Geographic Location

The entire Planning Area is subject to potential flooding.

Callaway County (unincorporated area), Fulton, Holts Summit, and New Bloomfield are all at risk from riverine flooding because they have areas in the 100-year flood plain. None of the school districts, Boone Co. PWS#9, Auxvasse, or Lake Mykee have buildings lying within the 100-year flood plain. There are numerous lagoons or sewage treatment facilities near or in the flood plains.

The current digital Flood Insurance Rate Map (D-FIRM) for Callaway County is dated 6/19/2015; it shows the flood zones for these jurisdictions at risk for riverine flooding. (Flood zones are geographic areas defined according to varying levels of flood risk; each zone reflects the severity or type of flooding in the area.) The flood zones for the Planning Area are shown in Figures 3.5.1-3.5.7.

Flash flooding is a concern for all jurisdictions in the Planning Area. Flash flooding occurs throughout the Planning Area and low water crossings in the county can become intermittently uncrossable. Figure 3.5.8 depicts low water crossings in the Planning Area. This information was provided by the Callaway County Road and Bridge department. Signs are posted at many of the low water crossings throughout the county.

Figure 3.5.1

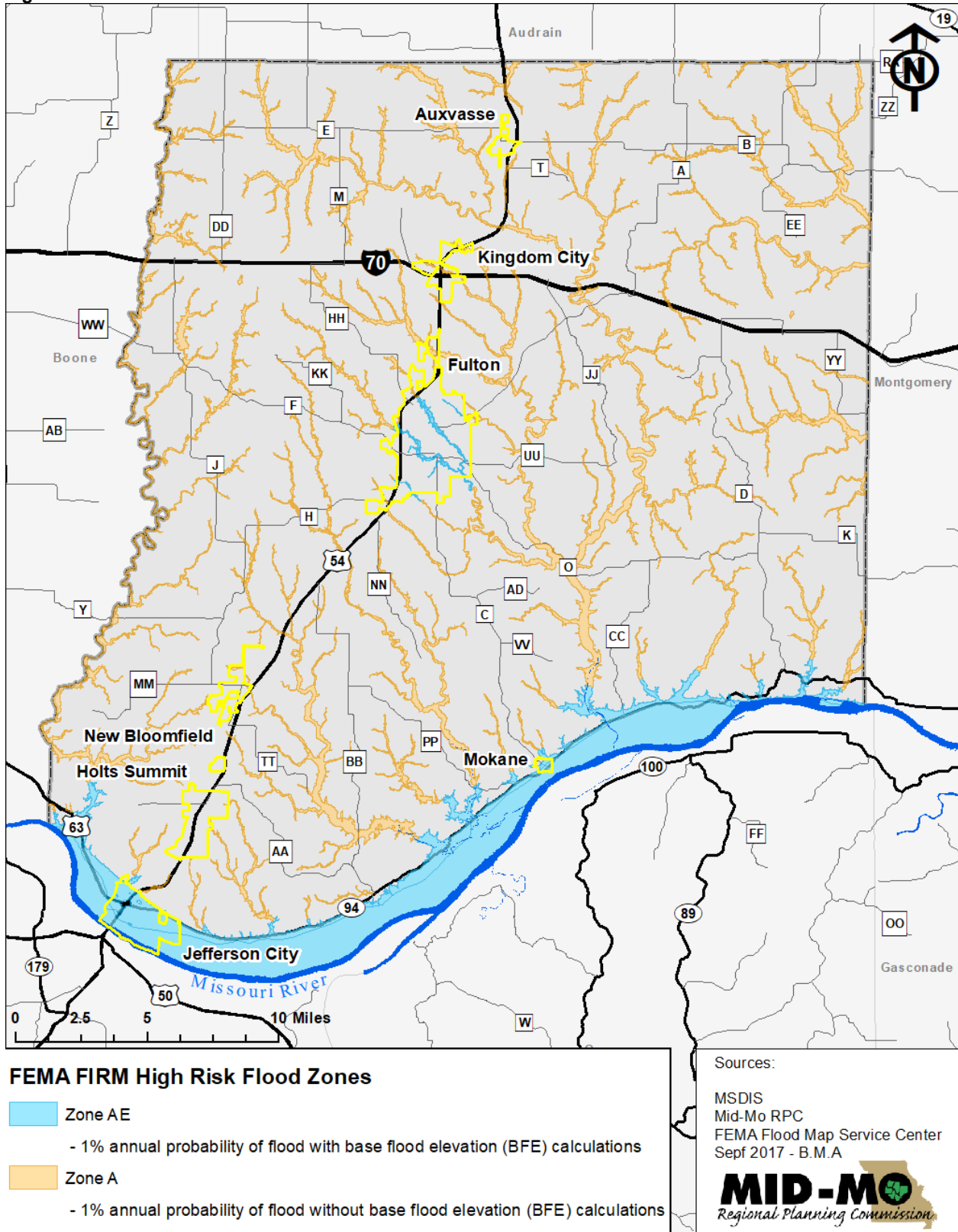
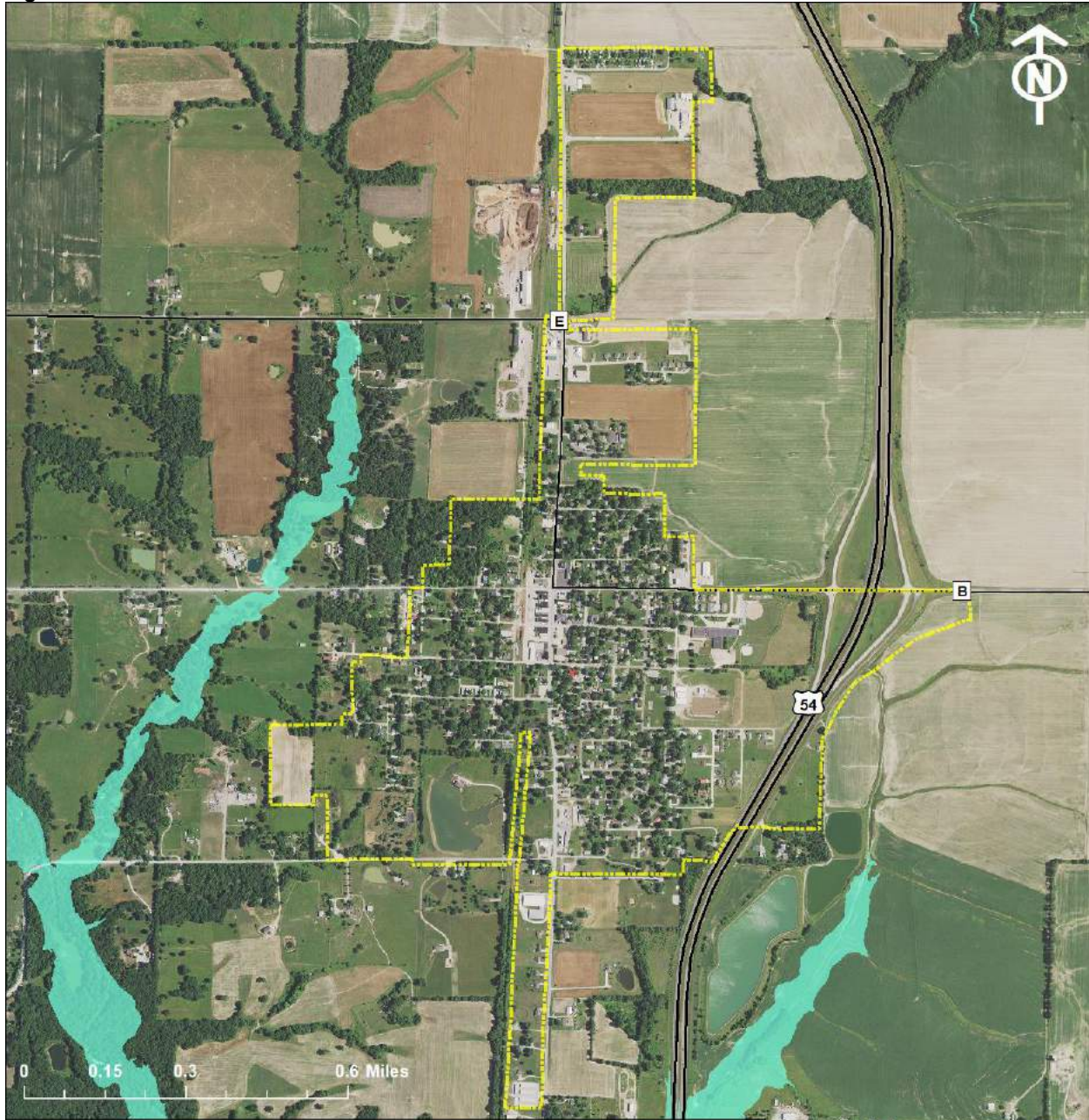


Figure 3.5.2



Auxvasse FEMA FIRM High Risk Flood Zones

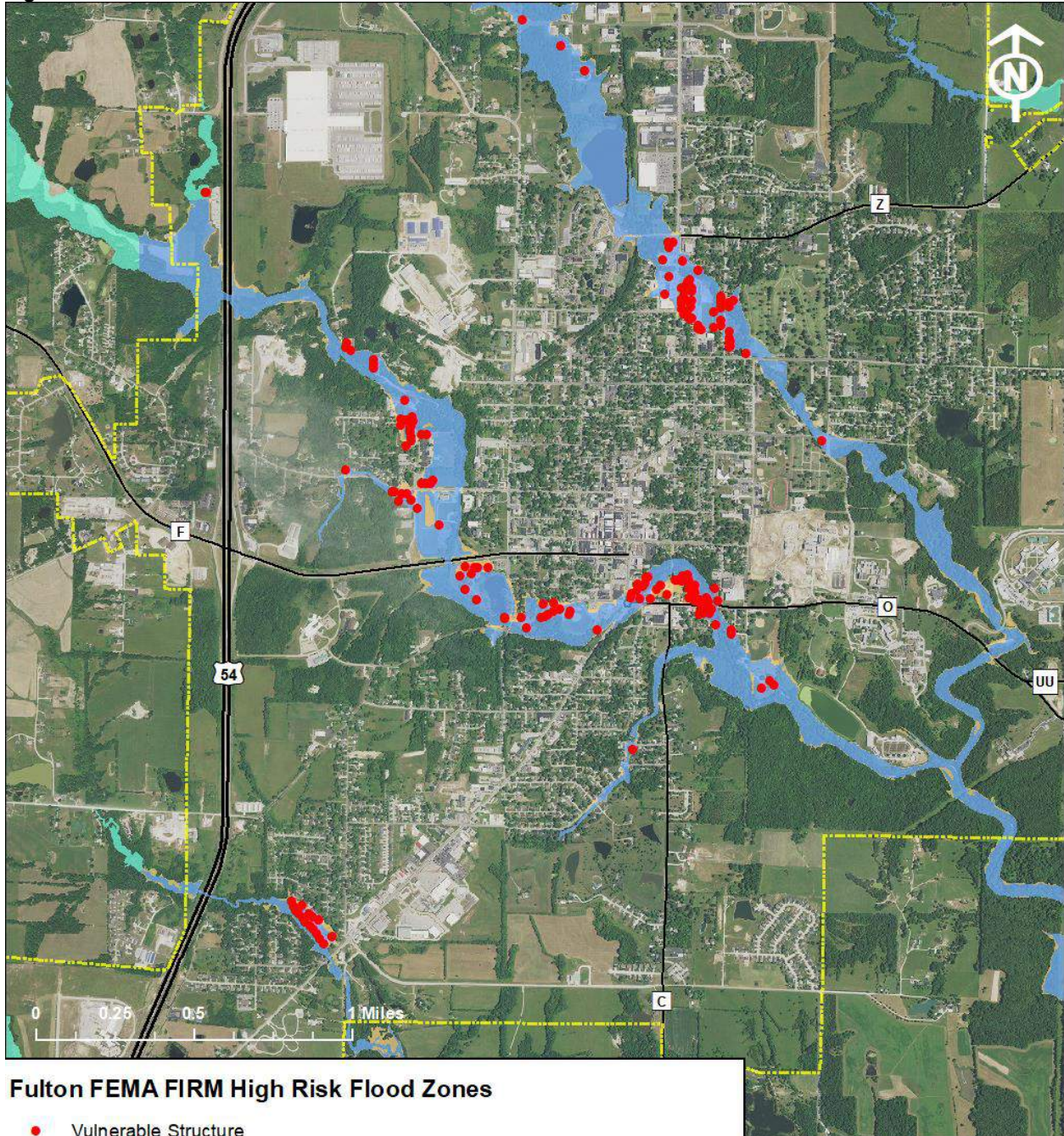
- Zone X (500 year flood)
- 0.2% annual probability of flooding
- Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.3



Fulton FEMA FIRM High Risk Flood Zones

- Vulnerable Structure
- Zone X (500 year flood)
- 0.2% annual probability of flooding
- Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:




MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4a



Northwest Fulton FEMA FIRM High Risk Flood Zones

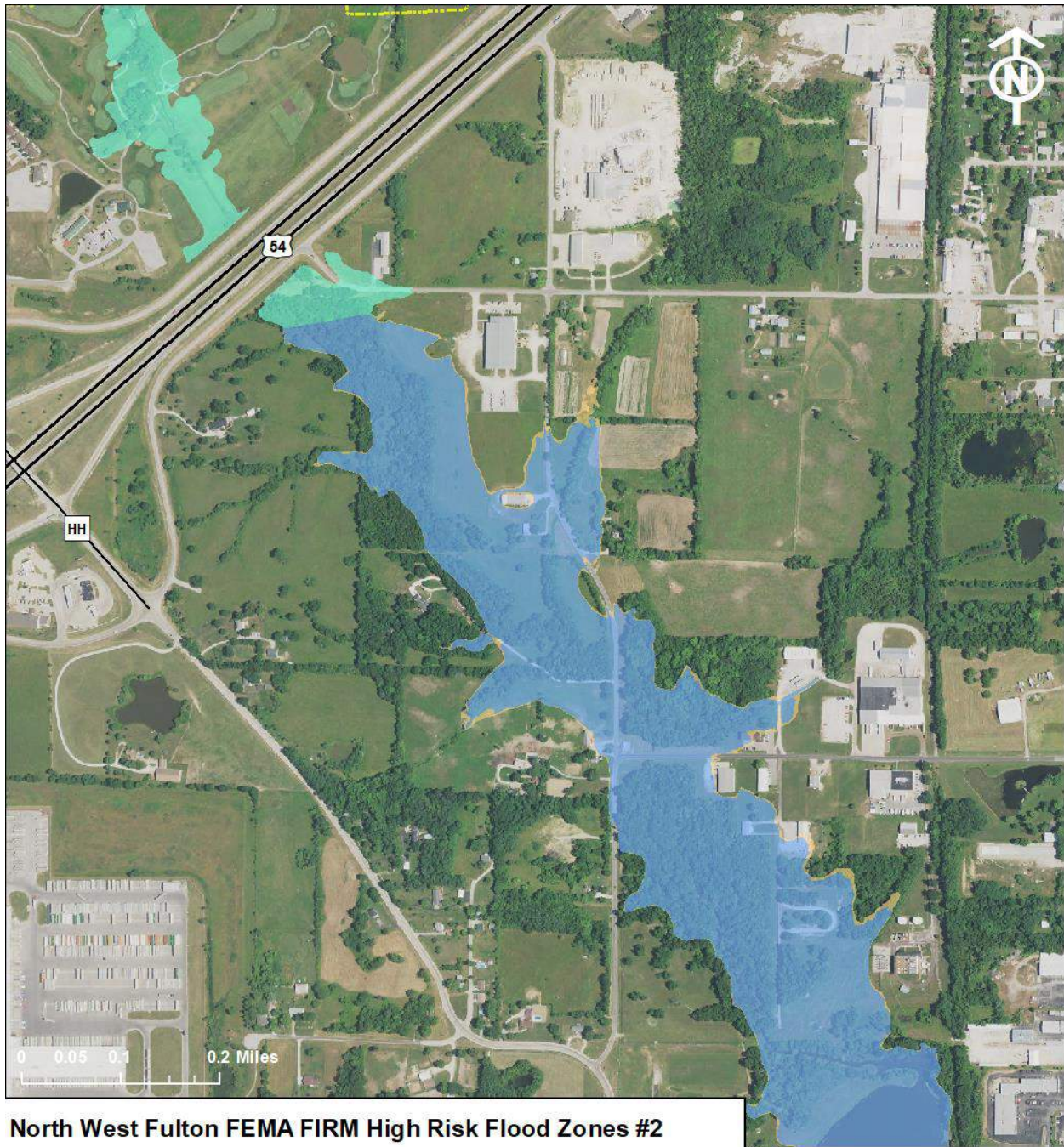
-  Zone X (500 year flood)
 - 0.2% annual probability of flooding
-  Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
-  Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:




MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4b



North West Fulton FEMA FIRM High Risk Flood Zones #2

-  Zone X (500 year flood)
 - 0.2% annual probability of flooding
-  Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
-  Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:




MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4c



North Central Fulton FEMA FIRM High Risk Flood Zones

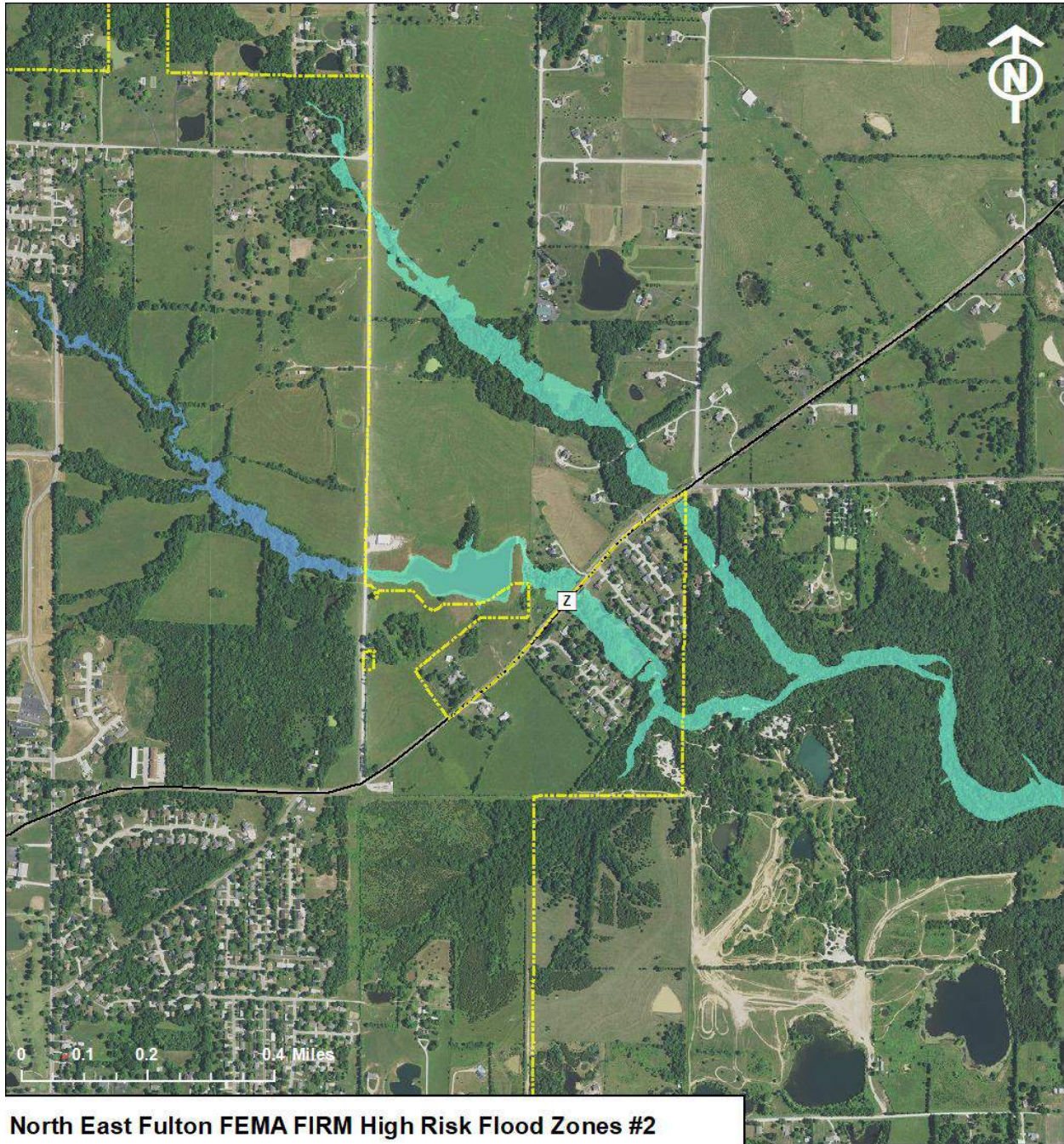
-  Zone X (500 year flood)
 - 0.2% annual probability of flooding
-  Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
-  Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:




MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4d



North East Fulton FEMA FIRM High Risk Flood Zones #2

-  Zone X (500 year flood)
 - 0.2% annual probability of flooding
-  Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
-  Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4e



Southeast Fulton FEMA FIRM High Risk Flood Zones

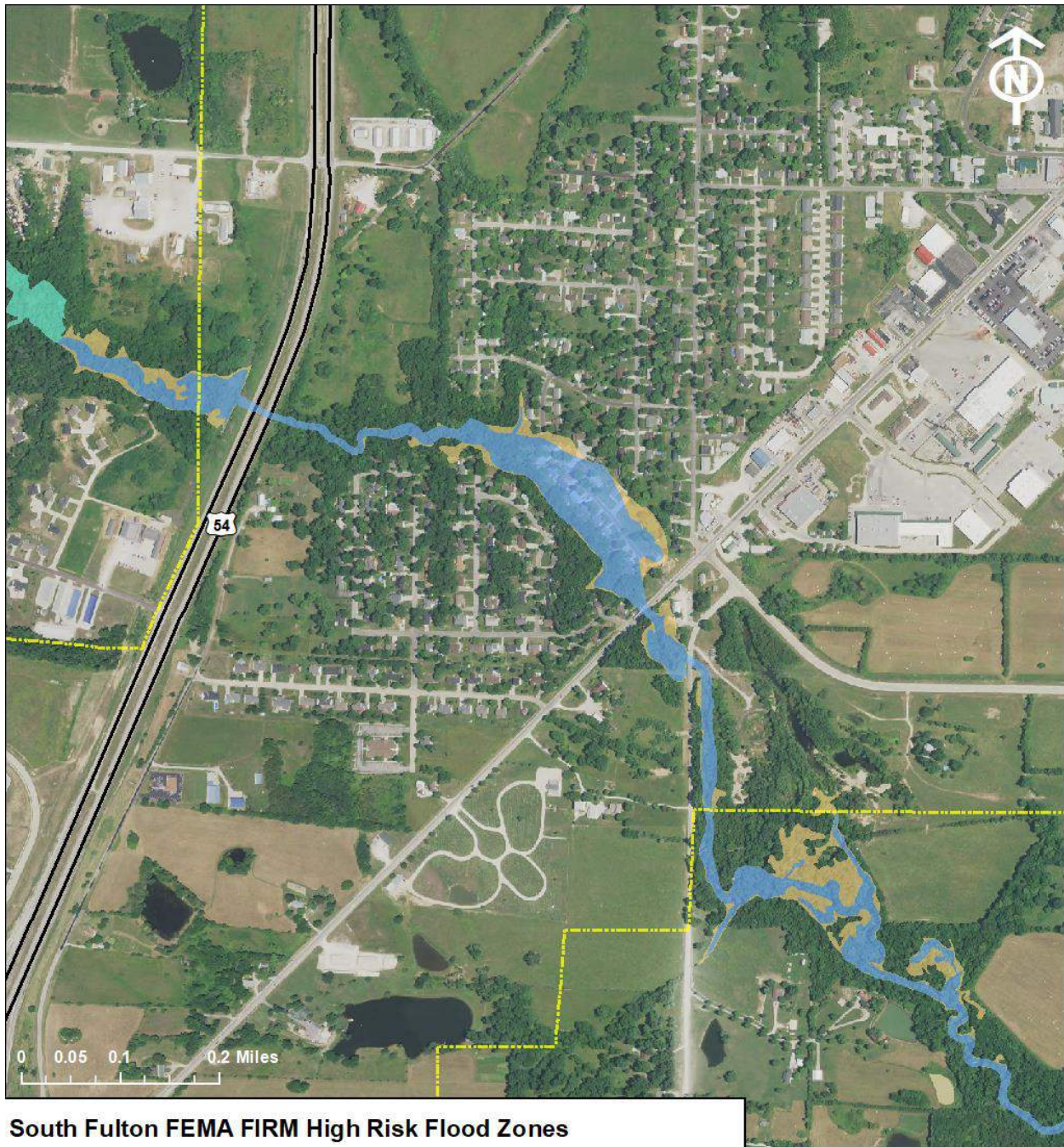
- Zone X (500 year flood)
 - 0.2% annual probability of flooding
- Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4f



South Fulton FEMA FIRM High Risk Flood Zones

- Zone X (500 year flood)
 - 0.2% annual probability of flooding
- Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.4g



West Fulton FEMA FIRM High Risk Flood Zones

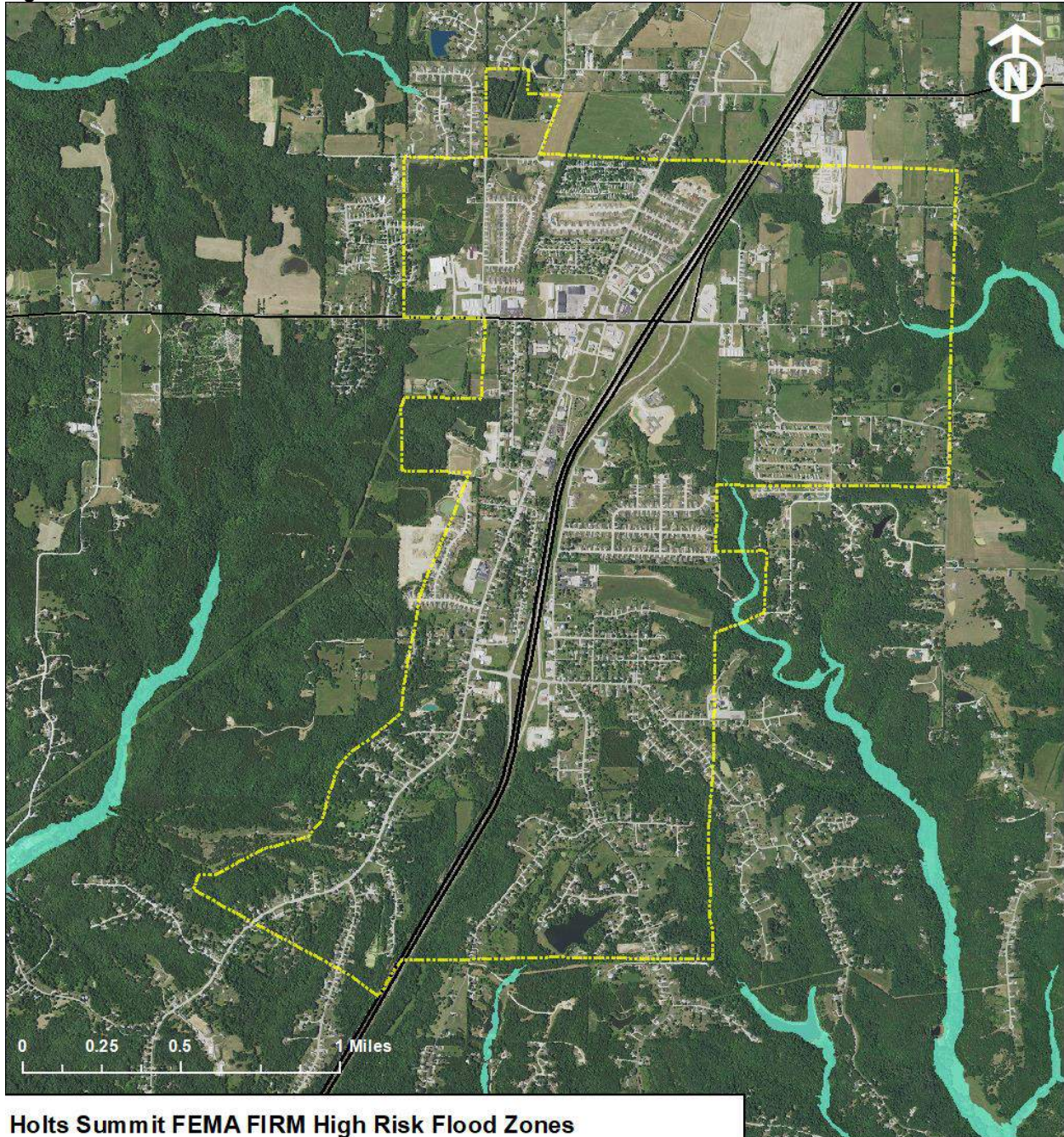
- Zone X (500 year flood)
 - 0.2% annual probability of flooding
- Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:




MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.5



Holts Summit FEMA FIRM High Risk Flood Zones

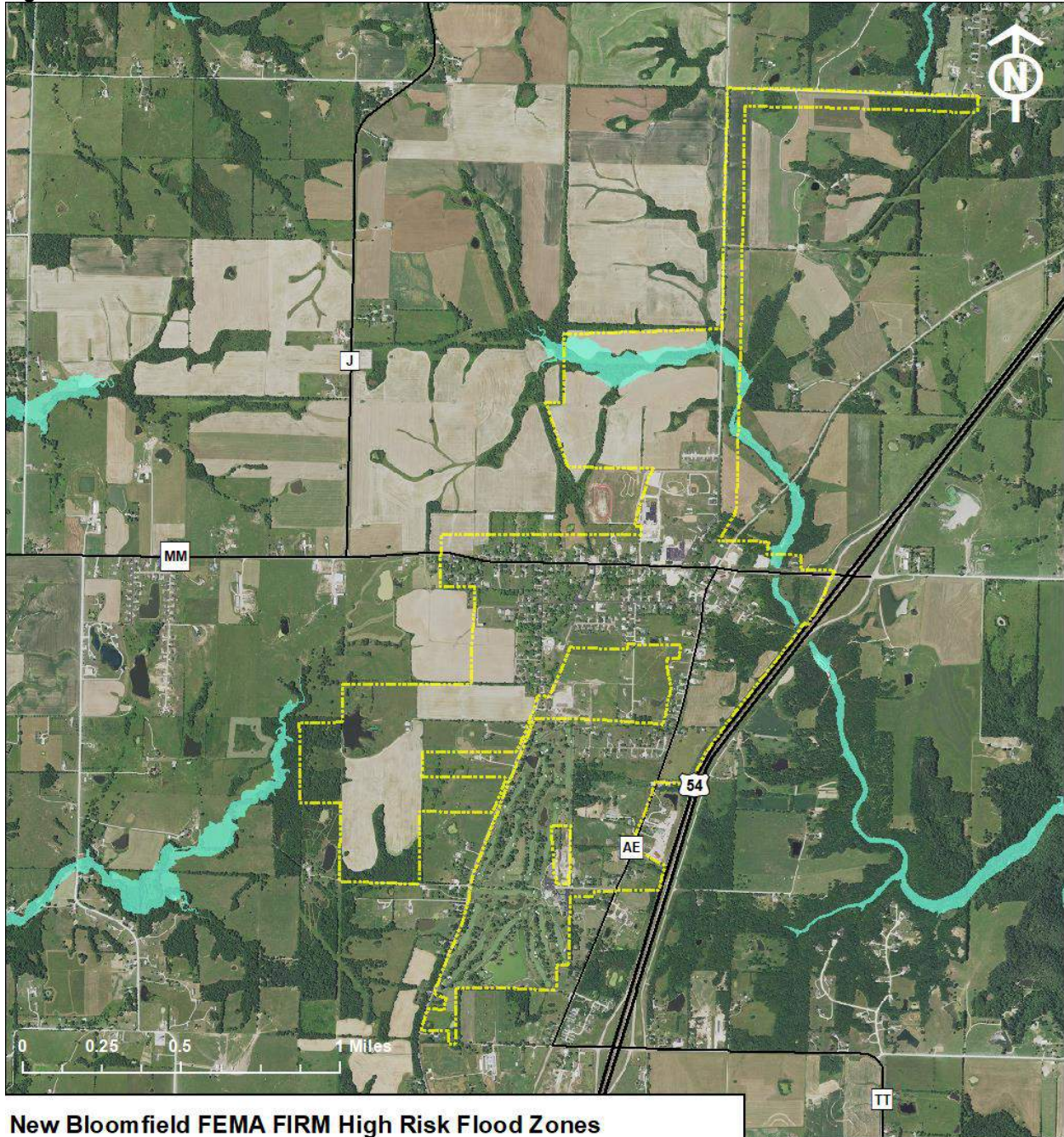
-  Zone X (500 year flood)
 - 0.2% annual probability of flooding
-  Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
-  Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.6



New Bloomfield FEMA FIRM High Risk Flood Zones

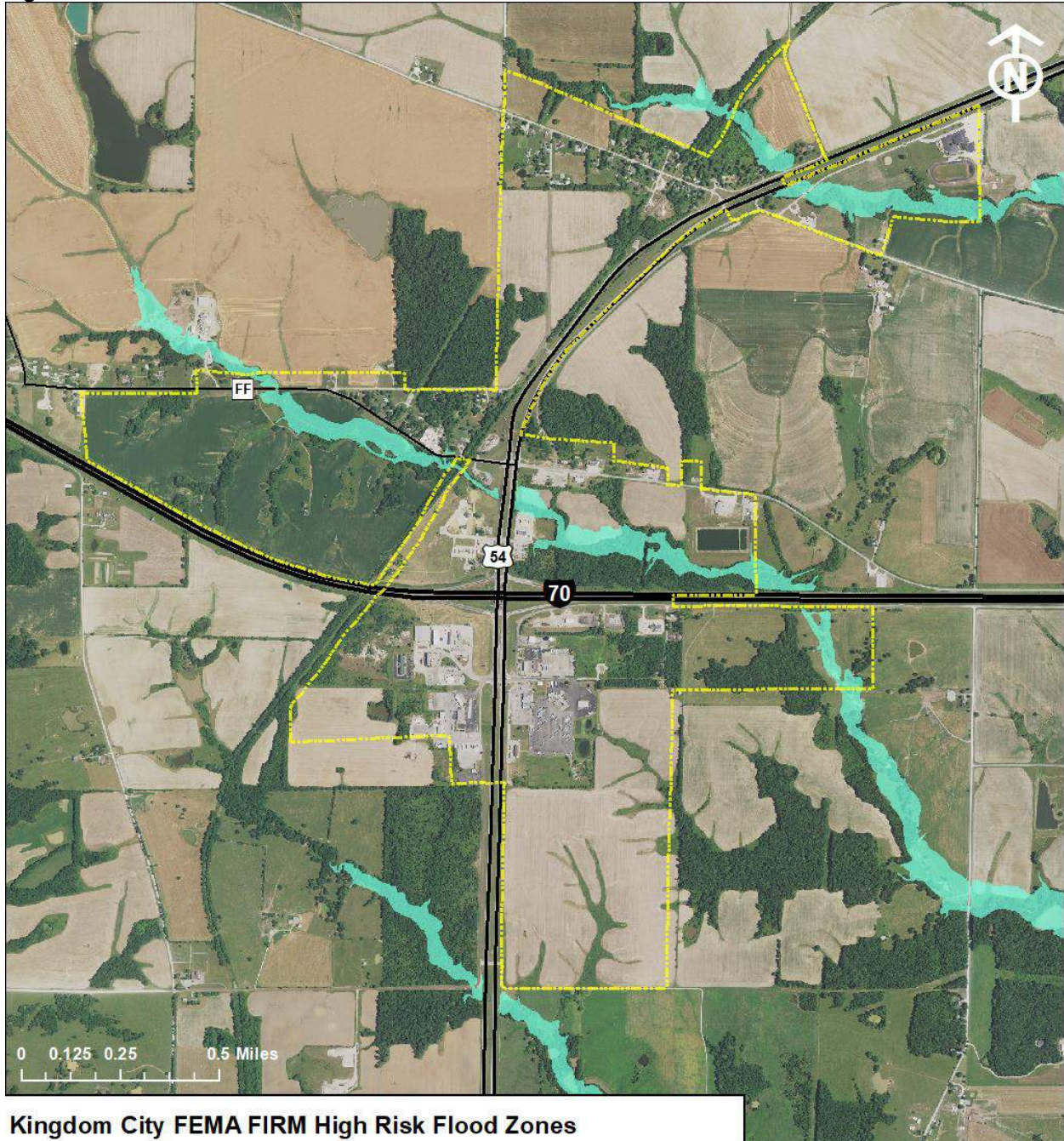
- Zone X (500 year flood)
 - 0.2% annual probability of flooding
- Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:




MSDIS
 Mid-Mo RPC
 FEMA Flood Map Service Center
 Sept 2017 - B.M.A



Figure 3.5.7



Kingdom City FEMA FIRM High Risk Flood Zones

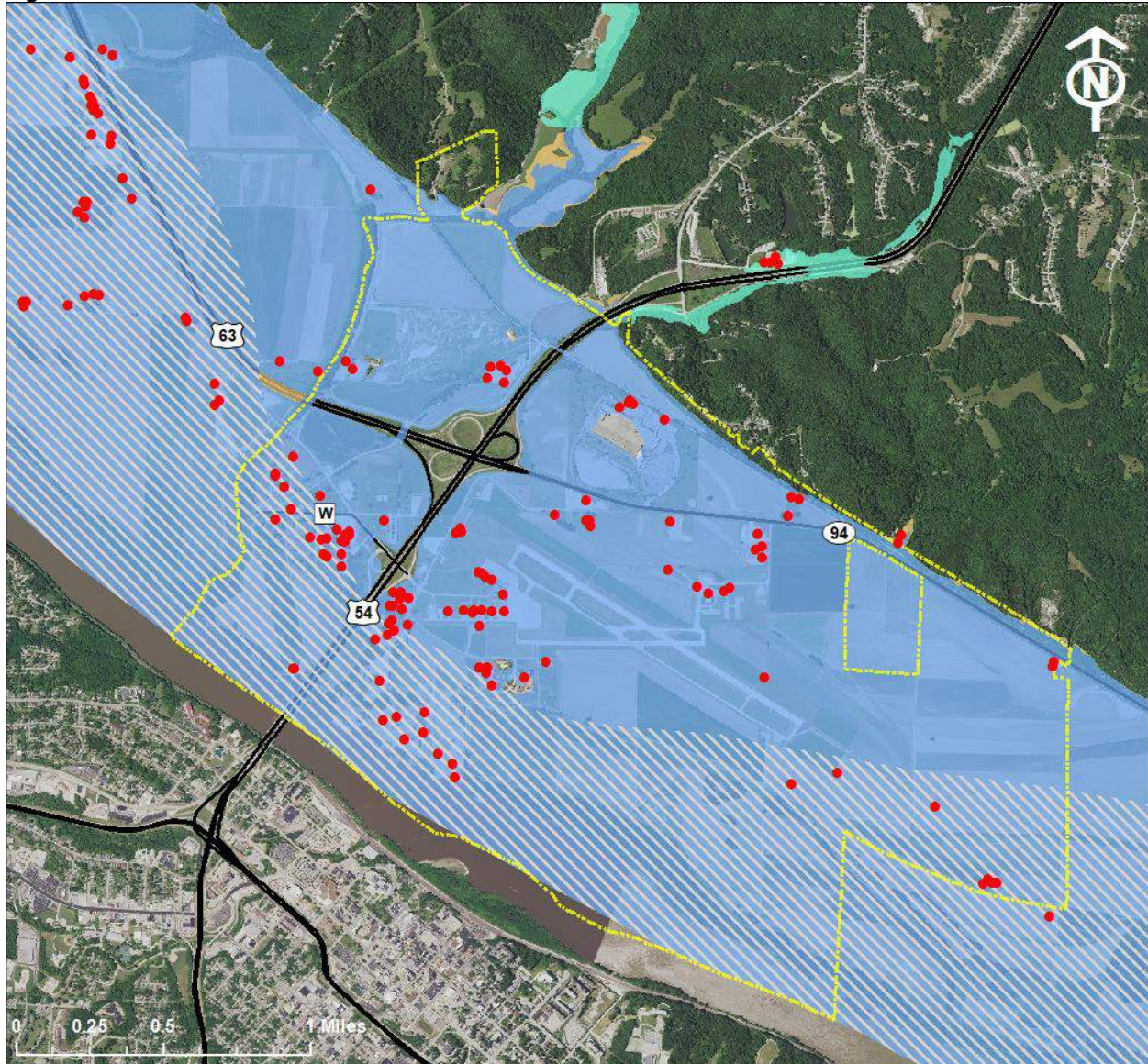
-  Zone X (500 year flood)
- 0.2% annual probability of flooding
-  Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
-  Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.8



Callaway Jefferson City FEMA FIRM High Risk Flood Zones

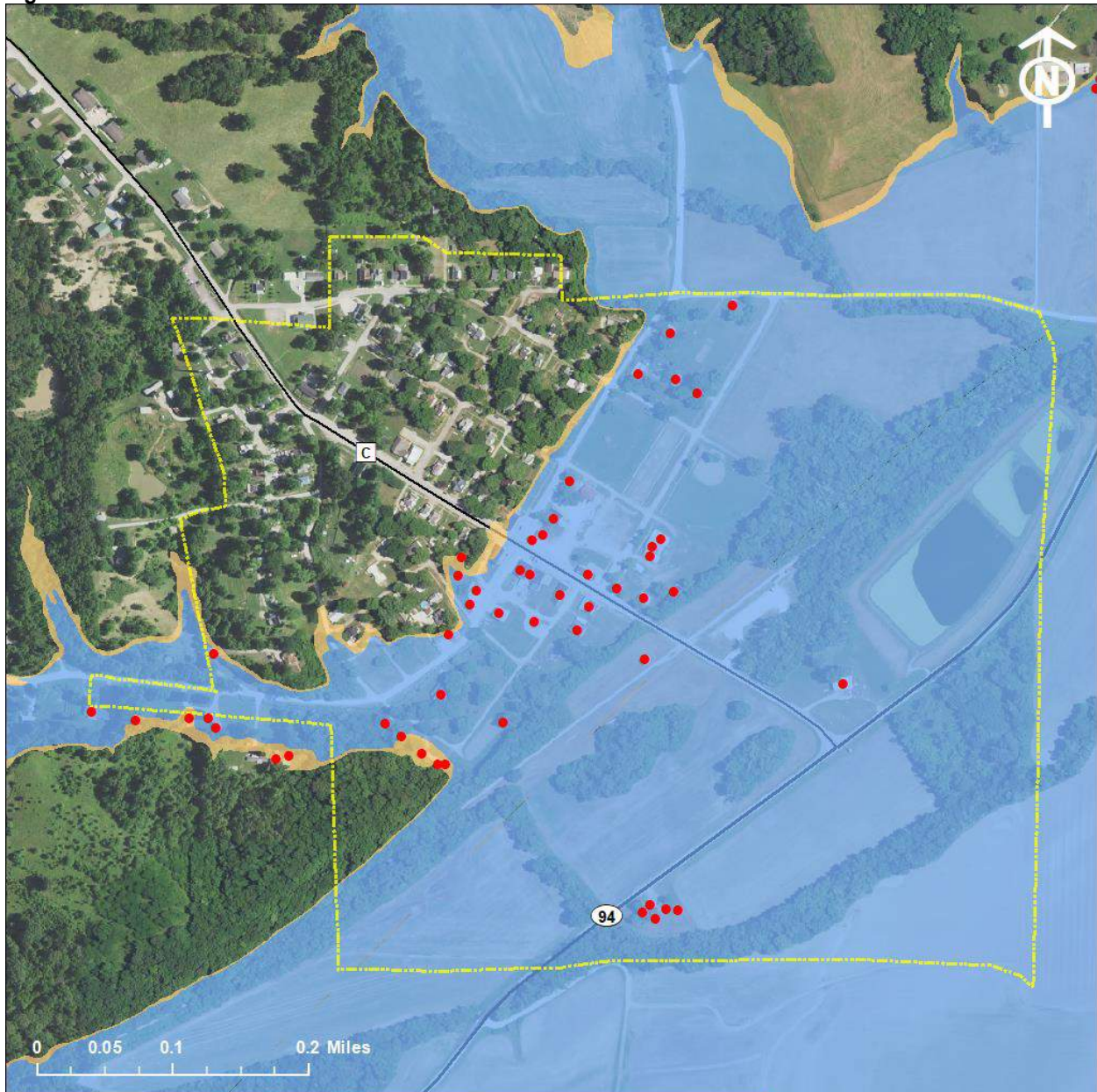
- Vulnerable Structure
- Floodway Zone
 - Regulated area of restricted development
- Zone X (500 year flood)
 - 0.2% annual probability of flooding
- Zone AE (100 year flood)
 - 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
 - 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
 Mid-Mo RPC
 FEMA Flood Map Service Center
 Sept 2017 - B.M.A



Figure 3.5.9



Mokane FEMA FIRM High Risk Flood Zones

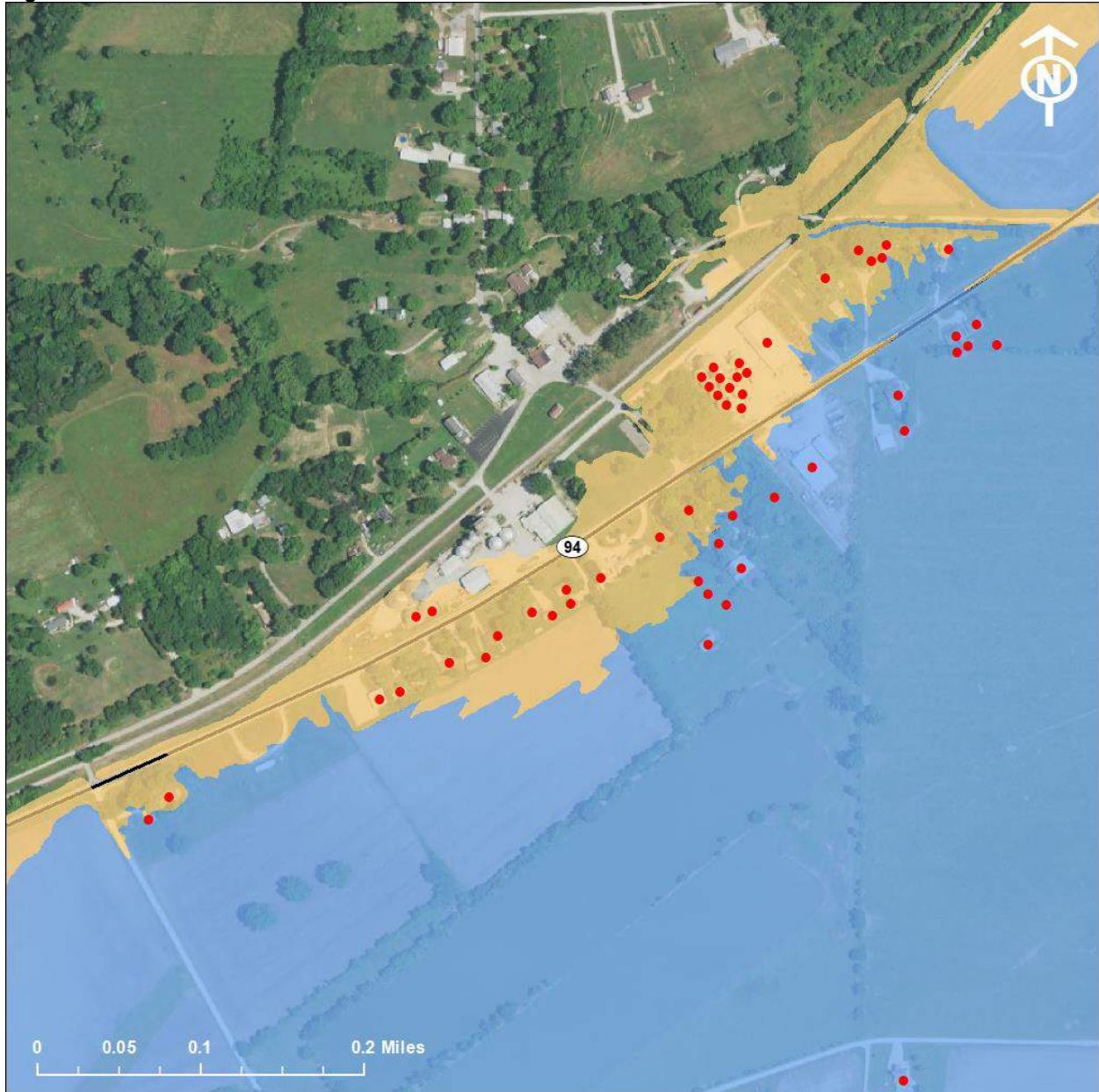
- Vulnerable Structure
- Zone X (500 year flood)
- 0.2% annual probability of flooding
- Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.10



Tebbetts FEMA FIRM High Risk Flood Zones

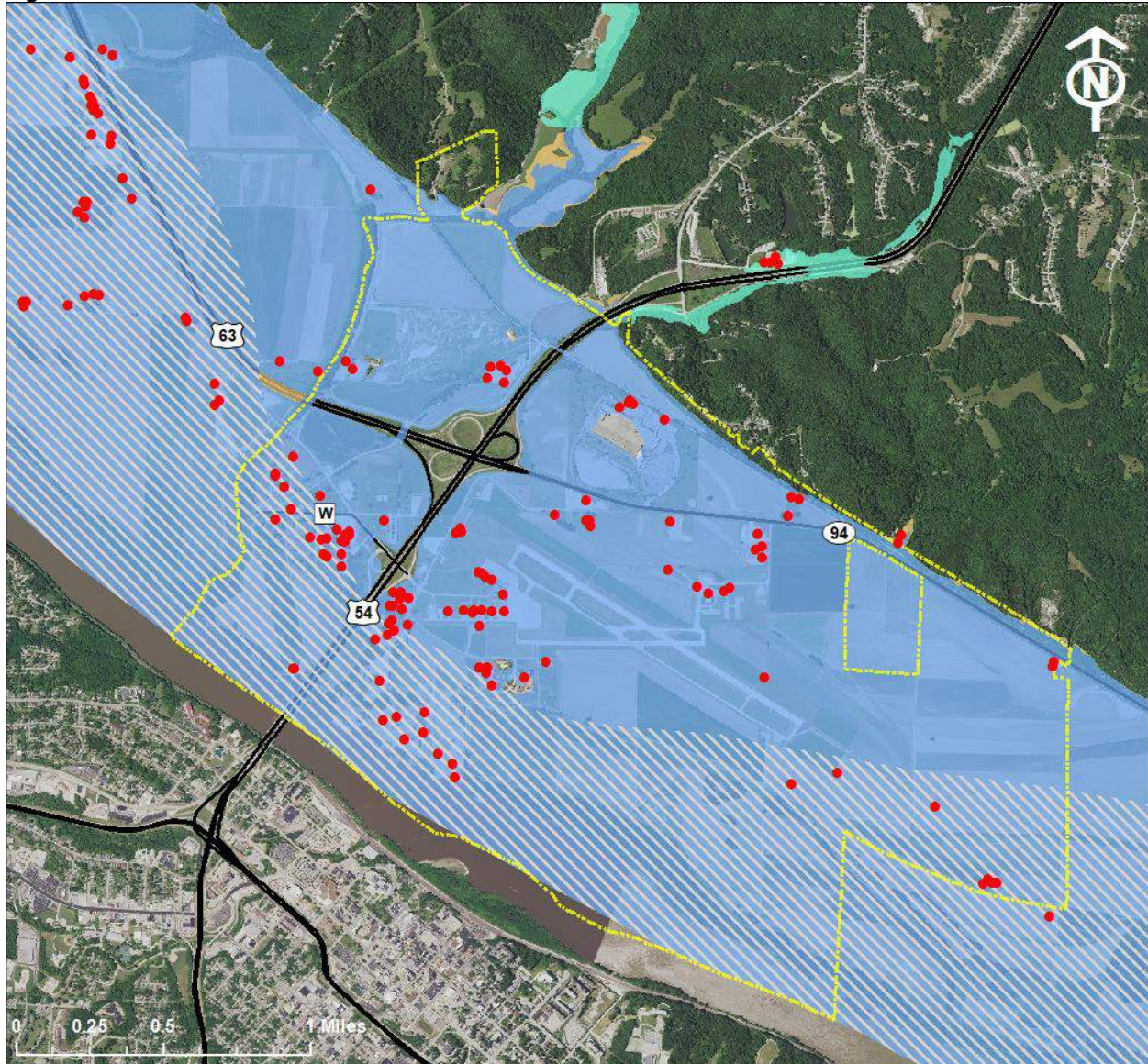
- Vulnerable Structure
- Zone X (500 year flood)
- 0.2% annual probability of flooding
- Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.11



Callaway Jefferson City FEMA FIRM High Risk Flood Zones

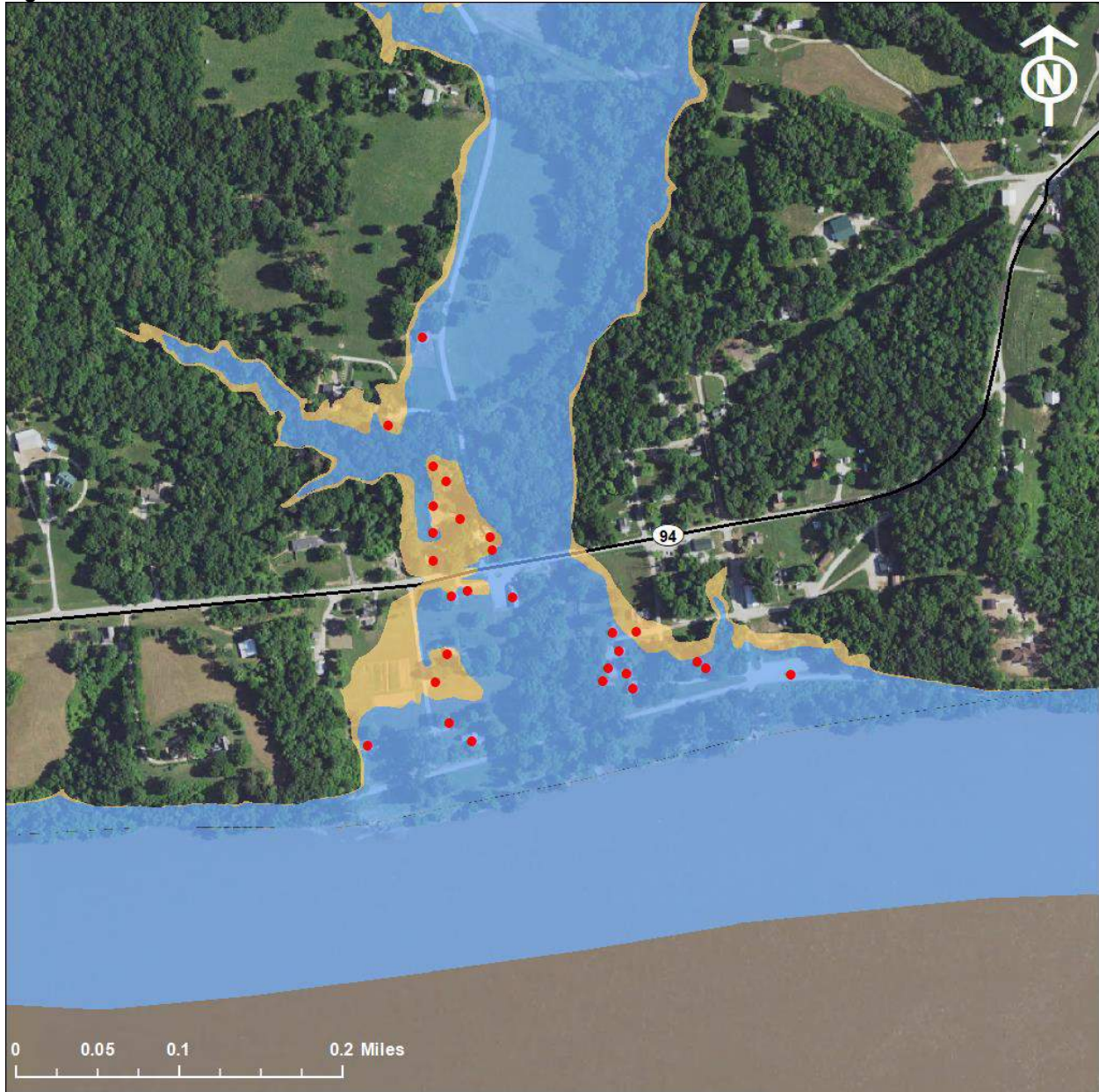
- Vulnerable Structure
- ▨ Floodway Zone
- Regulated area of restricted development
- Zone X (500 year flood)
- 0.2% annual probability of flooding
- Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.12



Portland FEMA FIRM High Risk Flood Zones

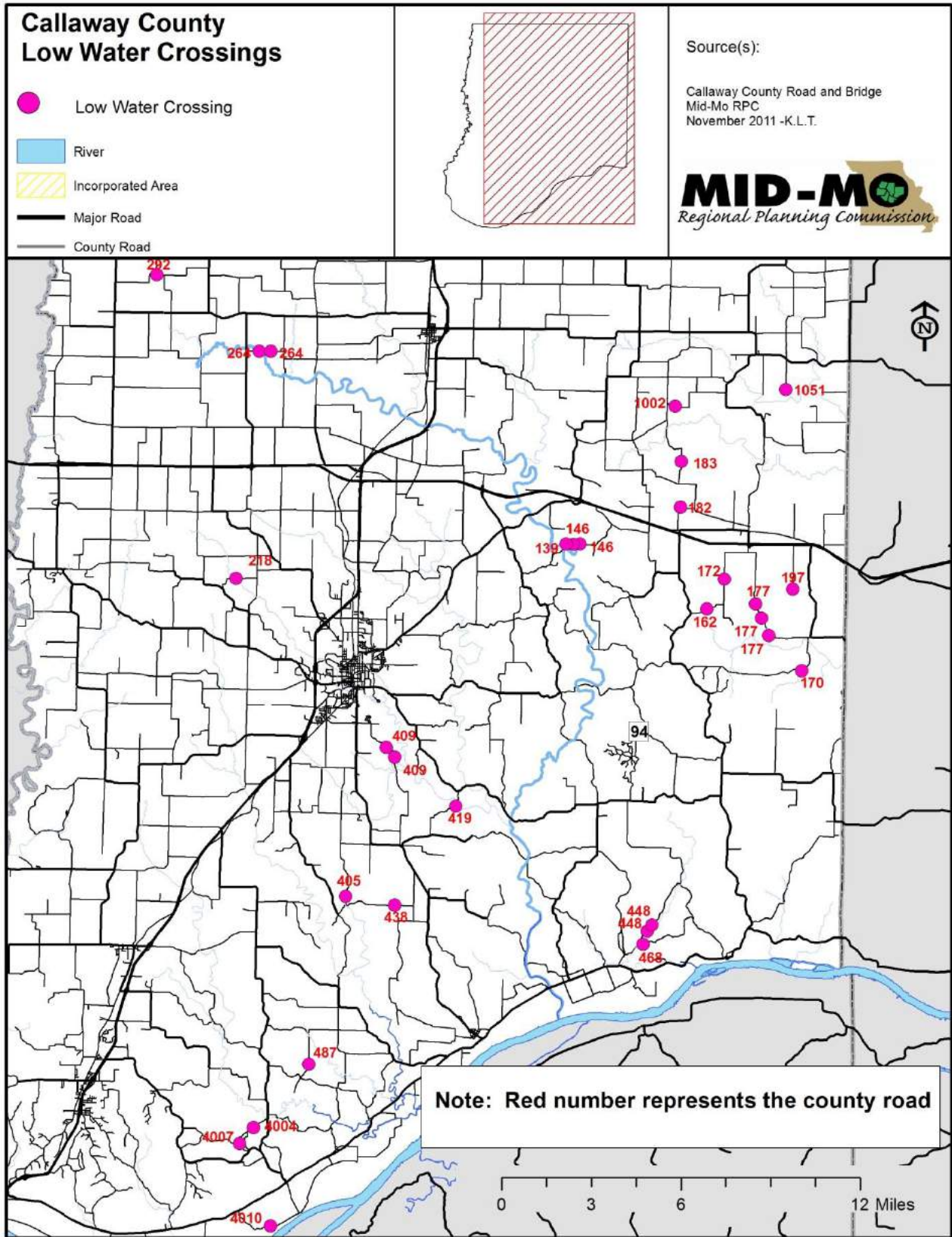
- Vulnerable Structure
- Zone X (500 year flood)
- 0.2% annual probability of flooding
- Zone AE (100 year flood)
- 1% annual probability of flood with base flood elevation (BFE) calculations
- Zone A (100 year flood)
- 1% annual probability of flood without base flood elevation (BFE) calculations

Sources:

MSDIS
Mid-Mo RPC
FEMA Flood Map Service Center
Sept 2017 - B.M.A



Figure 3.5.13



Previous Occurrences

1993-1995 Flooding

The floods of 1993 and 1995 were the worst repetitive flood events in Missouri history, according to the Missouri State Hazard Mitigation Plan (2013). There was also severe flooding in the state in 1994. There were five presidential disaster declarations for flooding in the state during this period; Callaway County was included in Disaster Declarations #995 (July 9, 1993), #1023 (April 21, 1994), and #1054 (June 2, 1995).

After a Presidential Disaster Declaration, Public Assistance (PA) and/or Individual Assistance (IA) is made available through FEMA. Callaway County was eligible for both PA and IA from Disaster Declarations #995 and #1054 and for IA from Disaster Declaration #1023.

All levees in Callaway County failed during the Flood of 1993, according to the U.S. Army Corps of Engineers. More information about this is included under Levee Failure (Section 3.7).

The City of Mokane and the unincorporated areas near the Missouri River experienced elevated loss statistics during the Missouri River floods of 1993 and 1995 as compared with damages in the remainder of the county. The extent of the 1993 flood is shown in Figure 3.5.9a. The maps in Figures 3.5.9b, 3.5.9c, and 3.5.9d show the extent of the 1993 flood on present day structures.

Figure 3.5.14

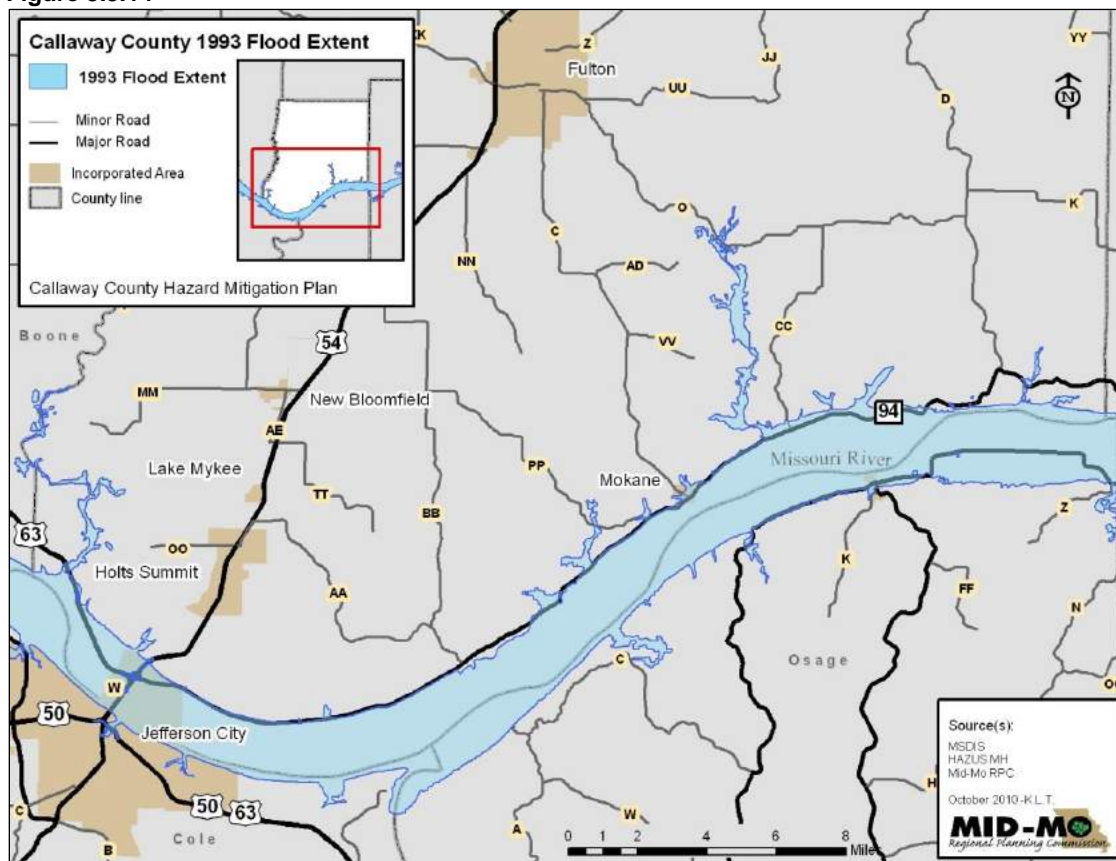


Figure 3.5.14b

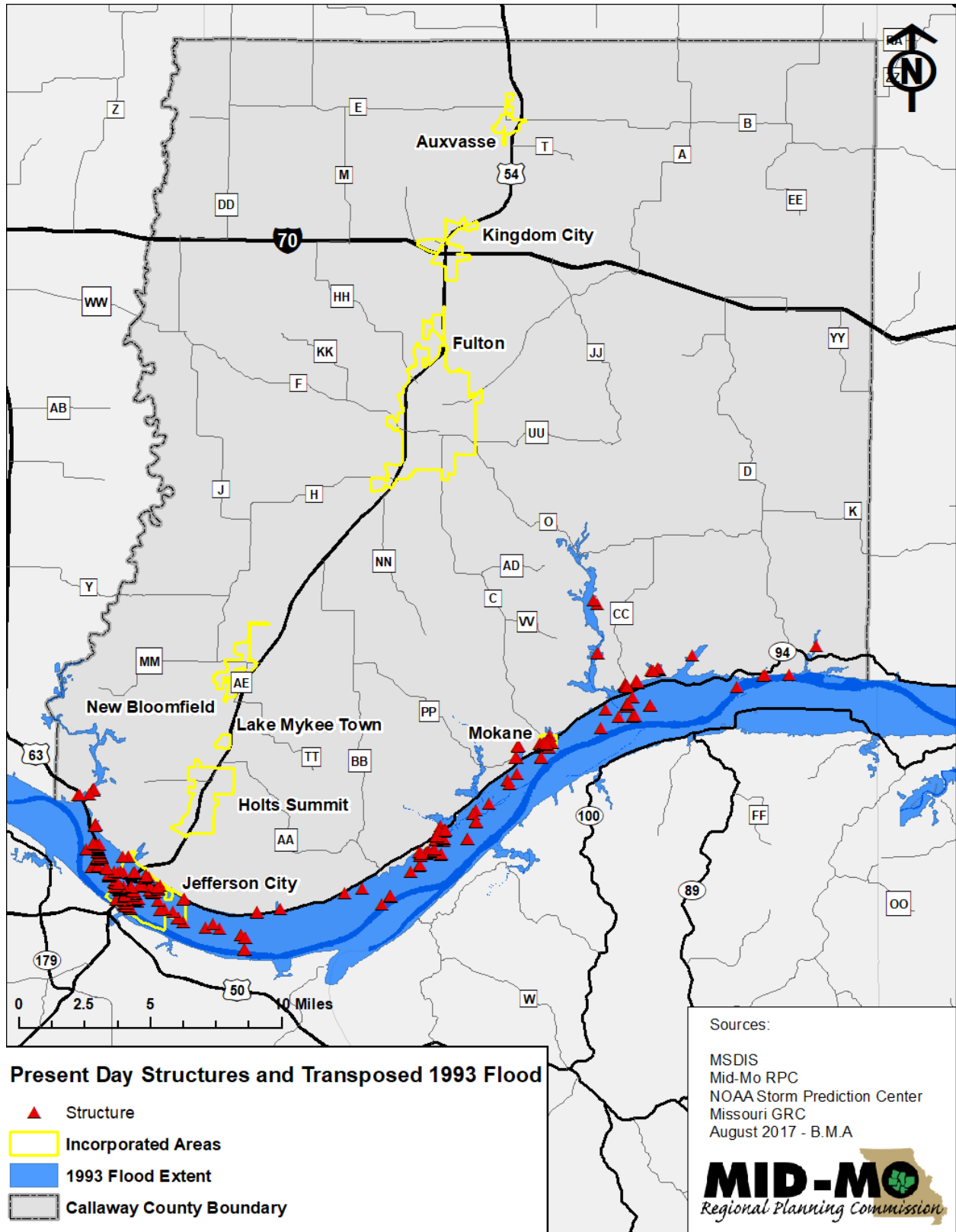


Figure 3.5.14c- Zoom of Present Day Structure Map

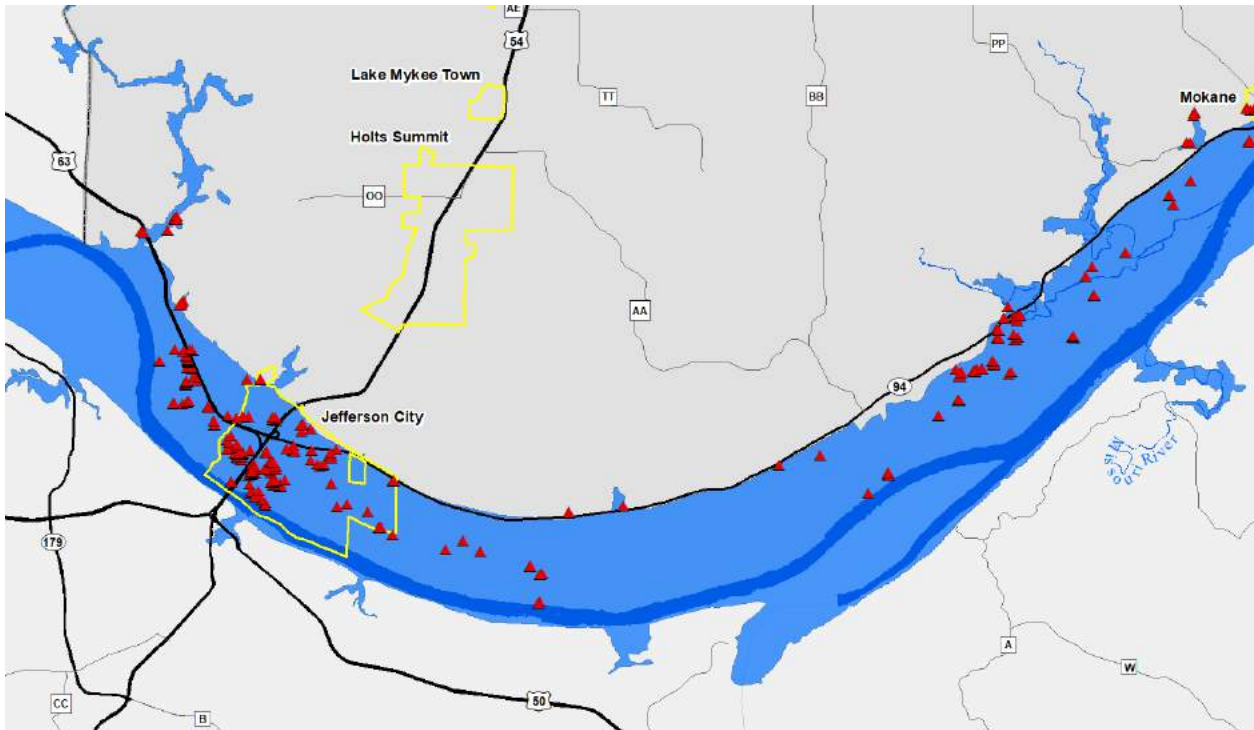
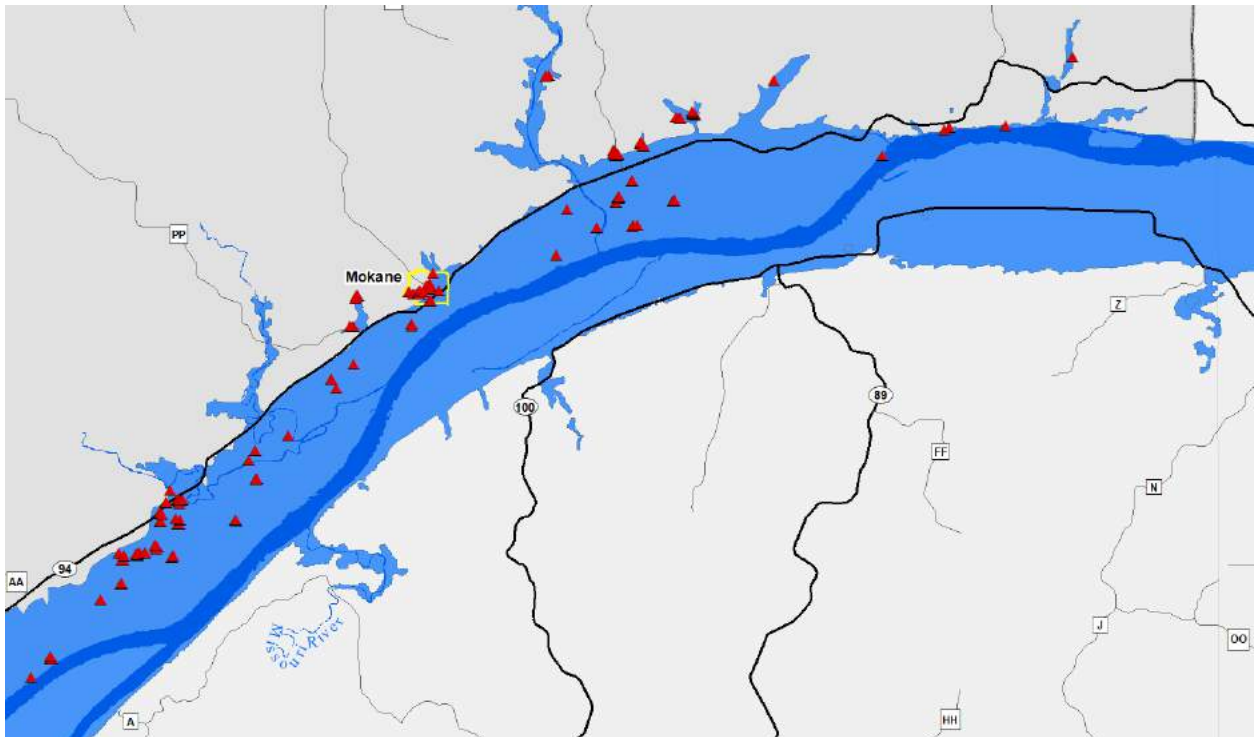


Figure 3.5.14d- Zoom of Present Day Structure Map



2011 Flooding

In the summer of 2011, the Missouri River flooded again, this time stemming not from significant precipitation in Mid-Missouri Region, but from high precipitation and snow melt in Montana and North Dakota. Higher than normal rain and snow in the winter and spring of 2011 caused wide scale flooding several states including; North Dakota, South Dakota, Nebraska, Iowa, Kansas, and Missouri. According to the National Weather Service, the Upper Missouri River Valley received more rainfall in May 2011 than it does in an entire year.

While Callaway County was spared from incurring damage to residences or businesses, unlike upriver neighbors, it was not spared from seepage through levee walls. All levee districts in Callaway County had to pump water from inside levee walls during June 2011 and July 2011. Callaway County was not part of the Presidential Disaster Declaration but was part of the June 30 Emergency Declaration #3325 and eligible for PA.

In addition to the river floods of 1993, 1995, and 2011, data from NOAA indicates numerous other flooding events in Callaway County since 1993. The Missouri River flood in April 1994 caused \$5 million in property damage and \$5 million in crop damage across 79 Missouri counties; the portion of this reported loss which occurred in Moniteau County is not indicated in the NOAA data.

The data also includes losses in the state and county from other flooding events. It is important to note that the total losses shown in the chart include the statewide losses from the events listed. The data does indicate, however, that there was at least \$60,400 in property damage and \$21,000 in crop damage in Callaway County itself from the events listed.

Figure 3.5.10a						
Callaway County Historic Flood Data (1/1/1993-1/1/2017)						
Location	Date	Type	Deaths	Injuries	Property Damage	Crop Damage
Fulton	08/12/93	Flash Flood	0	0	0	0
SW of Mokane (Highway 94 and PP intersection) to Wainwright (Highway 94)	09/14/93	Flash Flood	0	0	5K	1K
2 counties	09/22/93	Flash Flood	0	0	5K	0
79 counties and City of St. Louis	4/11/1994 - 4/19/1994	River Flood	0	0	5.0M	5.0M
County (numerous county roads)	4/11/1994 - 4/12//1994	Flash Flood	0	0	50K	0
County (secondary roads and low water crossings)	05/16/95	Flash Flood	0	0	0	0
Holts Summit area (numerous roads closed)	05/17/95	Flash Flood	0	0	0.4K	0
20 counties and the City of St. Louis	5/1/1996 - 5/31/1996	Flood	0	0	0	0
Countywide	06/22/97	Flash Flood	0	0	0	0
Western Portion	07/04/98	Flash Flood	0	0	0	0

Countywide (all county roads from Holts Summit to Portland; Highway 94 near Mokane; Highway Z near Calwood; Highways E, M, PP, Y)	10/05/98	Flash Flood	0	0	0	0
11 counties	10/6/1998-10/12/1998	Flood	0	0	0	0
Countywide (I-70 closed at Kingdom City for a short time)	05/04/99	Flash Flood	0	0	0	0
Southern Portion	05/27/00	Flash Flood	0	0	0	0
Central Portion (vehicles flooded at intersections in Fulton)	07/03/00	Flash Flood	0	0	0	0
Countywide (streets flooded in Fulton)	8/7/2000 - 8/8/2000	Flash Flood	0	0	0	0
11 counties	6/4/2001 - 6/13/2001	Flood	0	0	0	0
9 counties (Missouri River)	5/8/2002 - 5/28/2002	Flood	0	0	0	0
Countywide	05/09/02	Flash Flood	0	0	0	0
Countywide	5/12/2002 - 5/13/2002	Flash Flood	0	0	0	0
Southern Portion (Highway 94 between Mokane and Jefferson City, numerous other roads)	08/18/02	Flash Flood	0	0	0	0
Countywide (numerous roads, especially around Kingdom City, Hatton, Fulton, Portland)	03/26/04	Flash Flood	0	0	0	0
Countywide (Highway 94 closed)	1/12/2005 - 1/13/2005	Flash Flood	0	0	0	0
Countywide	06/11/06	Flash Flood	0	0	0	0
Jefferson City Memorial Area to Portland (Missouri River)	05/08/07	Flood	0	0	39K	100K
E of Concord to ENE of Auxvasse	7/27/2008 - 7/28/2008	Flash Flood	0	0	0	0
E of Auxvasse to SSW of Toledo	4/29/2009 - 4/30/2009	Flash Flood	0	0	0	0
NNE of Shamrock to ESE of Williamsburg (Co. Rds. 261, 262; Highway 54 S of Kingdom City; N outer road of I-70 E of Williamsburg; S outer road of I-70 between mile markers 150 and 151;	06/15/09	Flash Flood	0	0	0	0

numerous other county roads)						
ESE of Youngers to NNE of Shamrock (Co. Rds. 240, 247, 263)	6/17/2009 - 6/18/2009	Flash Flood	0	0	0	0
NNE of Steedman to N of Tebbetts (Highway 94 between Mokane and Steedman; Highway 94 and PP intersection)	07/04/09	Flash Flood	0	0	0	0
Southern portion (Highway 94 near Mokane; Van Horn Boulevard in Holts Summit)	11/15/09	Flash Flood	0	0	0	0
Boydsville	04/24/10	Flash Flood	0	0	0	0
Boydsville and Cedar City (Highway F and Highway PP)	4/29/2012-4/30/2012	Flash Flood	0	0	0	0
Guthrie (Highway 94)	05/31/13	Flash Flood	0	9	60M	0
Cedar City and Jefferson City	6/1/2013-6/7/2013	Flood	0	0	3K	8K
Youngers and Cedar City, including Highway 54	9/1/2014-9/2/2014	Flash Flood	0	0	0	0
From southwest Missouri through the Grater St. Louis Metropolitan Area and into central Illinois	12/26/2015-12/28/2015	Flash Flood	7	0	1B	0
Cedar City and Holts Summit	08/01/16	Flash Flood	1	0	0	0
Youngers and Wainwright (including County Roads 132 and 134, and eastbound Business U.S. 54)	08/02/16	Flash Flood	0	0	50K	0
Central Missouri (especially southern portions of Callaway County, and the intersection of Routes J and MM)	08/03/16	Flash Flood	0	0	0	0
Fulton	8/3/2016-8/4/2016	Flash Flood	0	0	0	0
TOTALS:					1.65B	5.109M
Source: https://www.ncdc.noaa.gov/stormevents/						

*This data does not include 2011 flooding.

Based on the number of previous events the probability of flooding is 100%. Based on at least one event happening per year, the probability that at least one flooding event would occur in any given year is 91.6% based on the historical data of at least one event per year.

Measure of Probability and Severity

Probability: High

Severity: High

Existing Mitigation Activities

County

Callaway County posts signs at some of their low-water crossing to warn of flooding. Also, many state routes in the county have flood warning signs.

Fulton

Enforces floodplain ordinances

Holts Summit

Enforces floodplain ordinances

Other

The National Weather Service issues flooding hazard alerts according to following response levels which are broadcast through local media:

- Flood Watch - Flash flooding or flooding is possible within a designated area.
- Flood Warning - Flash flooding or flooding has been reported or is imminent.
- Flood Advisory - Flooding of small streams, streets, and low lying areas, such as railroad underpasses and some urban drains is occurring.

National Flood Insurance Program (NFIP)

The U.S. Congress established the National Flood Insurance Program (NFIP) with the passage of the National Flood Insurance Act of 1968. The NFIP is a Federal program enabling property owners in participating communities to purchase insurance as a protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages. Participation in the NFIP is based on an agreement between communities and the Federal Government. If a community adopts and enforces a floodplain management ordinance to reduce future flood risk to new construction in floodplains, the Federal Government will make flood insurance available within the community as a financial protection against flood losses. This insurance is designed to provide an insurance alternative to disaster assistance to reduce the escalating costs of repairing damage to buildings and their contents caused by floods.

Participation in the National Flood Insurance Program is a critical aspect of hazard mitigation planning as it provides communities with direct resources that can be used for controlling the

potentially devastating impacts of floods. Furthermore, participation in the program helps communities more easily recover from flood impacts.

The following Callaway County jurisdictions participate in the NFIP: Callaway County, Fulton, Holts Summit, Kingdom City, and Mokane; detailed information on NFIP participation is shown in Figure 3.5.11.

Figure 3.5.11 Callaway County Jurisdictions Participating in NFIP		
Jurisdiction	Entry into Program	Date of Current FIRM
Callaway County	01/03/1985	02/18/2005
Fulton	06/15/1983	02/18/2005
Holts Summit	01/16/2007	02/18/05 (M)*
Mokane	09/18/1986	02/18/2005
* (M) indicates that no elevation was determined.		
Source: http://www.fema.gov/fema/csb.shtm		

Auxvasse, Kingdom City, and New Bloomfield do not currently participate in the NFIP.

A summary of the NFIP insurance policies in the county is shown in Figure 3.5.12

Figure 3.5.12 NFIP Policies in Callaway County as of 9/30/2017			
Community	Number of Policies	Amount Insured (\$)	Total Premium (\$)
Callaway County	29	4,524,200	27,320
Fulton	30	3,095,000	29,839
Holts Summit	1	280,000	351
Mokane	3	265,400	3,639
Source: http://bsa.nfipstat.com/reports/1011.htm			

Figure 3.5.12 NFIP Claims in Callaway County as of 7/31/2017			
Community	Total Loses	Closed Losses	Total Payments (\$)
Callaway County	34	31	446,651.57
Fulton	44	35	222,373.44
Cedar City	11	10	13,499.19
Mokane	41	37	245,630.86
Source: https://bsa.nfipstat.fema.gov/reports/1040.htm#29			

National Flood Insurance Program Repetitive Loss Properties

Requirement
§201.6(c)(2)(ii):

[The risk assessment] must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged by floods.

The NFIP defines a **Repetitive Loss Property** as “any insurable building for which two or more claims of more than \$1,000 were paid by the National Flood Insurance Program (NFIP) within any rolling ten-year period, since 1978. At least two of the claims must be more than 10-days apart.” A repetitive loss property may or may not currently be insured by the NFIP. Callaway county has mitigated 33 repetitive loss properties that have been mitigated. Of those 33 properties, 28 were residential and 5 were commercial. There are an existing 27 repetitive loss properties that have not been mitigated. Those non-mitigated repetitive loss properties consist of 13 residential properties and 17 commercial properties.

Figure 3.5.16 Callaway County Repetitive Loss Properties 1978-2009			
# of Properties	# of Losses	Total Paid	Average Payment
30	94	\$2,595,358.71	\$95,088.35
Source: Missouri State Emergency Management Agency (January 2018)			

In addition to the repetitive loss properties, there has been over \$6.6 Million in flood insurance loss payments in the county between 1978-2009.

The unmitigated repetitive loss properties are located as follows:

Figure 3.5.16a Callaway County Unmitigated Repetitive Loss Properties (as of 2018)		
Community	SRL Properties	Losses
Callaway County	1	2
Fulton	5	16
Jefferson City	21	64
Mokane	3	3
Source: State Emergency Management Agency (January 2018)		

A **Severe Repetitive Loss (SRL)** property is defined as a single family property that is covered under an NFIP flood insurance policy and:

- (a) has had at least four NFIP claim payments (including building and contents) over \$5,000 each, with the cumulative amount of the claims payments exceeding \$20,000; or
- (b) for which at least two separate claims payments (building payments only) have been made with the cumulative amount of the building portion of such claims exceeding the market value of the building.

Flood Vulnerability

Jurisdictions: Callaway County (unincorporated area), Fulton, Holts Summit, Kingdom City, Mokane, New Bloomfield, and the Public Water Supply Districts are all at risk from riverine flooding because they have area in the 100-year flood plain.

Auxvasse and all school districts have no vulnerability to flooding because they are not in the 100-year flood plain and do not report any serious flash flooding issues in their jurisdictions. None of the school districts have buildings lying within the 100-year flood plain.

Structures not within designated floodplains are potentially vulnerable to the effects of flash flooding brought on by storm water or sheet flooding. Small-scale floods or flash flooding can impact a neighborhood or a city but are limited in their spatial extent.

Overview

Large-scale floods such as the 1993 flood are devastating events for entire regions of the country. Not only was Mid-Missouri impacted but the entire Midwest suffered large losses in life, property, and crop damage; effects carried over to the rest of the United States. Transit routes were disrupted, people lost jobs, and crops never made it to market.

Potential Impact on Existing Structures

Callaway County residents, structures, and infrastructure lying in or near the Missouri River Floodplain are all vulnerable to the effects of a major flood. Other structures not within designated floodplains are also vulnerable to the effects of flash flooding brought on by storm water or sheet flooding. Figures 3.5.1-3.5.7 depict the 100 year flood plain for Callaway County. Through the use of high resolution 2007 aerial imagery from the Missouri Spatial Data Service at the University of Missouri, a GIS Specialist for the Mid-Missouri Regional Planning Commission was able to see and count structures in the floodplain. It was found that only Fulton and the Callaway County (unincorporated area) had structures in the floodplain. There were 656 structures in all of Callaway County, with 168 of those in Fulton. These “structures” may consist of businesses, residences, towers, outbuildings, or other manmade structures. Further analysis of the data may give a more precise categorization of the structures. Based on a rough estimate of data in 2017, it appears that 186 structures in Fulton are located in the floodplain.

It can be said with certainty that there are not fire stations, schools, nursing homes, hospitals, prisons, government centers, or police stations in the 100 year floodplain.

The City of Fulton’s wastewater lagoon is directly next to the floodplain (technically not “in” the floodplain), but a berm protects the facility from flooding. Other communities have had recent lagoon and sewage treatment flooding issues. They have berms, but as reported in update meetings, the berms are not of use when the rainfall exceeds roughly four inches.

Potential Impact on Future Development

Impact on future development is directly related to floodplain management and regulations set forth by the county and individual communities.

3.6 Levee Failure

Description of Hazard

A levee is defined by the National Flood Insurance Program as “a man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.”

Levee failure, according to FEMA, can occur by the following means:

- **Overtopping** - When a large flood occurs, water can flow over a levee. Called overtopping, the stress exerted by flowing water can cause rapid erosion.
- **Piping** - Levees are often built over old stream beds. Flood waters will follow these sub grade channels causing a levee to erode internally thereby allowing flood waters to rupture the levee structure.
- **Seepage and Saturation** - If flood waters sit up against a levee for a long period, the levee may become saturated and eventually collapse.
- **Erosion** - Most levees are constructed of sand or soil which erodes easily under high-velocity flood waters.
- **Structural Failures** - Lack of regular maintenance is a key reason levees fail at gates, walls or closure sites.

Federally authorized levees are typically designed and built by the US Army Corps of Engineers in cooperation with a local sponsor and then turned over to the local sponsor to operate and maintain.

Non-federal levees are designed, built, and managed by a non-federal entity.

There is no single agency with responsibility for levee oversight. The Corps of Engineers has specific and limited responsibilities for approximately 2,000 levees nationwide.

The responsibilities of local levee owners or sponsors are broad and may include levee safety; land use planning and development; building codes; and operations, maintenance, repair, rehabilitation and/or replacement of the levee. The certification of levees for FEMA’s National Flood Insurance Program is the responsibility of the local levee owner or sponsor.

Federally authorized and some non-federal levees may be eligible for Corps of Engineers rehabilitation assistance funding.

Geographic Location

There are 7 major levees in the Planning Area (see Figure 3.6.1 and 3.6.2). All are located in Unincorporated Callaway County with the exception of the Capitol View Drainage District which touches and encompasses a portion of Jefferson City. The other six levees protect agricultural land in the southern portion of the county between Highway 94 and the Missouri River.

All seven major levee systems in the Planning Area are part of the U.S. Army Corps of Engineers Rehabilitation Program and are currently eligible for levee rehabilitation assistance should they receive damage during a flood event.

Figure 3.6.1 US Army Corps of Engineers Rehabilitation Program Levees		
Levee Name	Sponsor	Acres Protected
Capitol View Drainage District	Callaway County Circuit Court	~2,800
Tebbetts East Levee District	Callaway County Circuit Court	2,400
Steedman Levee District	Callaway County Circuit Court	2,200
Riveaux Levee District	Callaway County Circuit Court	2,200
Wainwright Levee District	Callaway County Circuit Court	1,597
Jacobs Levee District	Callaway County Circuit Court	405
Mokane Levee District	Callaway County Circuit Court	960

In 2009 the Cedar City Levee District and Capitol View Drainage District consolidated under the name Capitol View Drainage District. A copy of the consolidation agreement can be found in Appendix F.

There are other, privately owned, levees in the Planning Area; official data on the locations of these private levees is not available. These privately owned levees are maintained by their owners and are not part of any federal rehabilitation program. Tracking of levee conditions is a point of concern, especially because there are so many of these privately owned levees.

“Operations and Maintenance is important to levee safety, but it is not the only factor that affects risk and reliability of a levee, and should not be represented as such. It is important to note, there is still a large universe of private and other non Corps levees that have not been inventoried or inspected/assessed. We don’t know the size of this universe, where the levees are located, their condition, or the consequences of failure, loss of life being of paramount concern.”

– US Army Corps of Engineers

(The data in Figures 3.7.3-3.7.9 is from information provided by Engineer Cliff Sanders of the US Army Corps of Engineers in Glasgow, MO. The data includes protected area information from a “Supplemental Levee Inspection Information” form collected during the last inspections in 2005 and 2006.)

Figure 3.6.2

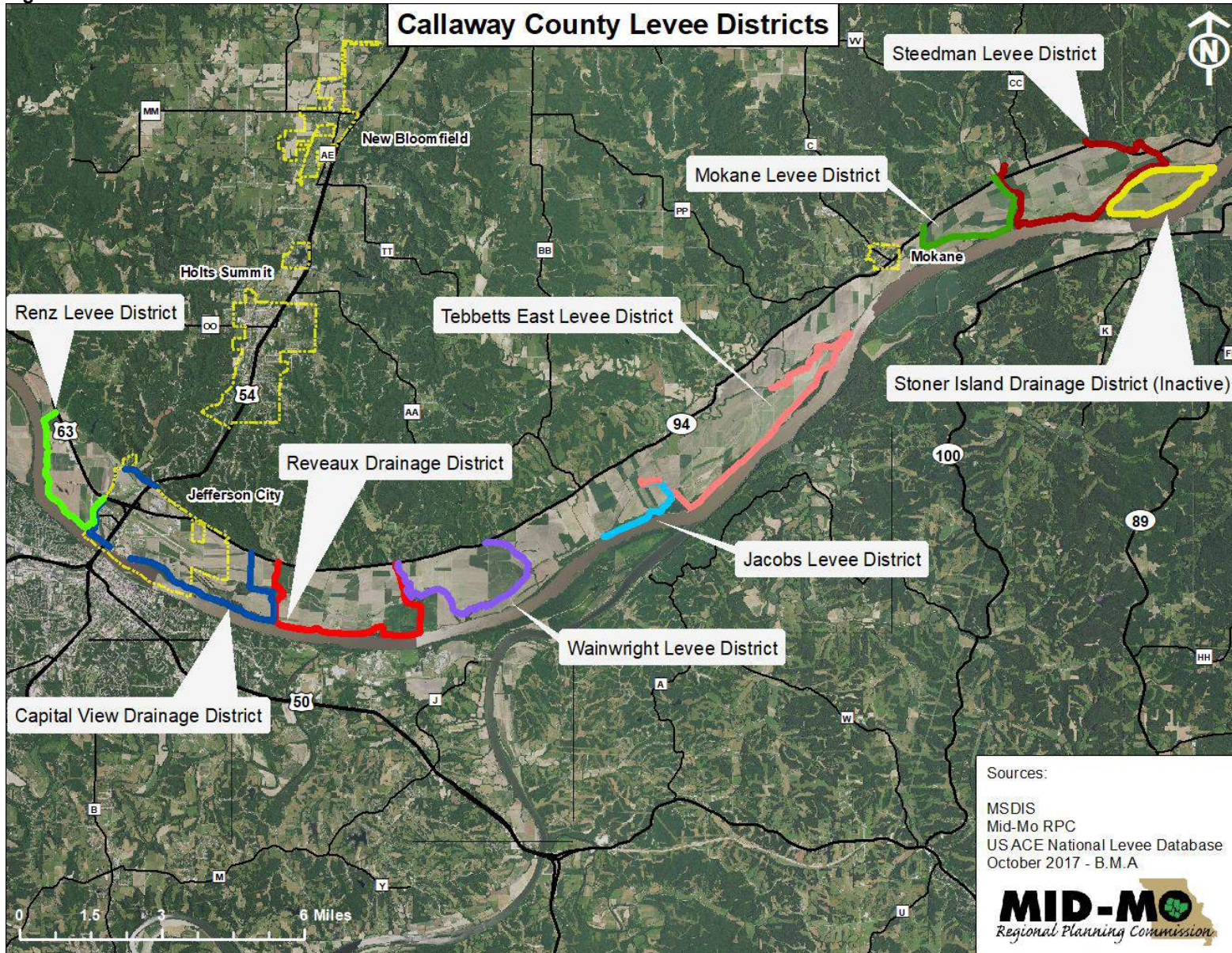


Figure 3.6.2a

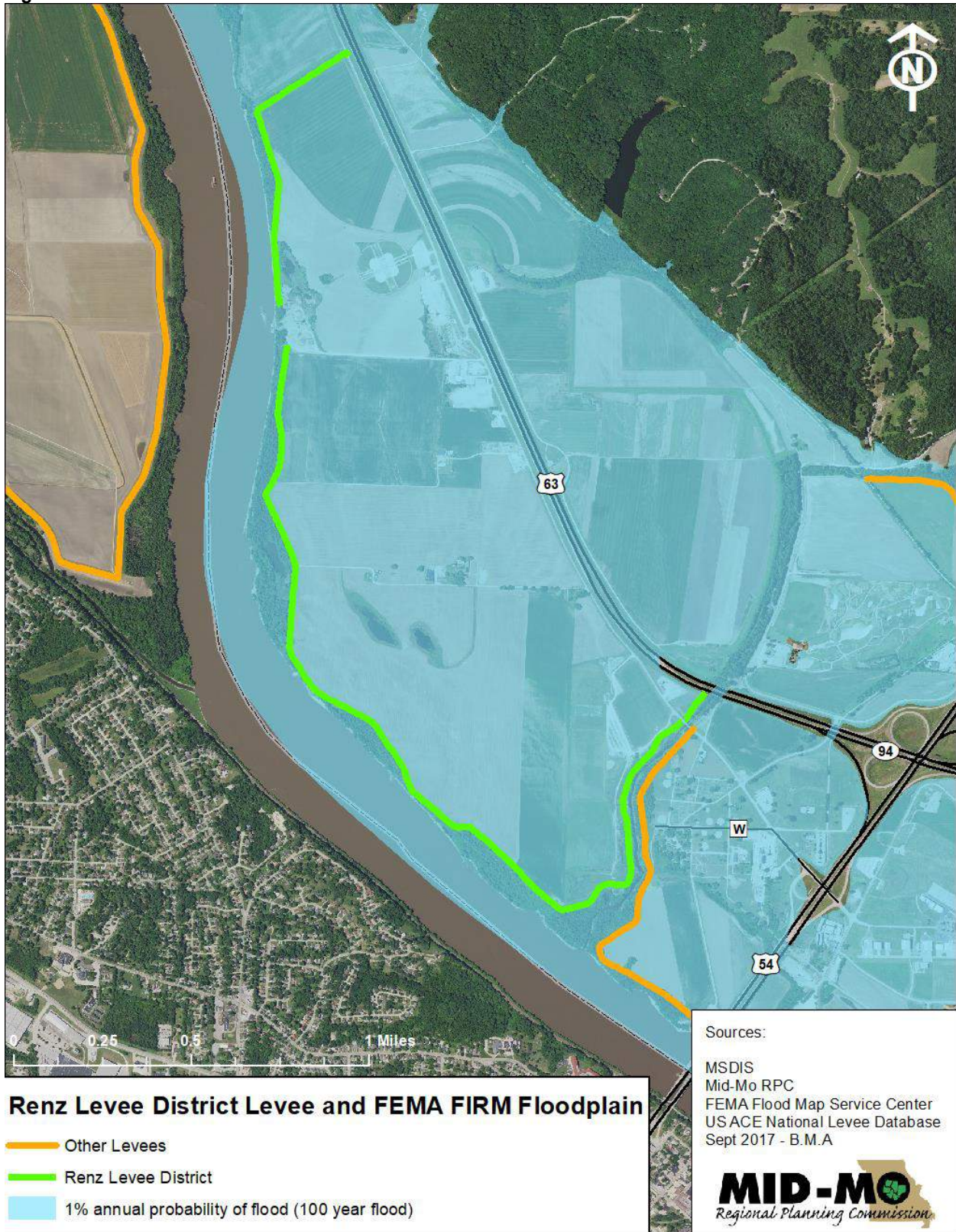


Figure 3.6.2b

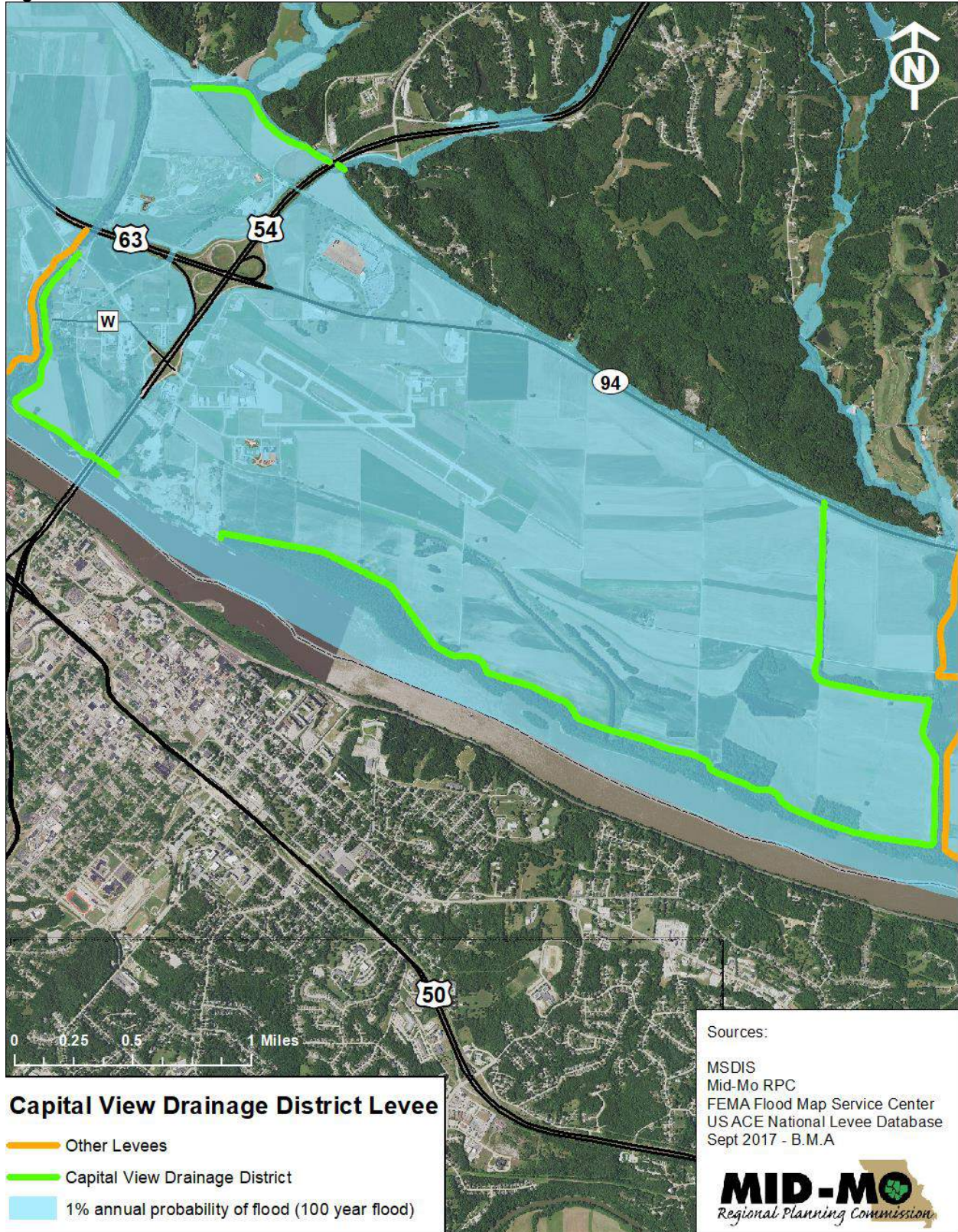


Figure 3.6.2c

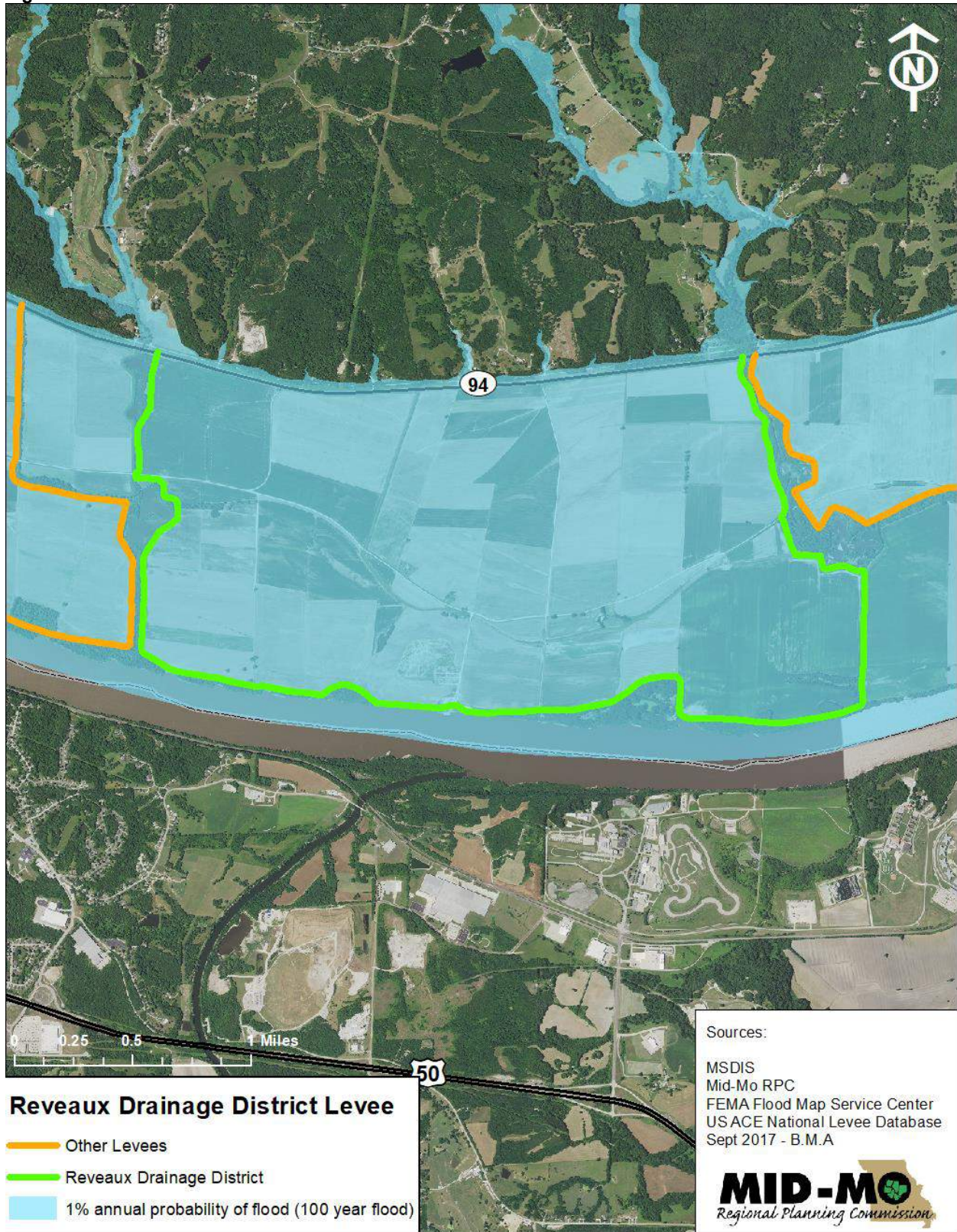


Figure 3.6.2d

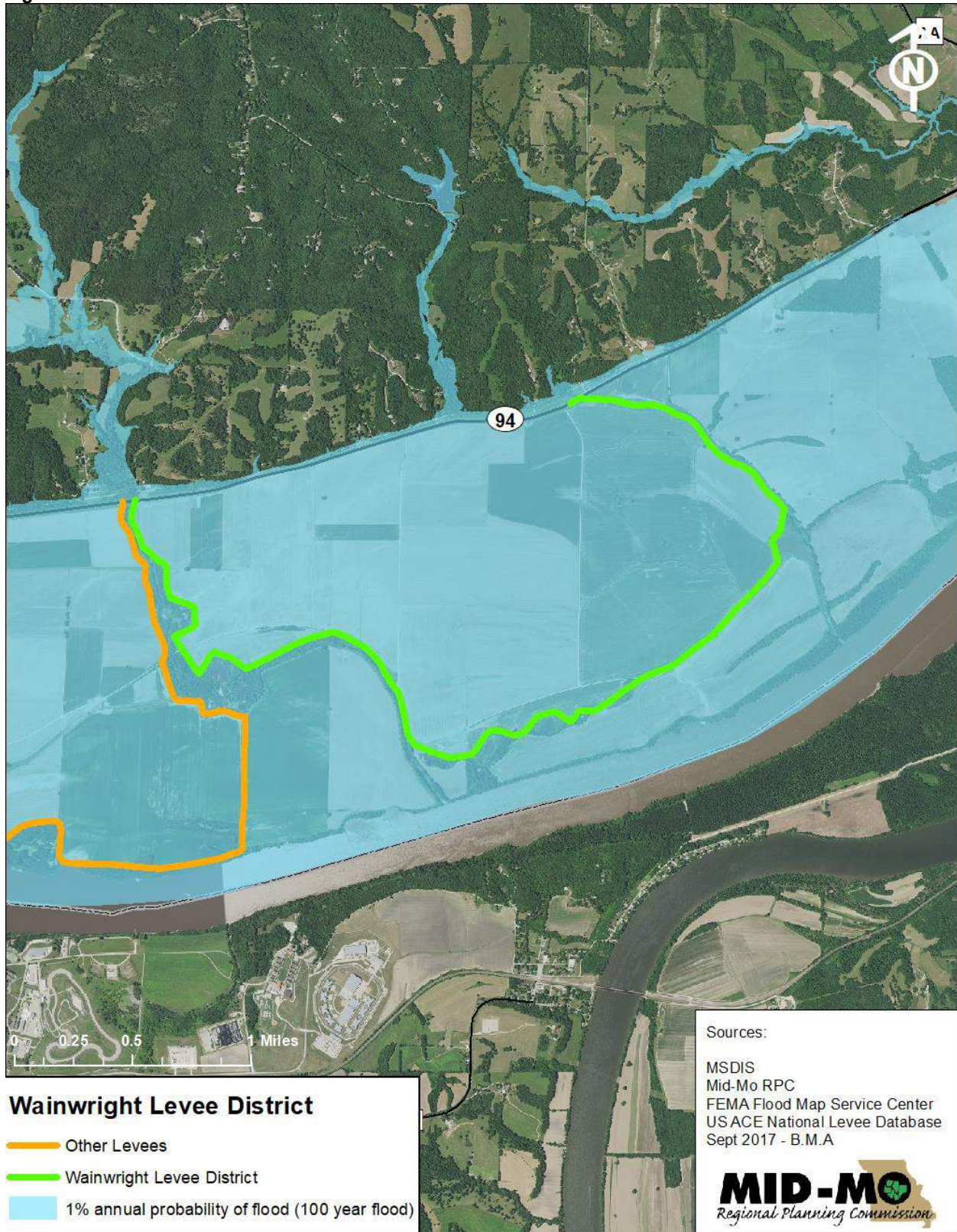


Figure 3.6.2e

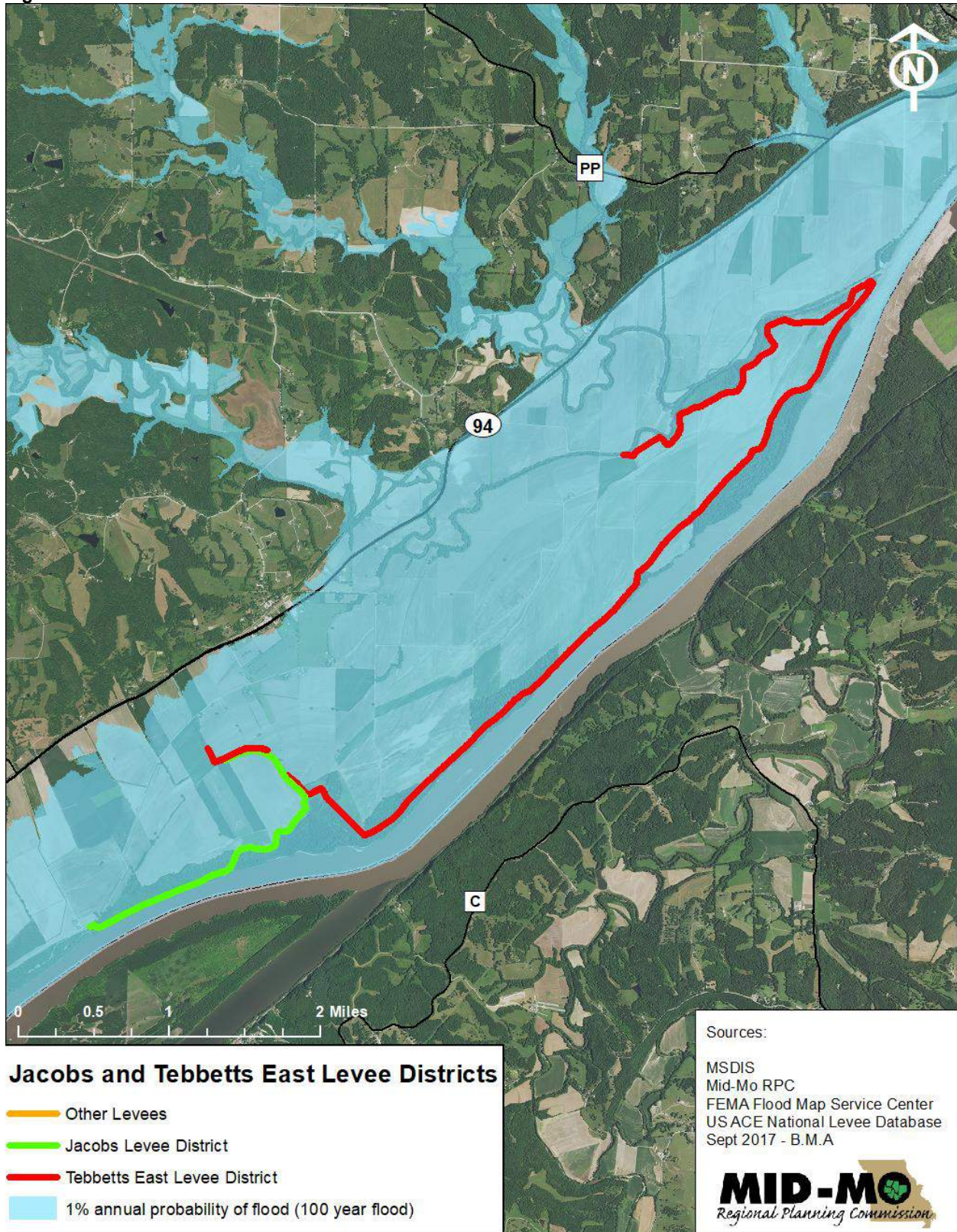


Figure 3.6.2f

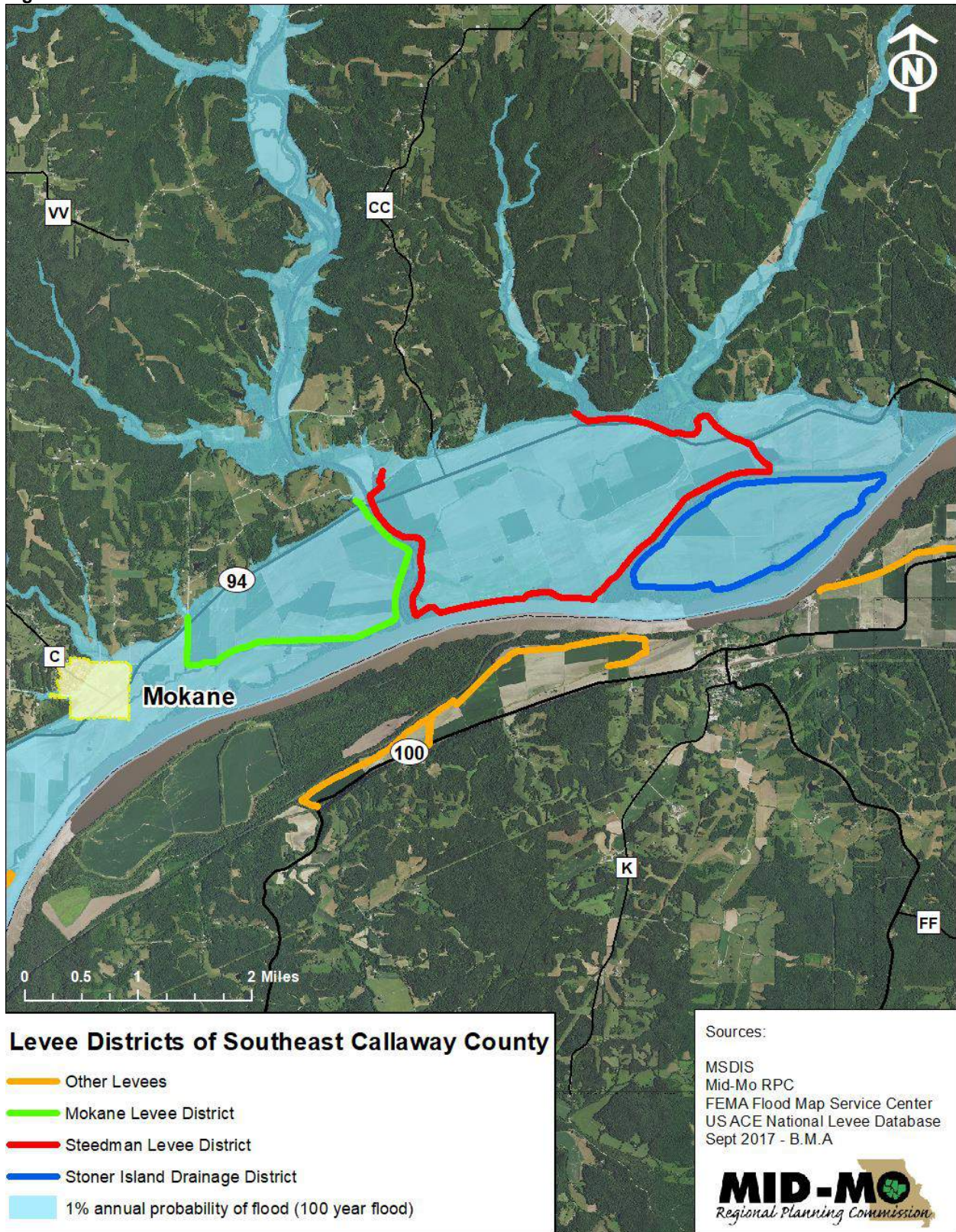


Figure 3.6.3

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: March 22, 2006

ITEM NO: 36B

LEVEE NAME: Capital View Drainage District

RIVER BASIN: Missouri River

RIVER LOCATION: Left Descending Bank Missouri River, River Mile 144.5 to 139.8, Left Descending Bank of Turkey Creek, Right Descending Bank of Niemans Creek and the Right Descending Bank of an unnamed upland Branch.

SPONSOR: A Drainage District organized by the Circuit Court of Callaway County, Missouri

LEVEE DIRECTORS: Mr. Dave Boessen, Chairman 2863 State Hwy 94 Holts Summit, MO 65043 Phone: 573-634-4666	Ms. Linda Kanagawa, Secretary 3301 Kunlin Columbia, MO 65203 Phone: 573-234-1271
--	---

LEVEE EMBANKMENT DATA

- 1. LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 31.0'(+) Jefferson City gage
- 2. LEVEL OF PROTECTION PROVIDED:** Provides protection for a 10-year flood event
- 3. AVERAGE HEIGHT OF LEVEE:** 3' to 12' above landside natural ground surface
- 4. AVERAGE CROWN WIDTH:** 10' to 14'
- 5. AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 6
R/S: Ranges from 1 on 3 to 1 on 6
- 6. ANNUAL MAINTENANCE COSTS:** Approximately \$5,000.00

PROTECTED FEATURES

(Note: Information below represents protected facilities which are protected by three independent levee systems, which consists of the following multiple Sponsors/levee segments: Cedar City Drainage District, Section 1 & 2, and the Capital View Drainage District; Item No.'s 35 and 36B respectfully. All three-levee systems are separated from each other by a high ground connection, however, all three are totally dependent upon each other to provide protection to below facilities.)

- 1. TOTAL ACRES PROTECTED:** 2,855 (1,355 Acres within this taxation District)
- 2. TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 2,300 (900 Acres within this taxation District)
- 3. TOWNS:** 1 North Jefferson City (formerly Cedar City)
- 4. BUSINESSES:** 20
- 5. RESIDENCES:** 5 (Occupancy varies)
- 6. ROADS:** Approximately 2.00 miles of State Highway Route 94, approximately 3.00 miles of old State Highway Route 94, approximately 2.00 miles of asphalt surfaced County roads, approximately 0.5 mile of State Highway Route W and approximately 0.4 mile of gravel surfaced City roads.
- 7. UTILITIES:** Undetermined amount of utility lines, water system lines, gas lines and sewer lines.
- 8. BARNs:** 0
- 9. MACHINE SHEDS:** 3
- 10. OUTBUILDINGS:** 7
- 11. IRRIGATION SYSTEMS:** 2
- 12. GRAIN BINS:** 1
- 13. OTHER FACILITIES:** Jefferson City Memorial Airport, Missouri Air National Guard Facility, Jefferson City Wastewater Treatment Plant, Cedar City Lions Club Building and Corley Park, Jefferson City Part pavilion and baseball fields and approximately 3.00 miles of Katy Trail State Park.

Figure 3.6.4

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: May 9, 2005

ITEM NO: 33

LEVEE NAME: Reveaux Levee District

RIVER BASIN: Missouri River

RIVER LOCATION: Left Descending Bank Missouri River, River Mile 139.9 to 136.7, Left Descending Bank Niemans Branch and the Right Descending Bank of Rivaux Creek

SPONSOR: A Levee District organized by the Circuit Court of Callaway County, Missouri

LEVEE DIRECTORS:

Clarence Trachsel, President
3021 Rockwood Trail
St. Charles, MO 63301
Phone: 636-441-1970

Mary Sue Armstrong, Secretary/Treasurer
12801 County Road 4031
Tebbetts, MO 65043
Phone: 573-295-4258

Larry Loesch, Director
4309 Kaiser Ln.
Jefferson City, MO 65109
Phone: 573-635-3153

Roy Boessen, Director
13088 County Rd. 4031
Holts Summit, MO 65043
Phone: 573-295-4341

David Prospt, Director

LEVEE EMBANKMENT DATA

1. **LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 32.0' Jefferson City Gage
2. **LEVEL OF PROTECTION PROVIDED:** Exceeds a 5-year flood event
3. **AVERAGE HEIGHT OF LEVEE:** 4' to 12' above landside natural ground surface
4. **AVERAGE CROWN WIDTH:** 10' to 16'
5. **AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 6
R/S: Ranges from 1 on 3 to 1 on 6
6. **ANNUAL MAINTENANCE COSTS:** \$1,800.00

PROTECTED FEATURES

1. **TOTAL ACRES PROTECTED:** 2,200
2. **TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 2,200
3. **TOWNS:** Wainwright
4. **BUSINESSES:** 0
5. **RESIDENCES:** 5
6. **ROADS:** Approximately 3.30 miles of State Highway Route 94, approximately 3.5 miles of asphalt surfaced County Roads, approximately 2.00 miles of gravel surfaced County Roads and approximately 1.50 miles of unimproved farm to market roads.
7. **UTILITIES:** Approximately 3.30 miles of fiber optic line.
8. **BARNs:** 6
9. **MACHINE SHEDS:** 6
10. **OUTBUILDINGS:** 5
11. **IRRIGATION SYSTEMS:** 1
12. **GRAIN BINS:** 4
13. **OTHER FACILITIES:** Levee system provides protection for approximately 20 residents. OCCI Loading Dock

Figure 3.6.5

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: August 10, 2005

ITEM NO: 32

LEVEE NAME: Wainwright Levee District

RIVER BASIN: Missouri River

RIVER LOCATION: Left Descending Bank Missouri River, River Mile 135.7 to 133.8, Left Descending Bank of Rivaux Creek and the Right Descending Bank of Dry Creek

SPONSOR: A Levee District organized by the Circuit Court of Callaway County, MO

LEVEE DIRECTORS:

Jose Cruz, President
P.O. Box 490
Rhineland, MO 65069
Phone: 573-236-4656
314-803-1104 (cell)

David Hardt, Secretary/Treasurer

Roy Boessen, Director
13088 County Road 4031
Holts Summit, MO 65043
Phone: 573-295-4341

LEVEE EMBANKMENT DATA

1. **LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 31.0' Jefferson City Gage
2. **LEVEL OF PROTECTION PROVIDED:** Exceeds a 5-year flood event
3. **AVERAGE HEIGHT OF LEVEE:** 8' to 12' above landside natural ground surface
4. **AVERAGE CROWN WIDTH:** 8' to 12'
5. **AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 4
R/S: Ranges from 1 on 3 to 1 on 4
6. **ANNUAL MAINTENANCE COSTS:** \$5,000.00

PROTECTED FEATURES

1. **TOTAL ACRES PROTECTED:** 1,597
2. **TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 1,597
3. **TOWNS:** 0
4. **BUSINESSES:** 0
5. **RESIDENCES:** 0
6. **ROADS:** Approximately 2.30 miles of asphalt surfaced State Highway Route 94, approximately 3.00 miles of gravel surfaced County Road 4015 and approximately 1.00 mile of gravel surfaced farm to market roads.
7. **UTILITIES:** Approximately 4.00 miles of fiber optic cable, approximately 2.00 miles of overhead power lines and approximately 2.30 miles of water distribution lines.
8. **BARNs:** 0
9. **MACHINE SHEDS:** 0
10. **OUTBUILDINGS:** 0
11. **IRRIGATION SYSTEMS:** 1
12. **GRAIN BINS:** 0
13. **OTHER FACILITIES:** Approximately 2.30 miles of Katy Trail State Park.

Figure 3.6.6

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: August 9, 2005

ITEM NO: 31D

LEVEE NAME: Jacobs Levee District

RIVER BASIN: Missouri River

RIVER LOCATION: Left Descending Bank Missouri River, River Mile 132.0 to 130.3 and the Right Descending Bank of an Unnamed Upland Branch

SPONSOR: A Levee District organized by the Circuit Court of Callaway County, Missouri

LEVEE DIRECTORS:

Eugene Richards, President
4358 State Road AA
Tebbetts, MO 65080
Phone: 573-295-4735

Elaine Richards, Secretary/Treasurer
4358 State Road AA
Tebbetts, MO 65080
Phone: 573-295-4735

Andy Ewing, Director
Phone: 573-676-5793

Jerry Keely, Director
Phone: 573-896-0205

Eleanor Keely, Director
Phone: 573-896-0205

LEVEE EMBANKMENT DATA

1. **LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 31.0' Jefferson City Gage
2. **LEVEL OF PROTECTION PROVIDED:** Exceeds a 5-year flood event
3. **AVERAGE HEIGHT OF LEVEE:** 1' to 10' above landside natural ground surface
4. **AVERAGE CROWN WIDTH:** 10' to 14'
5. **AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 6
R/S: Ranges from 1 on 3 to 1 on 6
6. **ANNUAL MAINTENANCE COSTS:** \$250.00

PROTECTED FEATURES

1. **TOTAL ACRES PROTECTED:** 405
2. **TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 321
3. **TOWNS:** 0
4. **BUSINESSES:** 0
5. **RESIDENCES:** 0
6. **ROADS:** Approximately 0.50 of unimproved farm to market road.
7. **UTILITIES:** 0
8. **BARNs:** 0
9. **MACHINE SHEDS:** 1
10. **OUTBUILDINGS:** 0
11. **IRRIGATION SYSTEMS:** 0
12. **GRAIN BINS:** 0
13. **OTHER FACILITIES:** 0

Figure 3.6.7

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: August 11, 2005

ITEM NO: 31B

LEVEE NAME: Mokane Levee District

RIVER BASIN: Missouri River

RIVER LOCATION: Right Descending Bank Missouri River, River Mile 121.4 to 120.7, Left Descending Bank of an Unnamed Upland Branch, Left Descending Bank of Muddy Creek and the Right Descending Bank of Auxvasse River

SPONSOR: A Levee District organized by the Circuit Court of Callaway County, Missouri

LEVEE DIRECTORS:

Andy Smart, President
P.O. Box 206
Tebbetts, MO 65080
Phone: 573-295-4583

Peggy Smart, Secretary/Treasurer
P.O. Box 206
Tebbetts, MO 65080
Phone: 573-295-4583

Larry Bloebaum, Director
Phone: 573-893-2112
Charles Horstman, Director
Phone: 573-676-5961

LEVEE EMBANKMENT DATA

1. **LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 36.0' Jefferson City Gage
2. **LEVEL OF PROTECTION PROVIDED:** Exceeds a 10-year flood event
3. **AVERAGE HEIGHT OF LEVEE:** 8' to 12' above landside natural ground surface
4. **AVERAGE CROWN WIDTH:** 8' to 28'
5. **AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 6
R/S: Ranges from 1 on 3 to 1 on 4
6. **ANNUAL MAINTENANCE COSTS:** \$2,000.00

PROTECTED FEATURES

1. **TOTAL ACRES PROTECTED:** 960
2. **TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 960
3. **TOWNS:** 0
4. **BUSINESSES:** 0
5. **RESIDENCES:** 0
6. **ROADS:** Approximately 2.00 miles of asphalt surfaced State Highway Route 94 and approximately 3.00 miles of unimproved farm to market roads.
7. **UTILITIES:** Approximately 2.00 miles of fiber optic lines and approximately 2.00 miles of overhead power lines.
8. **BARNs:** 0
9. **MACHINE SHEDS:** 1
10. **OUTBUILDINGS:** 0
11. **IRRIGATION SYSTEMS:** 1
12. **GRAIN BINS:** 0
13. **OTHER FACILITIES:** Approximately 2.00 miles of Katy Trail.

Figure 3.6.8

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: May 10, 2005

ITEM NO: 30E

LEVEE NAME: Tebbetts East Levee District

RIVER BASIN: Missouri River

RIVER LOCATION: Left Descending Bank Missouri River, River Mile 130.3 to 124.7, Left Descending Bank of an Unnamed Upland Branch, Right Descending Bank of Middle River and the Right Descending Bank of Auxvasse Creek.

SPONSOR: A Levee District organized by the Circuit Court of Callaway County, Missouri

LEVEE DIRECTORS:

Andy Smart, President
5761 County Road 4011
Tebbetts, MO 65080
Phone: 573-295-4583

Calvin Stock, Vice President/Secretary/Treasurer
5802 State Highway 94
Tebbetts, MO 65080
Phone: 573-295-4788

LEVEE EMBANKMENT DATA

1. **LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 30.0' Jefferson City Gage
2. **LEVEL OF PROTECTION PROVIDED:** Exceeds a 5-year flood event
3. **AVERAGE HEIGHT OF LEVEE:** 1' to 12' above landside natural ground surface
4. **AVERAGE CROWN WIDTH:** 10' to 16'
5. **AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 6
R/S: Ranges from 1 on 3 to 1 on 6
6. **ANNUAL MAINTENANCE COSTS:** \$2,000.00

PROTECTED FEATURES

1. **TOTAL ACRES PROTECTED:** 2,400
2. **TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 2,200
3. **TOWNS:** 0
4. **BUSINESSES:** 0
5. **RESIDENCES:** 1
6. **ROADS:** Approximately 6.00 miles of gravel surface County Roads and approximately 5.00 miles of unimproved farm to market roads.
7. **UTILITIES:** Approximately 6.00 miles of fiber optic lines.
8. **BARNs:** 0
9. **MACHINE SHEDS:** 4
10. **OUTBUILDINGS:** 0
11. **IRRIGATION SYSTEMS:** 1
12. **GRAIN BINS:** 3
13. **OTHER FACILITIES:** None

Figure 3.6.9

SUPPLEMENTAL LEVEE INSPECTION INFORMATION

INSPECTION DATE: April 4, 2005

ITEM NO: 31A

LEVEE NAME: Steedman Levee District

RIVER BASIN: Missouri River

RIVER LOCATION: Left Descending Bank Missouri River, River Mile 120.5 to 117.0, Left Descending Bank Auxvasse River, Left Descending Bank Mollie Dozier Chute, Right Descending Bank Logan Creek and Right Descending Bank Mud Creek

SPONSOR: A Levee District organized by the Circuit Court of Callaway County, Missouri

LEVEE DIRECTORS:

Steve Smart, President
5574 State Hwy 94
Tebbetts, MO 65080
Phone: 573-295-6108

Darrell Krebs, Vice President
7723 State Hwy 94
Mokane, MO 65059
Phone: 573-676-5856

Gary Vandelight, Secretary/Treasurer
11564 County Road 481
Tebbetts, MO 65080
Phone: 573-676-5428

LEVEE EMBANKMENT DATA

1. **LEVEE DESIGNED GAGE FUNCTION READING/STATION:** 33.0' Jefferson City Gage
2. **LEVEL OF PROTECTION PROVIDED:** Exceeds a 10-year flood event
3. **AVERAGE HEIGHT OF LEVEE:** 6' to 14' above landside natural ground surface
4. **AVERAGE CROWN WIDTH:** 8' to 14'
5. **AVERAGE SIDE SLOPE:** L/S: Ranges from 1 on 3 to 1 on 6
R/S: Ranges from 1 on 3 to 1 on 6
6. **ANNUAL MAINTENANCE COSTS:** \$1,500.00

PROTECTED FEATURES

1. **TOTAL ACRES PROTECTED:** 2,200
2. **TOTAL AGRICULTURAL PRODUCTION ACRES PROTECTED:** 2,175
3. **TOWNS:** Steedman (4 residences)
4. **BUSINESSES:** 1
5. **RESIDENCES:** 8 (outside town of Steedman)
6. **ROADS:** Approximately 4.25 miles of asphalt surfaced State Highway Route 94, approximately 7.00 miles of gravel surfaced County Roads and approximately 4.00 miles of unimproved farm to market roads.
7. **UTILITIES:** Approximately 6.00 miles of fiber optic cable, approximately 6.00 miles of overhead power lines and approximately 0.50 mile of buried water line.
8. **BARNs:** 3
9. **MACHINE SHEDS:** 4
10. **OUTBUILDINGS:** 6
11. **IRRIGATION SYSTEMS:** 0
12. **GRAIN BINS:** 8
13. **OTHER FACILITIES:** Approximately 2.50 miles of Katy Trail and the United States Post Office in Steedman.

Previous Occurrences

According to the US Army Corps of Engineers, all levees in Callaway County and most of the surrounding counties failed during the 1993 Flood, resulting in the inundation of land and structures being protected.

Structures that were affected by the levee breach include the Jefferson City Airport, Cedar City (now annexed by Jefferson City), the Jefferson City Wastewater Treatment Plant, and several residences and businesses. All of these inundated areas are within the boundary of the Capitol View Drainage District.

During the summer of 2011, Missouri River flooding caused seepage of water into all levee districts in Callaway County. This seepage was dealt with by mechanical pumps throughout the area. While there was a loss in crop production, there were no structures impacted by this flooding.

Measure of Probability and Severity

Probability: Medium

Severity: Low

The medium probability of occurrence is based on the fact that the levee infrastructure is aging and regulations and/or cost restraints prevent significant upgrades or changes to the existing structures.

The severity is low because there would be little injury if levee failure occurred and the extent of damages would be to cropland.

Existing Mitigation Strategies

The US Army Corps of Engineers oversees the inspection of the seven major levee districts; it is up to the owner or sponsor to inspect and fix their levees.

Most areas behind the seven major levees in the Planning Area are in designated floodplains and new construction must meet Callaway County floodplain regulations.

Levee Failure Vulnerability

Jurisdictions: Callaway County (unincorporated areas) near the Missouri River

Neither school districts nor the Boone Co. PWSD #9 are vulnerable to the hazard of levee failure.

Overview

The seven main levees in the Planning Area will be addressed in this assessment. Vulnerability assessments are not being completed for the private levees in the Planning Area due to the lack of official data on their locations.

All seven levees in the Planning Area are agricultural levees. Agricultural levees are usually built to withstand a 50 year flood but these three levees fall well below that protection level at 10 to 25 year flood event levels. Specific protection information is shown in Figures 3.6.3 -3.6.9.

Potential Impact on Existing Structures

Structures in Callaway County that would be vulnerable to the effects of levee failure would include those that lie in areas in or near the Missouri River floodplain and its tributaries. Since the 1993 Flood many structures have been relocated, bought out, abandoned, elevated, or remodeled; this has reduced the amount of vulnerable structures and people in areas where levees could potentially fail.

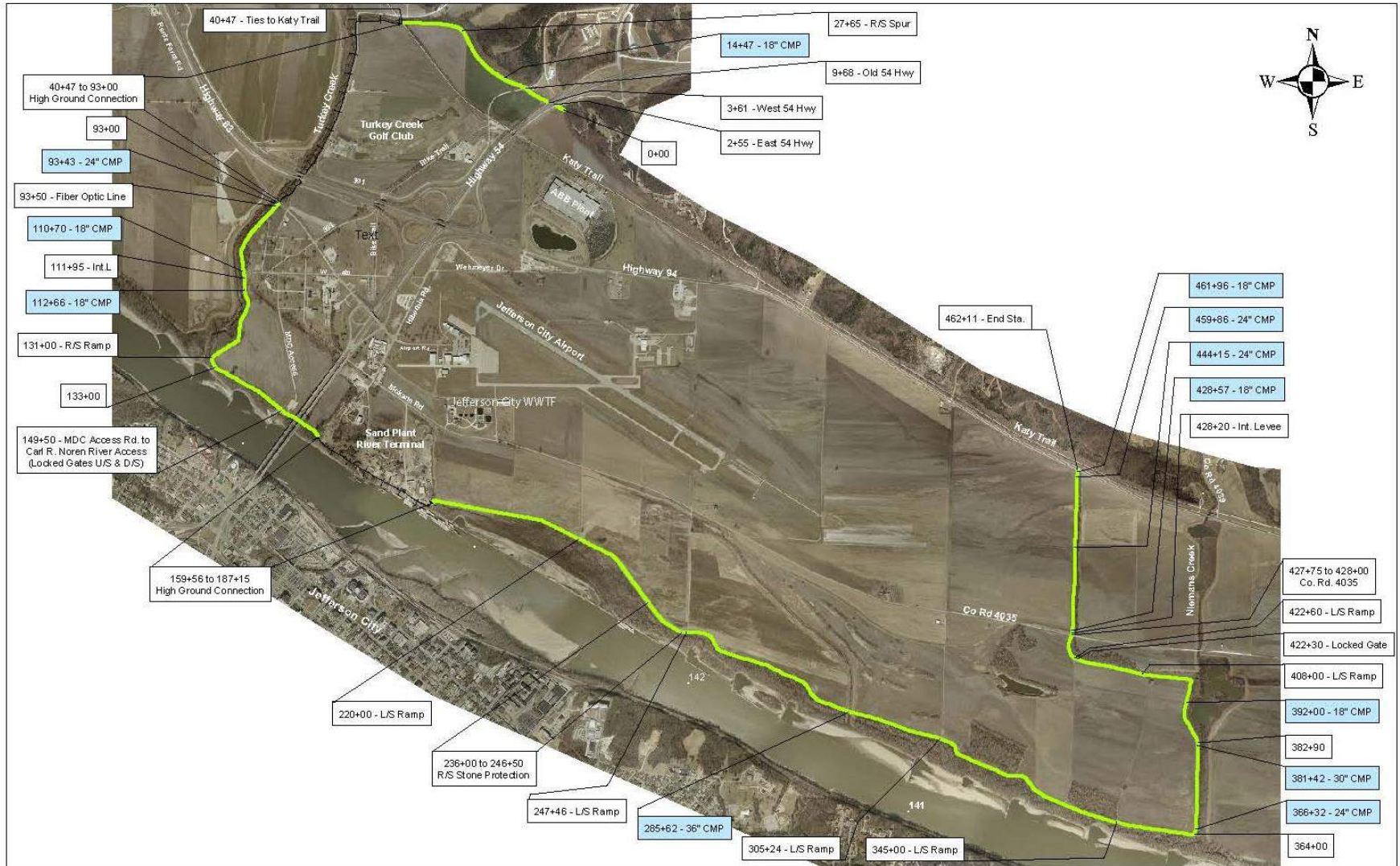
The Capitol View Drainage District protects two important facilities for Jefferson City along with several businesses, a few homes, and farmland. The Jefferson City Waste Water Treatment Facility and the Jefferson City Memorial Airport are both protected by this levee. Figure 3.6.10 was provided by the US Army Corps of Engineers and shows the drainage district and information about levee. This drainage district is also profiled in the Cole County Hazard Mitigation Plan 2010.

Detailed information on the facilities, acreage, and infrastructure protected by the levee districts is located in the inspection reports found in Figures 3.6.3-3.6.9.

Potential Impact on Future Development

Impact on future development is directly related to floodplain management and regulations set forth by the county and individual communities through levee management and regulations which are not clearly defined. Because most private levees in Callaway County are not regulated or inspected by any one agency it is difficult to predict what path future development will follow. It is important to note that levees in Callaway County are located in designated floodplains. This means that all new construction in these areas fall under Callaway County's floodplain ordinances and must adhere to those guidelines.

Figure 3.6.10



Capital View Drainage District
Item 36B

Jan 14/15 2010

3.7 Severe Winter Weather

Description of Hazard

Winter storms in central Missouri contain ice, snow, severe cold, sleet, freezing rain, and wind; each of these has the potential to disrupt life in the region by making normal activity difficult and/or dangerous. Within the last five years, there have been few extreme winter weather events. Whether it be the expectation of severe winter weather in the region or the perceived oddity of not having severe winter weather, residents expect severe winter weather annually regardless of the trends. If anything, the lack of severe winter weather makes the intensity of anticipation for a severe winter weather event greater.

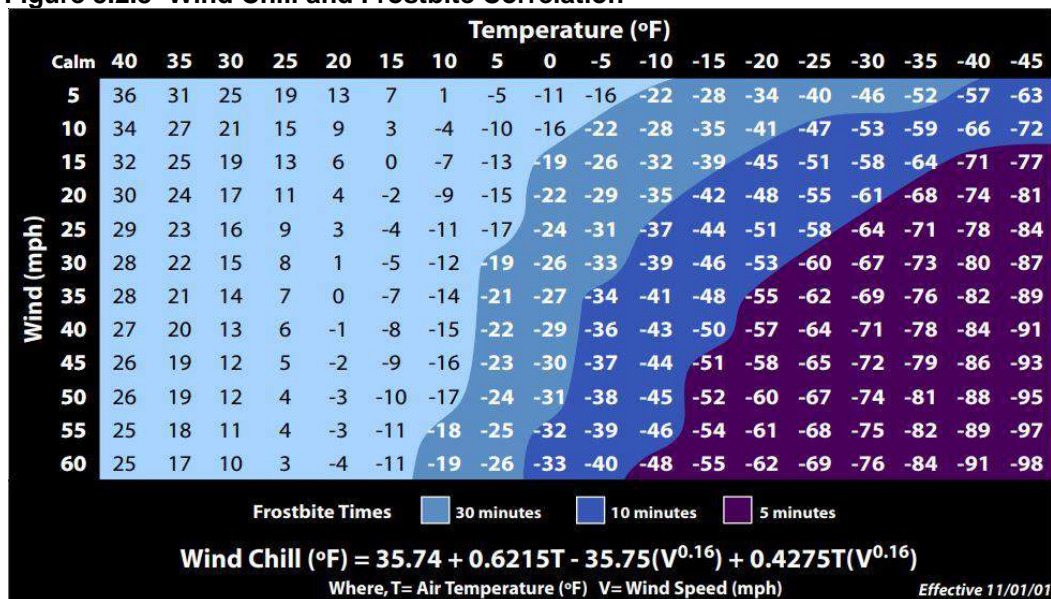
Winter storms pose a threat to central Missouri by creating disruptions in electricity, telephone, and other critical infrastructures. Employees may be unable to get to work due to icy conditions, unplowed roadways, and disruptions in transportation services, or facility damage. A shortage of supplies may ensue with a longer stretch of severe winter weather.

Snowstorms do not generally impact the region for long periods of time but ice storms have shut down schools and businesses for extended periods. Ice is also the biggest threat to reliable power and phone service. Additionally, winter weather includes the potential for frostbite as a result of wind chill. Wind chill can occur when a combination of low temperatures and strong winds combine. Exposure during a wind chill warning can be a life threatening situation (*Missouri State Hazard Mitigation Plan 2013*).

Wind chill advisory- Combination of low temperatures and strong winds resulting in readings of -20°F or lower.

Wind chill warning- Wind chill temperatures are -35°F or lower.

Figure 3.2.8- Wind Chill and Frostbite Correlation



Geographic Location

The entire planning area is at risk from severe winter weather.

Previous Occurrences

Callaway County experienced 42 recorded winter storms or periods of extreme cold in the period Jan. 1, 1993 – June 30, 2017, according to data from NOAA. Figure 3.7.1 summarizes available data for these storms including additional information from SEMA Situation Reports.

Winter storms typically move through a large area. The number of counties affected by a storm is indicated in Figure 3.7.1 for those storms where deaths, injuries, and/or costs are reported. The deaths, injuries, and estimated costs reflect all counties in Missouri affected by the storm. One of the deaths indicated in this data did occur in Callaway County; a National Guardsman was killed in a traffic related accident in the December 2007 storm. Information on the locations of injuries was not available. While it can be seen from the data that severe winter weather can result in great financial cost, the exact cost of these storms to Callaway County was not available in the data.

More cost information is available for storms for which Presidential Disaster Declarations were made. After a Presidential Disaster Declaration, Public Assistance (PA) and/or Individual Assistance (IA) is made available through FEMA. The PA can be further specified as a specific category; the categories relevant to this data are Category A for debris removal and Category B for emergency protective measures.

Since 2006, there have been five Presidential Disaster Declarations for severe winter weather in Missouri, three of these included Callaway County (#1673, #1676, #1736, and #1961). In all of these disasters, Public Assistance (PA) was made available to Callaway County through FEMA. There have also been two Presidential Emergency Declarations due to severe winter weather for the entire state of Missouri since 2006 (#3281 and #3303). Public Assistance (PA), limited to direct Federal Assistance, was made available during these Emergencies.

The Governor of Missouri declared a State of Emergency in the State for the winter storm of Nov. 30 – Dec. 1, 2006; this declaration allowed state funds to be used in disaster response. SEMA Situation Reports indicate a dairy farmer lost 23 head of cattle and other facilities valued at more than \$1 million in damage from this storm; other individuals in Callaway County reported roofs collapsing on barns and greenhouses.

The severe winter weather in the first two weeks of December 2007 resulted in both a Presidential Emergency Declaration (#3281) for the ice storm beginning on Dec. 8, 2007 and a Presidential Disaster Declaration (#1736) for the entire 10-day period of severe winter weather. Callaway County received a total of \$295,090 in PA funds from this Disaster Declaration.

SEMA activated the State Emergency Operations Center and the Governor of Missouri declared a State Emergency which made state resources available to assist local governments.

SEMA Situation Reports indicate one death on U.S. 63 in Callaway County from these storms; a Missouri National Guardsman who had stopped to help another was killed when a car skidded on ice and struck him in the median. An estimated 7,500-8,000 people in the county were without power including those in Fulton and Holts Summit. A warming center was opened in Holts Summit and shelters were opened in both cities, but no one stayed at the Fulton Shelter. Debris was a major problem in the county. According to the SEMA Situation Report of 12/14/07, AmeriCorps volunteers were assisting in the county and a need for National Guard to assist with wellness checks was indicated; whether the National Guard actually did assist in the county is not stated.

A blizzard in 2011 brought Mid-Missouri to a stand still for several days. According to the National Climate Data Center, this blizzard was the first to strike central Missouri in several years. Over 20 inches of snow fell over a 24 hour period coupled with 40 mph winds which resulted in both a Presidential Emergency Declaration (#3317) and a Presidential Disaster Declaration (#1961). Interstate 70 was shut down from Warren County to just east of Kansas City. The National Guard was called to clear County roads and assist with emergency transportation. A Federal disaster declaration was obtained for many counties in order to assist with the cost of snow removal. Light freezing rain and sleet started on Monday 1/31 with an inch of sleet accumulating by the early morning hours of Tuesday (2/1). By midday Tuesday (2/1) the precipitation had changed to snow and the wind began increasing. By late Tuesday (2/1) afternoon travel became extremely dangerous. SEMA activated the State Emergency Operations Center and the Governor of Missouri declared a State of Emergency making state resources available to assist local governments with their disaster response.

Figure 3.7.1 Severe Winter Storms in Callaway County, Missouri January 1993-January 2017						
Date	Storm Type	Deaths / Injuries	Cost (Million \$)	Declaration #	# of Counties	Assistance in Callaway Co. (IA or PA)
1/14/1994	Extreme Cold	0/15	5		52*	
2/22/1994	Glaze/ice Storm	0/15	0			
4/5/1994	Winter Storm	0	0.5		32*	
1/3/1995	Cold	2/6	0		30*	
1/6/1995	Ice Storm	0	0			
1/18/1995	Heavy Snow	0	0.2		13	
1/2/1996	Winter Storm	0	0			
1/3/1996	Winter Storm	0	0			
11/25/1996	Ice Storm	0	0			
1/8/1997	Winter Storm	0	0			
1/15/1997	Winter Storm	0	0			
1/27/1997	Winter Storm	0	0			
4/10/1997	Winter Storm	0	0			
12/8/1997	Winter Storm	0	0			
1/12/1998	Winter Storm	0	0			
3/8/1998	Winter Storm	0	0			
12/21/1998	Winter Storm	0	0			

1/1/1999	Winter Storm	0	0			
1/27/2000	Winter Storm	0	0			
12/13/2000	Heavy Snow	0	0			
12/16/2000	Extreme Windchill	0	0			
2/25/2002	Winter Storm	0	0			
3/2/2002	Winter Storm	0	0			
12/4/2002	Winter Storm	0	0			
12/24/2002	Winter Storm	0	0			
1/1/2003	Winter Storm	0	0			
2/23/2003	Winter Storm	0	0			
12/9/2003	Winter Storm	0	0			
12/13/2003	Winter Storm	0	0			
1/25/2004	Winter Storm	0	0			
11/24/2004	Winter Storm	0	0			
12/8/2005	Winter Storm	2/0	0		29*	
12/1/2006	Winter Storm	0	23	1673	14*	PA
1/12/2007	Ice Storm	0	65	1676	39*	PA (A,B)
12/6/07-12/15/07	Severe Winter Storm	4/NA	34.8	1736	42	PA
12/8/2007	Ice Storm	0	NA	3281	statewide	PA (A,B)
2/23/2008	Winter Weather	0	0			
1/26/2009	Winter Storm	NA	NA	3303	statewide	PA (B)
1/6/2010	Winter Weather	0	0		18	
1/19/2011	Heavy Snow	0	0		7	
1/31/2011-2/3/2011	Winter Storm	0	0	3317, 1961	27*	PA (B)
2/21/2013	Heavy Snow	0	0			
3/24/2013	Heavy Snow	0	0			
12/21/2013	Winter Storm	0	0			
1/5/2014	Winter Storm	0	0			
1/6/2014	Cold/Wind Chill	0	0			
2/4/2014	Winter Storm	0	0			

Sources: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>; <http://www.fema.gov/news/disasters.fema>;
<http://sema.dps.mo.gov/SitReps/Situation%20Reports.htm>

* Count includes city of St. Louis, counted as a county

Based on the number of previous events, there is probability of 100% that a storm will occur. Using the criterion of at least one event occurring per year over the 24 years of data observation (January 1993-January 2017), there is a probability of 70.8% that at least one winter weather event will happen in any given year.

Measure of Probability and Severity

Probability: High
Severity: Moderate

Existing Mitigation Activities

The Fulton/Callaway County Office of Emergency Management has been proactive in educating the public and using the media to educate the public about the dangers of severe winter weather and driving in severe winter weather. The Callaway County EMA maintains the SMART-911 system where county citizens can register any critical health issues or power needs in the case of power outages. This list can be shared with the power companies in the county.

Callaway County Electric Cooperative has a policy regarding tree trimming and brush removal around power lines. Consistent maintenance of trees and brush around utility lines limits the possibility of power outages during a severe winter storm. Maintenance also makes financial sense because repairing fallen utility lines and poles is costly and dangerous. They also maintain a voluntary list of individuals who have critical power needs.

School districts work with Missouri Department of Transportation and Callaway Road and Bridge on snow/ice removal progress during inclement weather occurring during the school day. Superintendents and transportation directors coordinate with each other and other school districts to ensure that students are not required to venture out in unsafe conditions. They consistently monitor winter storms and road conditions to ensure that students and staff are kept safe.

National Weather Service and Local Media

The St. Louis Office of the National Weather Service coordinates with local jurisdictions and media outlets to disperse information regarding severe winter storm watches and warnings. Early warning allows the public to prepare for a severe storm. Should a storm reach catastrophic proportions and officials need to communicate directly with the public, the Emergency Alert System exists to spread that information.

The National Weather Service sets up winter weather warnings in stages of severity. These stages are shown in Figure 3.7.2.

Figure 3.7.2 National Weather Service Winter Warnings	
Winter Weather Advisory	Winter weather conditions are expected to cause significant inconveniences and may be hazardous. If caution is exercised, these situations should not become life-threatening. The greatest hazard is often to motorists.
Winter Storm Watch	Severe winter conditions, such as heavy snow and/or ice, are possible within the next day or two.
Winter Storm Warning	Severe winter conditions have begun or are about to begin in your area.
Blizzard Warning	Snow and strong winds will combine to produce a blinding snow (near zero visibility), deep drifts, and life-threatening wind chill. Seek refuge immediately.
Frost/Freeze Warning	Below freezing temperatures are expected and may cause significant damage to plants, crops, or fruit trees. In areas unaccustomed to freezing temperatures, people who have homes without heat need to take added precautions.

Severe Winter Weather Vulnerability

Jurisdictions: All Jurisdictions

Overview

Callaway County rarely suffers from heavy damage due to severe winter storms and therefore most winter storms impact the community only temporarily. It is not uncommon for a severe winter storm to leave a long lasting mark on the community by inflicting heavy financial damage on the area but storms of this magnitude are rare.

Potential Impact on Existing Structures

A series of small winter storms can impact several jurisdictions. This increases the financial burden on communities and can have a more far reaching economic impact. Below are listed the many impacts severe winter storms can have on Callaway County.

- **Life and Property-** Many deaths from winter storms are a result of traffic accidents caused by a combination of poor driving surfaces and driving too fast for the conditions. Accidents during winter storms can be particularly devastating because often multiple cars are involved. The elderly population within the county are at a high risk for impacts from winter storms. According to the World Health Organization, “elderly” is defined as those over the age of 65. These individuals are the most susceptible to complications from excessive and/or prolonged cold or heat. Power outages can be particularly difficult for these individuals. According to the US Census Bureau website the estimated 2015 elderly population for Callaway County stands at 6,194.
- **Roads and Bridges-** Roads and bridges serve as vital arteries for all residents. Winter storms often limit the effectiveness of the arteries by making driving conditions difficult and unsafe. Emergency vehicles also have trouble operating in these conditions that slow down response times thus limiting their effectiveness in an emergency.
- **Power Lines-** Ice storms often adversely impact consistent power supplies. The ice can build up on the wires causing them to fall or the ice can lead to falling tree limbs which then knock down power lines. When this happens power outages occur that can be dangerous. For instance, if the population relies on electricity for heat and the electricity does not work for a long time, people run the risk of hypothermia. This is a particular concern for more vulnerable populations such as the elderly.
- **Water Lines-** Winter storms and their associated cold weather lead to the ground freezing and thawing. As the ground freezes and thaws, pipes in the ground shift and sometimes break causing a lack of potable water. Also, when a pipe breaks, damage to property can be extensive and expensive. The lack of water can be an issue if not fixed quickly.

Currently, there is not a reliable or accurate way to estimate costs associated with winter storms. Too many variables exist to accurately portray how much damage would be incurred by a winter storm. For instance, the cost of a snowstorm that dropped 20 inches would be different than an ice storm that causes different types of damage and challenges to infrastructure. Locations of heavier snow accumulation, time of day, and other characteristics would all play a role in determining the cost of a winter storm.

Potential Impact on Future Development

The impact of winter weather on future development cannot accurately be measured with available data, but we can assume that more roadways would cause delays in getting roads cleared in a timely manner without an increase in the number of people working on snow and ice removal. More roadways would also stretch budgets for snow and ice removal. Heavy snowfall or ice storms can impact the ability to conduct business within the county, which can cause a loss of profit.

3.8 Wildfire

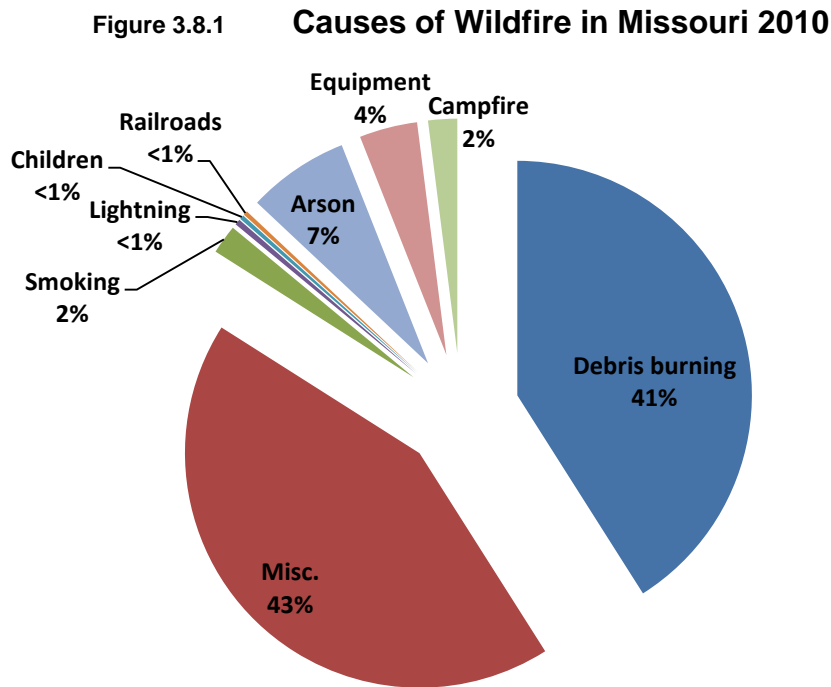
Description of Hazard

According to the Missouri Department of Conservation, forest, grassland, and natural cover fires can and have occurred at any time throughout the year in Missouri. In Callaway County, the majority of the fires and the greatest acreage loss occur during the spring fire season (February 15 - May 10). Although this may be the official state data of fire occurrence, Callaway County fire departments have stated that fire season only excludes the months of January and February.

Spring is the time of the year when residents burn garden spots and brush piles. Many landowners also believe it is necessary to burn the woods in the spring to grow more grass, kill ticks, and get rid of brush. These factors, combined with low humidity and high winds, result in higher fire danger at this time of year. The spring fire season abates with the growth of the new season's grasses and other green vegetation.

Numerous fires also occur in October and November due to the dryness associated with fall in Missouri. Many residents use this time of year to burn leaves and debris thus raising the possibility of a fire which burns out of control.

The major causes of wildfires in Missouri are various human activities, according to statistics from the Missouri Department of Conservation (see Figure 3.8.1). In Callaway County, the rural fire districts report that burning of agricultural fields is the primary cause of wildfire in the area.



Red Flag Warning

Issued by the National Weather Service, a Red Flag Warning is a term used by fire-weather forecasters to call attention to limited weather conditions of particular importance that may result in extreme burning conditions. It is issued when it is an on-going event or the fire weather forecaster has a high degree of confidence that Red Flag criteria will occur within 24 hours of issuance. Red Flag criteria occurs whenever a geographical area has been in a dry spell for a week or two, or for a shorter period, if before spring green-up or after fall color, and the National Fire Danger Rating System (NFDRS) is high to extreme and the following forecast weather parameters are forecasted to be met:

- 1) a sustained wind average 15 mph or greater
- 2) relative humidity less than or equal to 25 percent and
- 3) a temperature of greater than 75 degrees F.

In some states, dry lightning and unstable air are criteria. A Fire Weather Watch may be issued prior to the Red Flag Warning.

Geographic Location

While the Planning Area as a whole is at some risk for wildfire, the unincorporated areas of Callaway County and the Wildland Urban Interfaces of Fulton and Holts Summit are at greater risk.

The Wildland Urban Interface (WUI) was defined as “the area where structures and other human development meet or intermingle with undeveloped wildland” in a 2001 Federal Register report. There is a higher risk scenario for wildfire in these areas where high fuel loads and structures meet or overlap.

Data provided by the University of Wisconsin-Madison outlines the WUI and has been used to map the WUI for the Planning Area (see Figure 3.8.2). The specific interface definitions used are:

- **Interface Community**

There is a clear line of demarcation between wildland fuels and residential, business, and public structures. Wildland fuels do not generally continue into the developed area. The development density for an interface community is usually three or more structures per acre, with shared municipal services.

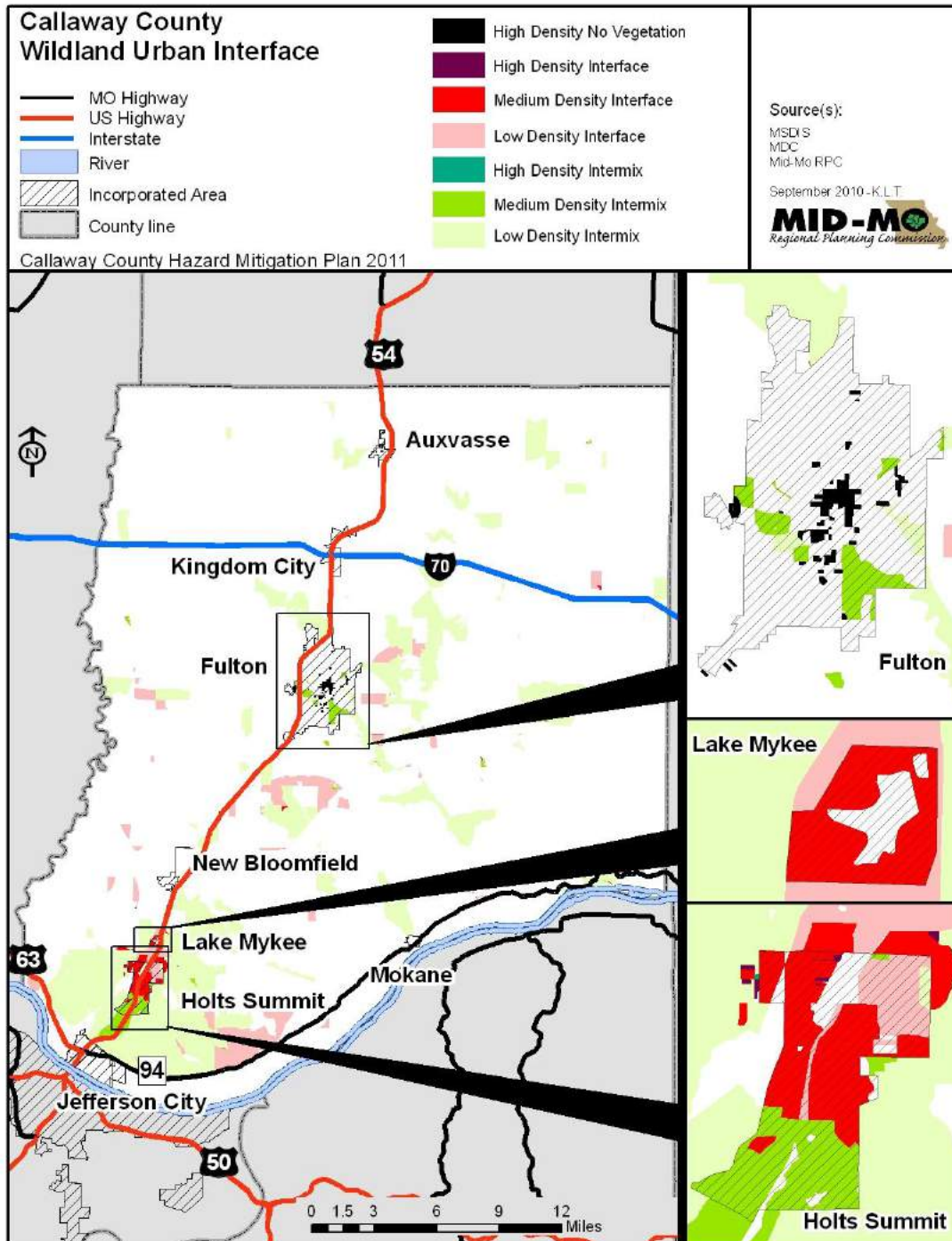
- **Intermix Community**

Structures are scattered throughout a wildland area. There is no clear line of demarcation; wildland fuels are continuous outside of and within the developed area. The development density in the intermix ranges from structures very close together to one structure per 40 acres.

- Occluded Community

Often found within a city, structures about an island of wildland fuels (e.g. park or open space). There is a clear line of demarcation between structures and wildland fuels. The development density is usually similar to those found in the interface community, but the occluded area is usually less than 1,000 acres in size.

Figure 3.8.2



Previous Occurrences

Large and widespread wildfires, such as occur in the western United States, have not been a problem in Callaway County in recent history. Most wildfires in the Planning Area stem from open debris burning and burning of agricultural fields.

Measure of Probability and Severity

Probability: Low

Severity: Low

The Missouri State Hazard Mitigation Plan (2010) points out that the probability of wildfires may increase to high during conditions of excessive heat, dryness, and drought. The probability is also higher in spring and late fall

Existing Mitigation Activities

Emergency response systems, well trained fire departments, and numerous county roads which function as fire roads all improve response times to fire events, thus decreasing the chances of fire spread.

All fire departments in Callaway County belong to the Fire Chiefs Association. This allows departments to work together to solve similar problems and reach goals more efficiently. All fire departments participate in county wide mutual aide agreements. The Callaway County EMA in cooperation with local fire districts participate in educating the public during the month of October during National Fire Safety Month.

The Missouri Department of Conservation and the State Fire Marshal have published an informational booklet entitled “Living with Wildfire” which educates homeowners on assessing a property’s vulnerability to wildfire and making changes to decrease the risk. The publication is available online at: <http://mdc4.mdc.mo.gov/Documents/322.pdf>

A Firewise Communities program has been implemented in Missouri to teach people how to minimize the threat of wildfire.

Wildfire Vulnerability

Jurisdictions: All Jurisdictions

Overview

Wildfires in Callaway County tend to be limited in their spatial extent thus minimizing their impact. According to the Missouri Department of Conservation, 49% of all wildfires in Missouri result from debris burning that gets out of hand and starts a wildfire. People and structures in the path of a wildfire are all at risk of minimum to extensive damage. Wildfire is defined as an uncontrolled fire that destroys forests and many other types of vegetation, as well as animal species.

Potential Impact on Existing Structures

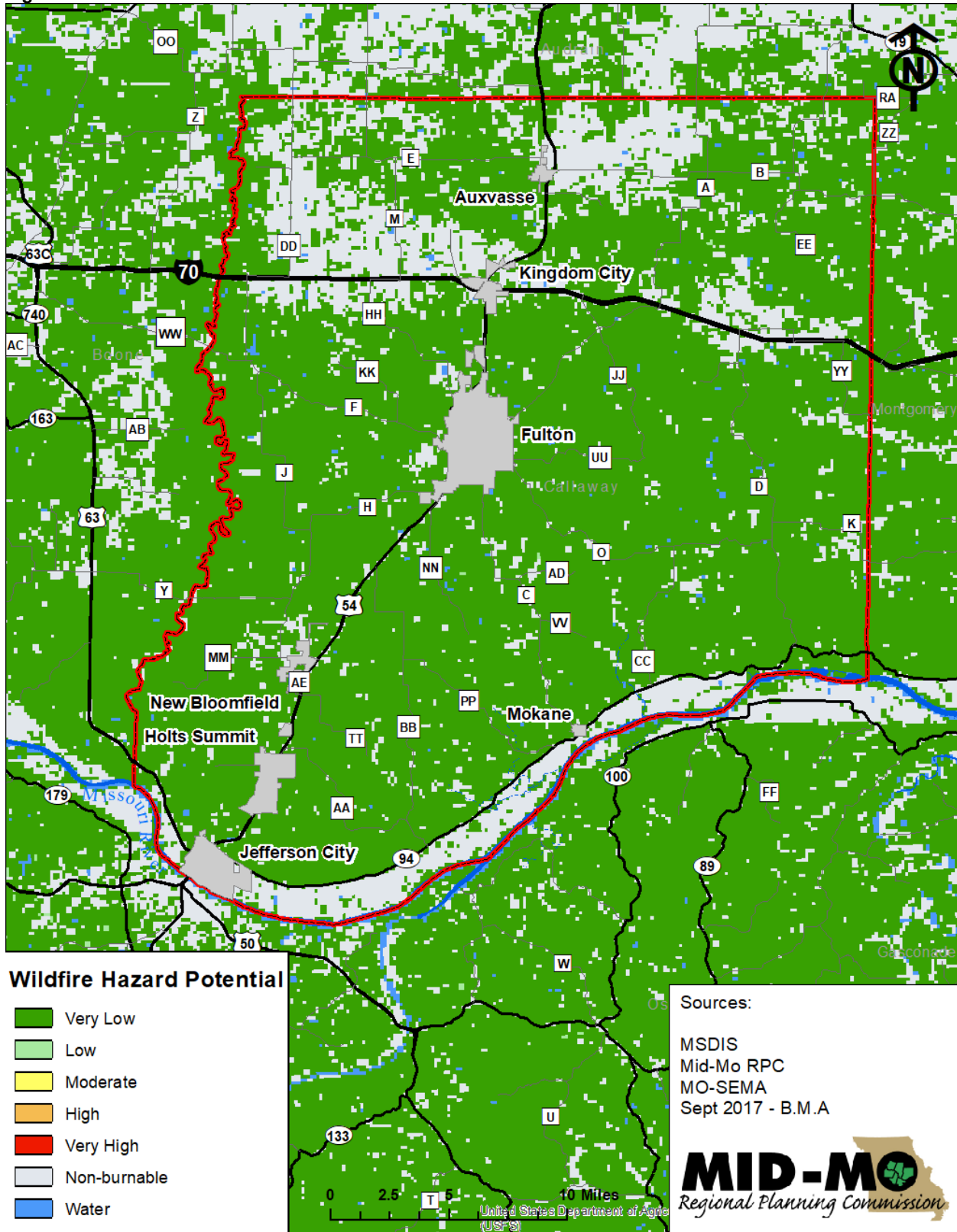
Currently, there is not a reliable or accurate way to estimate costs associated with a wildfire event. Too many variables exist to accurately portray how much damage would be incurred by a wildfire. For instance, the cost of a wildfire that strikes structures versus cropland versus forestland would all be different. Locations of the fire, time of day, and other characteristics would all play a role in determining the cost of a wildfire. Fire suppression methods also vary depending on existence of structures. Some wildfires are allowed to burn themselves out which means minimal cost for suppression.

The Missouri State Hazard Mitigation Plan 2013 estimates that Callaway County has a moderate potential for wildfire occurrence (8 year average of 39.2 occurrences a year) and a low potential for the amount of acres that could burn (8 year average of 328 acres burned a year).

Potential Impact on Future Development

Potential impacts of this hazard on future development are not quantifiable with the resources available.

Figure 3.8.3



3.9 Windstorm and Hailstorm

Windstorm, tornado, and hailstorm are hazards with potential to cause great damage. They will each be profiled separately but grouped together in this section of the plan as these three hazards are closely associated with severe thunderstorms in Missouri. There will be a general discussion of thunderstorms followed by the profiles of the three hazards (windstorm, tornado, and hailstorm.) Lightning is a hazard which FEMA does not require to be profiled for mitigation purposes; therefore, it is not profiled in this plan.

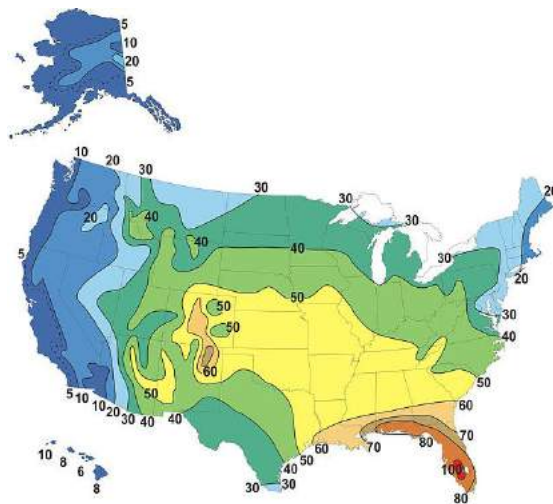
Some Background on Thunderstorm

A thunderstorm is a rainstorm with thunder and lightning present. Warm, humid climates, such as that in mid-Missouri, are favorable for the formation of thunderstorms. The average Missourian is well aware of the potential hazards of the thunderstorm season; these include heavy rains and, potentially, strong winds, tornadoes, hail, and lightning strikes. The effects of heavy rains have been considered in the section on flood (see Section 3.5).

Thunderstorms can range in complexity from single cell storms through multicell cluster storms, multicell line storms (squall lines), and on to supercell storms. A single cell thunderstorm typically lasts 20-30 minutes but when numerous cells are generated, as in a multicell storm, the thunderstorm can last for hours. Supercell storms include rotation and are responsible for the generation of severe tornadoes. The National Weather Service considers a thunderstorm “severe” when it includes one or more of the following: **winds** gusting in excess of 57.5 mph, a **tornado**, or **hail** at least 0.75 inch in diameter.

Callaway County is located in a part of the country with a relatively high number of thunderstorms. National Weather Service data indicates that there are on average 50-60 thunderstorm days per year in Missouri (see Figure 3.9.1). Thunderstorms can occur during any season in Missouri but they are more frequent in the spring and summer. Many of these thunderstorms are severe.

Figure 3.9.1 Average Number of Thunderstorm Days Annually in U.S.



Source: http://www.srh.noaa.gov/jetstream/tstorms/tstorms_intro.htm

Windstorm

Description of Hazard

Severe and damaging winds in the planning area are usually, but not always, associated with thunderstorms. Thunderstorm winds can reach speeds up to 100 mph and produce damage paths for hundreds of miles. According to NOAA, property and crop damage from thunderstorm winds is more common, and can be more severe, than damage from tornadoes. Thunderstorm wind damage accounts for half of all the NOAA reports of severe weather events in the lower 48 states.

Thunderstorm winds are often called "straight-line" winds to distinguish them from tornadoes, which have a rotational element. The following are the distinctions made between different thunderstorm winds:

- **Gust front** - Gusty winds out ahead of a thunderstorm; characterized by a wind shift and temperature drop.
- **Downbursts** – A strong downdraft with a width of greater than 2.5 miles which results in an outward burst of damaging winds near the ground; may possibly produce damage similar to that of a strong tornado.
- **Microbursts** – A small concentrated downburst with a width less than 2.5 miles; generally short-lived, lasting only 5-10 minutes, with maximum wind speeds up to 168 mph.

A **derecho** is a widespread, massive, and violent thunderstorm wind event producing straight-line winds in excess of 70 mph and moving quickly over large areas. These are not common events but a massive derecho, almost the size of the area of the state of Missouri, caused extensive damage in southern Missouri and Illinois in the spring of 2009. Based on information taken from the NOAA-NWS-NCEP Storm Prediction Center, the Mid-Missouri region should expect at least one derecho every 1-2 years.

Figure 3.9.2

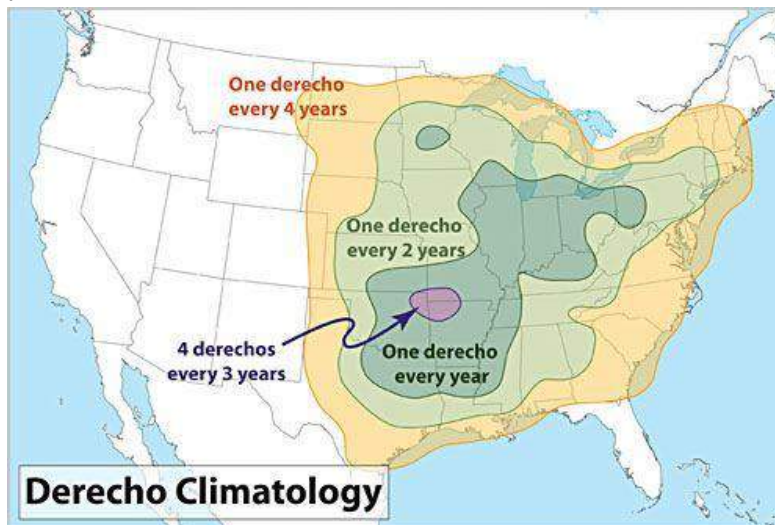


Image Source: <http://www.spc.noaa.gov/misc/AbtDerechos/derechofacts.htm>

Much of the damage caused by high winds occurs because of falling trees; people, buildings, and vehicles may be damaged by falling trunks and branches. Power lines may be blown or knocked down and people left without electricity. In some cases, roofs are directly blown off buildings and windows are shattered.

Geographic location

The entire planning area is at risk from windstorms. Both urban and rural areas can sustain heavy losses from severe winds; the potential damage to houses and urban trees is obvious but crops and forests can also sustain massive and costly damage from windstorms.

Previous occurrences

According to NOAA, there have been 164 windstorm events in Callaway County since 1950 (see Figure 3.9.2a-g). Only 5 of these windstorm events were not associated with thunderstorms. These windstorms resulted in at least \$595,000 in property in the Planning Area. Property damage in the Planning Area may have been higher than the NOAA data indicates. The thunderstorm winds on April 18, 1995 were responsible for \$700,000 property damage in 23 Missouri counties, including Callaway County, and the City of St. Louis; some of that recorded damage may have occurred in the Planning Area.

In addition, there was \$2,000 in reported crop damage in a 2008 windstorm affecting 6 counties in central Missouri.

Figure 3.9.2a						
Windstorm Events in Callaway County 1/01/1950 - 8/7/2011						
General Location	Date	Type	Magnitude (mph)	Property Damage	Crop Damage	Injury/Damage Details
County	9/16/1956	Tstm Wind	0	0	0	
County	4/5/1958	Tstm Wind	0	0	0	
County	5/22/1958	Tstm Wind	0	0	0	
County	6/11/1971	Tstm Wind	0	0	0	
County	7/20/1973	Tstm Wind	0	0	0	
County	12/4/1973	Tstm Wind	0	0	0	
County	4/13/1974	Tstm Wind	0	0	0	
County	4/20/1974	Tstm Wind	0	0	0	
County	5/30/1974	Tstm Wind	0	0	0	
County	6/9/1974	Tstm Wind	0	0	0	
County	3/4/1976	Tstm Wind	0	0	0	

County	5/30/1977	Tstm Wind	63	0	0	
County	6/23/1978	Tstm Wind	0	0	0	
County	7/14/1978	Tstm Wind	63	0	0	
County	7/30/1979	Tstm Wind	0	0	0	
County	5/12/1980	Tstm Wind	0	0	0	
County	5/12/1980	Tstm Wind	0	0	0	
County	8/4/1980	Tstm Wind	0	0	0	
County	7/20/1981	Tstm Wind	0	0	0	
County	7/23/1981	Tstm Wind	0	0	0	
County	7/23/1981	Tstm Wind	0	0	0	
County	10/5/1981	Tstm Wind	0	0	0	
County	10/5/1981	Tstm Wind	58	0	0	
County	3/15/1982	Tstm Wind	75	0	0	
County	5/30/1982	Tstm Wind	64	0	0	
County	5/30/1982	Tstm Wind	60	0	0	
County	6/8/1982	Tstm Wind	60	0	0	
County	8/5/1982	Tstm Wind	60	0	0	
County	4/27/1983	Tstm Wind	60	0	0	
County	5/21/1983	Tstm Wind	0	0	0	
County	7/24/1983	Tstm Wind	0	0	0	
County	7/25/1983	Tstm Wind	0	0	0	
County	7/25/1983	Tstm Wind	0	0	0	
County	3/15/1984	Tstm Wind	81	0	0	
County	4/23/1985	Tstm Wind	0	0	0	
County	6/17/1985	Tstm Wind	60	0	0	
County	7/14/1986	Tstm Wind	0	0	0	
County	5/8/1988	Tstm Wind	76	0	0	
County	10/17/1988	Tstm Wind	0	0	0	
County	11/15/1988	Tstm Wind	58	0	0	
County	11/15/1988	Tstm Wind	60	0	0	
County	5/25/1989	Tstm Wind	67	0	0	
County	8/27/1989	Tstm Wind	0	0	0	
County	9/15/1991	Tstm Wind	0	0	0	
County	4/15/1992	Tstm Wind	60	0	0	
County	7/2/1992	Tstm Wind	0	0	0	
County	7/2/1992	Tstm Wind	0	0	0	
Fulton	4/26/1994	Tstm Wind	0	5K	0	Large trees and power lines knocked down; local power outages caused the WXL-45 NOAA weather radio transmission tower in Fulton to fail between 19:00 and 22:00 CST.
Millersburg	6/25/1994	Tstm Wind	0	0	0	
Mokane	6/25/2017	Tstm Wind	0	0	0	

Fulton	6/25/1994	Tstm Wind	0	50K	0	Roof torn off church; two metal stakes were driven into the side of a trailer; power lines and large trees blown down.
New Bloomfield	6/25/1994	Tstm Wind	0	0	0	Several large trees blown down.
23 Missouri Counties plus City of St. Louis	4/18/1995	High Winds	0	700K	0	Report for all Missouri areas: Numerous trees and billboards were damaged or blown down. Many homes sustained minor damage, either to roofs, porches, or garages.
Fulton	5/16/1995	Tstm Wind	0	0	0	
Hatton	6/7/1995	Tstm Wind	0	0	0	
Auxvasse	6/7/1995	Tstm Wind	60	0	0	
Kingdom City	6/7/1995	Tstm Wind	60	0	0	
Fulton	6/7/1995	Tstm Wind	70	2K	0	Large trees blown down across northwest parts of the county; several trees blown down in Fulton area, with one crushing a mobile home; sections of a roof ripped off a lumber building.
Fulton	6/8/1995	Tstm Wind	60	0	0	
Shamrock	6/8/1995	Tstm Wind	0	na	0	Mobile home heavily damaged in the northeast part of the county.
Fulton	7/8/1995	Tstm Wind	0	2K	0	House roof slightly damaged.
Holts Summit	7/8/1995	Tstm Wind	60	0	0	
Kingdom City	7/8/1995	Tstm Wind	0	1.20K	0	
Fulton	7/25/1995	Tstm Wind	0	0	0	
Fulton	9/3/1995	Tstm Wind	0	0	0	
Hatton area	5/27/1996	Tstm Wind	67	30K	0	Barn, grain silo, and other outbuildings damaged on farm.
Fulton	5/27/1996	Tstm Wind	63	0	0	
Fulton	6/13/1998	Tstm Wind	60	0	0	
Holts Summit	6/18/1998	Tstm Wind	69	0	0	
Fulton	6/29/1998	Tstm Wind	63	0	0	
Fulton	6/29/1998	Tstm Wind	70	0	0	
Fulton	11/10/1998	Tstm Wind	64	0	0	
Kingdom City	11/10/1998	Tstm Wind	64	0	0	
Portland	6/11/1999	Tstm Wind	64	0	0	
Holts Summit	8/7/1999	Tstm Wind	69	0	0	
Holts Summit	8/7/1999	Tstm Wind	69	0	0	
Fulton	4/20/2000	Tstm Wind	70	0	0	
Holts Summit	6/25/2000	Tstm Wind	60	0	0	

Millersburg	7/2/2000	Tstm Wind	60	0	0	
Fulton	8/7/2000	Tstm Wind	60	0	0	
Fulton Arpt	8/7/2000	Tstm Wind	63	0	0	
Millersburg	9/11/2000	Tstm Wind	64	0	0	
28 Missouri Counties plus City of St. Louis	2/25/2001	High Wind	46	0	0	Report for all Missouri areas: Minor tree, power line, and roof damage was common across the area.
County	3/13/2001	High Wind	40	0	0	
Fulton Arpt	4/10/2001	Tstm Wind	63	0	0	
18 Missouri Counties plus City of St. Louis	3/9/2002	High Wind	49	0	0	Report for all Missouri areas: Area electric companies reported scattered power outages as some power poles and lines were downed by the winds. Close to 50,000 customers lost power at various times in the St. Louis area. Some billboards and street signs were also damaged by the wind.
New Bloomfield	4/27/2002	Tstm Wind	60	0	0	
Millersburg	5/6/2002	Tstm Wind	60	0	0	
Millersburg	5/6/2002	Tstm Wind	60	0	0	
Kingdom City	5/8/2002	Tstm Wind	63	0	0	
New Bloomfield	6/4/2002	Tstm Wind	63	0	0	
Fulton	6/11/2002	Tstm Wind	63	0	0	
Holts Summit	7/22/2002	Tstm Wind	60	0	0	
Auxvasse	5/8/2003	Tstm Wind	75	0	0	
Fulton	6/10/2003	Tstm Wind	63	0	0	
Holts Summit	6/10/2003	Tstm Wind	63	0	0	
Fulton	9/26/2003	Tstm Wind	63	0	0	
Holts Summit	11/23/2003	Tstm Wind	58	0	0	
Fulton	4/20/2004	Tstm Wind	63	0	0	
Fulton	5/24/2004	Tstm Wind	60	0	0	
Holts Summit	7/5/2004	Tstm Wind	55	0	0	
Millersburg	8/25/2004	Tstm Wind	58	0	0	
New Bloomfield	8/25/2004	Tstm Wind	58	0	0	
Holts Summit	8/25/2004	Tstm Wind	63	0	0	
Fulton	4/21/2005	Tstm Wind	58	0	0	
New Bloomfield	4/21/2005	Tstm Wind	58	0	0	
Fulton	5/22/2005	Tstm Wind	63	5K	0	Roof torn off mobile home on Route NN.

Jefferson City Mem Arpt	9/13/2005	Tstm Wind	63	0	0	
Holts Summit	9/13/2005	Tstm Wind	63	0	0	
Holts Summit	9/13/2005	Tstm Wind	63	0	0	
Fulton	9/19/2005	Tstm Wind	63	0	0	
Fulton	9/19/2005	Tstm Wind	63	0	0	
Portland	9/19/2005	Tstm Wind	63	0	0	
Auxvasse	3/12/2006	Tstm Wind	60	0	0	
Hatton	3/12/2006	Tstm Wind	60	0	0	
Kingdom City	3/30/2006	Tstm Wind	60	0	0	
Auxvasse	6/10/2006	Tstm Wind	69	0	0	
Fulton	6/10/2006	Tstm Wind	63	0	0	
Fulton	7/13/2006	Tstm Wind	60	0	0	
Auxvasse	7/21/2006	Tstm Wind	63	0	0	
Auxvasse	8/18/2006	Tstm Wind	60	0	0	
Fulton	8/18/2006	Tstm Wind	60	0	0	
Fulton	8/12/2007	Tstm Wind	60	0	0	
Holts Summit	8/12/2007	Tstm Wind	60	0	0	
Portland	8/12/2007	Tstm Wind	60	0	0	
Eastville	10/17/2007	Tstm Wind	64	0	0	
						A swath of damaging downburst winds extended from Calwood, along Highway Z towards Interstate 70; grain elevator sustained major damage in Calwood; numerous trees, tree limbs and power lines blown down along the damage path.
Calwood	10/17/2007	Tstm Wind	75	500K	0	
Hatton	1/7/2008	Tstm Wind	61	0	0	
Fulton	1/7/2008	Tstm Wind	52	0	0	
County	5/11/2008	Strong Wind	48	0	2K	
Auxvasse	7/2/2008	Tstm Wind	60	0	0	
New Bloomfield	7/22/2008	Tstm Wind	60	0	0	
Fulton	7/27/2008	Tstm Wind	64	0	0	
Lindbergh	7/27/2008	Tstm Wind	70	0	0	
Millersburg	7/27/2008	Tstm Wind	64	0	0	
Fulton	5/7/2009	Tstm Wind	72	0	0	
Jefferson City Mem Arpt	5/7/2009	Tstm Wind	62	0	0	
County	12/9/2009	Strong Wind	42	1K	0	

Williamsburg	3/10/2010	Tstm Wind	60	0	0	
Fulton	7/20/2010	Tstm Wind	52	0	0	
Hams Prairie	8/20/2010	Tstm Wind	56	0	0	
Fulton	8/20/2010	Tstm Wind	56	0	0	
New Bloomfield	4/3/2011	Tstm Wind	56	0	0	
Hams Prairie	5/25/2011	Tstm Wind	56	0	0	
Fulton	5/25/2011	Tstm Wind	52	0	0	
Fulton Arpt	6/18/2011	Tstm Wind	56	0	0	
Holts Summit	7/3/2011	Tstm Wind	61	0	0	
Williamsburg	7/3/2011	Tstm Wind	61	0	0	
New Bloomfield	8/7/2011	Tstm Wind	55	0	0	
New Bloomfield	7/7/2012	Tstm Wind	61	0	0	One injury
Holts Summit	1/29/2013	Tstm Wind	56	0	0	
Williamsburg	1/29/2013	Tstm Wind	56	0	0	
Wainwright	5/31/2013	Tstm Wind	56	0	0	
Callaway	11/17/2013	Strong Wind	46	2K	0	
New Bloomfield	4/24/2014	Tstm Wind	56	0	0	
Guthrie	4/27/2014	Tstm Wind	52	0	0	
Eastville	6/21/2014	Tstm Wind	56	0	0	
Boydsville	7/7/2014	Tstm Wind	56	0	0	
Holts Summit	10/1/2014	Tstm Wind	52	0	0	
Williamsburg	6/12/2015	Tstm Wind	56	0	0	
New Bloomfield	8/18/2015	Tstm Wind	63	0	0	
Mokane	4/26/2016	Tstm Wind	56	0	0	
Kingdom City	7/7/2016	Tstm Wind	61	0	0	
New Bloomfield	7/13/2016	Tstm Wind	50	0	0	
Toledo	3/6/2017	Tstm Wind	52	0	0	
TOTALS				1.298M	2K	

Data prior to 1970 seems to be incomplete, as an entire decade of windstorm events are missing from the dataset. Using data after 1970, there is a probability of 89.2% that at least one windstorm will occur. Based on the number of events that have occurred over the course of the entire data observation period, there is probability of 100% that a windstorm will occur each year.

Measures of Probability and Severity

Probability: High

Severity: Moderate

Existing mitigation strategies

Warning Systems

The following warning systems are used in the Planning Area:

Local television weather reports

Local radio weather reports

9-1-1 call center and emergency mass notifications (SMART-911)

Outdoor warning sirens

Windstorm Vulnerability

Jurisdictions: All Jurisdictions

Overview

All jurisdictions in Callaway County are vulnerable to the effects of Windstorms. All above ground structures are vulnerable to the effects of a Windstorm and all other hazards associated with them (hail, rain, flooding, flying debris, etc.) Much of the damage caused by high winds occurs because of falling trees; people, buildings, and vehicles may be damaged by falling trunks and branches. Critical infrastructure such as communication lines, power lines, and cell towers may be blown down. Flying debris causes damage to people, homes, and businesses.

Potential Impact on Existing Structures

While past impacts have been minimal, future disasters can cause extensive damage. There is a wide range of impact possible. Non-permanent and wood framed structures are very vulnerable to destruction from high winds. While high winds are the force behind damage, it is the windblown debris that causes the most damage.

Figure 3.9.3 Estimated exposed structures

Impact Assessment - Windstorm							
High Vulnerability = 10 - 100% of buildings impacted							
Minimum Calculated Impact (10%)							
Building Type							
Jurisdiction	Residential	Commercial	Industrial	Agricultural	Religious	Governmental	Educational
Planning Area	1677	73	22	17	8	3	3
Callaway County (unincorporated areas)	1048	38	15	15	4	2	1
Auxvasse	49	2	0	0	0	0	0
Fulton	396	25	5	1	3	1	2
Holts Summit	121	6	1	0	1	0	0
New Bloomfield	26	1	0	0	0	0	0
HAZUS MH							

Potential Impact on Future Development

Because of the random nature of this hazard, potential impacts of this hazard on future development are not quantifiable with the resources available. Wind damage can occur to any structure or type of infrastructure not anchored or attached to the ground.

Hailstorm

Description of Hazard

Hail is formed when updrafts in thunderstorms carry raindrops up to very high and cold areas where they freeze into ice. Hail, especially large sized hail, can cause severe damage and presents a threat to automobiles, airplanes, roofs, crops, livestock, and even humans.

Geographic Location

The entire planning area is at risk from hailstorm.

While hail can strike anywhere, population centers are more at risk for injury and/or property damage from hail.

Previous Occurrences

NOAA lists 179 separate reports of hail (of at least 0.75 inch in diameter) in Callaway County since 1950 (see Figure 3.9.7a-e). These reports were associated with 98 separate storm systems. The largest hail reported in the planning area measured 4 inches in diameter; there were 6 reports of hail of 1.5 inch diameter or larger since 2012. For perspective, 1.5 inch hail is considered “ping pong ball” sized hail and 3.8 inch hail is considered “softball” sized hail.

There was \$156,800 in property damage from these hailstorm events reported to NOAA. The actual damage during this period was most likely higher since this is only the reported amount. Insurance claims and actual damage is likely much higher. There was a huge storm in the spring of 2006 which caused massive hail damage across the mid-Missouri region. Information from neighboring Boone County indicates that there was over \$1million in hail damage incurred by county-owned buildings for the year 2006; this damage did not show up in the NOAA data for Boone County but was found in county records. Many private homes throughout the region received new roofs because of hailstorm damage that year. It is very likely that Callaway County suffered at least some property damage from hail in 2006 (and very possibly other years) which is not captured in the NOAA data.

Figure 3.9.7a**Hailstorm Events in Callaway County 1/01/1960 - 1/31/2010**

General Location	Date	Time	Magnitude (diameter)	Property Damage	Crop Damage
County	5/25/1960	13:35	1.00 in.	0	0
County	4/12/1970	16:00	1.75 in.	0	0
County	5/29/1974	8:30	2.00 in.	0	0
County	5/11/1975	12:43	1.00 in.	0	0
County	6/14/1975	18:30	0.75 in.	0	0
County	8/25/1975	18:45	1.00 in.	0	0
County	6/12/1977	1:43	0.75 in.	0	0
County	8/8/1977	15:40	1.75 in.	0	0
County	8/10/1978	13:25	0.75 in.	0	0
County	8/17/1980	22:46	0.75 in.	0	0
County	9/16/1980	15:30	2.75 in.	0	0
County	4/8/1981	19:05	1.75 in.	0	0
County	3/15/1982	22:45	2.00 in.	0	0
County	4/16/1982	17:21	1.75 in.	0	0
County	4/16/1982	17:35	1.75 in.	0	0
County	6/8/1982	5:30	1.75 in.	0	0
County	6/8/1982	6:00	4.00 in.	0	0
County	7/4/1982	17:18	1.75 in.	0	0
County	7/4/1982	17:20	1.75 in.	0	0
County	5/1/1983	6:40	1.50 in.	0	0
County	5/1/1983	6:47	1.50 in.	0	0
County	7/24/1983	16:40	0.75 in.	0	0
County	7/24/1983	17:48	1.75 in.	0	0
County	7/25/1983	16:45	1.00 in.	0	0
County	7/25/1983	17:48	1.75 in.	0	0
County	4/3/1984	13:42	0.75 in.	0	0
County	4/3/1984	14:23	0.75 in.	0	0
County	4/3/1984	14:30	0.75 in.	0	0
County	5/4/1984	18:15	0.75 in.	0	0
County	9/22/1985	16:30	1.75 in.	0	0
County	5/8/1986	12:18	0.75 in.	0	0
County	5/21/1987	18:15	0.75 in.	0	0
County	5/21/1987	18:45	0.75 in.	0	0
County	4/5/1988	17:25	1.75 in.	0	0
County	3/17/1991	11:50	1.75 in.	0	0
County	3/6/1992	14:30	0.75 in.	0	0
County	4/19/1993	2:20	0.75 in.	0	0

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms>

Figure 3.9.7b

Hailstorm Events in Callaway County 1/01/1960 - 1/31/2010					
General Location	Date	Time	Magnitude (diameter)	Property Damage	Crop Damage
Mokane	3/26/1995	16:18	0.75 in.	0	0
Kingdom City	4/16/1995	21:40	0.88 in.	1K	0
Holts Summit	5/16/1995	3:45	0.75 in.	0	0
Auxvasse	6/7/1995	10:58	0.75 in.	0	0
Ellington	7/8/1995	19:45	0.75 in.	0	0
Holts Summit	5/23/1998	15:40	1.75 in.	0	0
Jeffrsn City Mem Arpt	5/23/1998	15:46	1.00 in.	0	0
Fulton	5/23/1998	16:15	0.75 in.	0	0
Kingdom City	5/23/1998	16:30	0.75 in.	0	0
Portland	6/10/1999	11:30	0.75 in.	0	0
Holts Summit	6/4/2000	18:21	0.75 in.	0	0
Calwood	8/17/2000	18:44	0.75 in.	0	0
Fulton	4/10/2001	18:13	1.00 in.	0	0
Fulton	4/10/2001	18:15	1.75 in.	0	0
Williamsburg	4/10/2001	18:30	1.75 in.	0	0
Fulton	4/27/2002	19:05	0.75 in.	0	0
New Bloomfield	4/27/2002	19:05	1.00 in.	0	0
Fulton	4/27/2002	19:09	1.75 in.	0	0
Millersburg	5/12/2002	12:40	1.75 in.	0	0
Millersburg	5/12/2002	12:50	1.75 in.	0	0
Kingdom City	5/12/2002	12:59	1.75 in.	0	0
Holts Summit	6/4/2002	16:10	0.75 in.	0	0
Mokane	6/4/2002	16:20	1.00 in.	0	0
Auxvasse	12/18/2002	13:57	0.88 in.	0	0
Holts Summit	12/18/2002	2:45	0.75 in.	0	0
Kingdom City	4/4/2003	12:45	1.00 in.	0	0
Kingdom City	4/4/2003	12:50	1.00 in.	0	0
Holts Summit	5/8/2003	10:16	0.75 in.	0	0
Kingdom City	5/8/2003	12:04	1.00 in.	0	0
New Bloomfield	6/10/2003	15:00	0.75 in.	0	0
Fulton	8/21/2003	20:25	0.75 in.	0	0
Mokane	11/4/2003	17:06	0.88 in.	0	0
New Bloomfield	5/23/2004	15:05	0.75 in.	0	0
New Bloomfield	5/23/2004	15:05	1.00 in.	0	0
Mokane	5/23/2004	15:20	2.00 in.	0	0
Fulton	5/25/2004	11:50	1.75 in.	100K	0

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms>

Figure 3.9.7c

Hailstorm Events in Callaway County 1/01/1960 - 1/31/2010					
General Location	Date	Time	Magnitude (diameter)	Property Damage	Crop Damage
Mokane	5/23/2004	15:20	2.00 in.	0	0
Fulton	5/25/2004	11:50	1.75 in.	100K	0
Fulton	5/25/2004	11:55	1.75 in.	50K	0
Kingdom City	4/20/2005	13:34	0.75 in.	0	0
Wainwright	4/21/2005	16:05	2.50 in.	5K	0
Holts Summit	4/21/2005	16:10	1.75 in.	0	0
Tebbetts	4/21/2005	16:10	0.88 in.	0	0
Tebbetts	4/21/2005	16:12	1.75 in.	1K	0
Millersburg	4/21/2005	20:10	1.25 in.	0	0
Fulton	4/21/2005	20:30	1.00 in.	0	0
Millersburg	5/11/2005	14:35	1.00 in.	0	0
Fulton	5/11/2005	15:09	1.75 in.	0	0
Fulton	6/8/2005	14:50	1.00 in.	0	0
Fulton	6/13/2005	15:10	0.75 in.	0	0
Fulton	11/5/2005	18:10	0.75 in.	0	0
Hatton	11/5/2005	18:30	0.75 in.	0	0
Auxvasse	3/11/2006	16:30	0.75 in.	0	0
Hatton	3/12/2006	17:25	0.75 in.	0	0
Auxvasse	3/12/2006	17:30	1.75 in.	0	0
Hatton	3/12/2006	17:30	1.75 in.	0	0
Holts Summit	3/12/2006	23:15	1.00 in.	0	0
Fulton	3/12/2006	23:30	1.00 in.	0	0
Fulton	4/2/2006	14:15	0.75 in.	0	0
Kingdom City	4/2/2006	14:17	1.00 in.	0	0
Kingdom City	4/2/2006	14:20	1.75 in.	0	0
Kingdom City	4/2/2006	14:22	2.00 in.	0	0
Fulton	4/5/2006	20:25	0.88 in.	0	0
New Bloomfield	4/19/2006	20:00	1.00 in.	0	0
New Bloomfield	4/19/2006	20:10	2.00 in.	0	0
Fulton	4/19/2006	20:17	0.75 in.	0	0
Fulton	4/19/2006	20:25	1.00 in.	0	0
Tebbetts	4/19/2006	20:35	0.75 in.	0	0
Holts Summit	4/23/2006	8:45	0.75 in.	0	0
Auxvasse	6/10/2006	16:30	1.00 in.	0	0
Holts Summit	6/10/2006	19:50	0.88 in.	0	0
Jeffrsn City Mem Arpt	6/10/2006	19:50	0.75 in.	0	0

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Figure 3.9.7d**Hailstorm Events in Callaway County 1/01/1960 - 1/31/2010**

General Location	Date	Time	Magnitude (diameter)	Property Damage	Crop Damage
Kingdom City	6/10/2006	21:48	1.75 in.	0	0
Holts Summit	3/1/2007	4:35	1.00 in.	0	0
Fulton	3/1/2007	4:51	1.75 in.	0	0
Mokane	3/1/2007	4:55	1.00 in.	0	0
New Bloomfield	4/3/2007	11:35	0.88 in.	0	0
Fulton	5/25/2008	19:23	1.00 in.	0	0
Stephens	7/27/2008	22:06	1.50 in.	0	0
Fulton	6/17/2009	19:03	1.25 in.	0	0
Mokane	6/17/2009	19:30	0.88 in.	0	0
Fulton	3/10/2010	22:33	0.88 in.	0	0
Fulton	3/10/2010	22:44	1.75 in.	0	0
Fulton	4/4/2010	21:10	1.75 in.	0	0
New Bloomfield	7/18/2010	7:05	1.00 in.	0	0
New Bloomfield	4/19/2011	2:48	1.00 in.	0	0
Holts Summit	4/19/2011	3:05	1.00 in.	0	0
Mc Credie	4/19/2011	3:40	1.75 in.	0	0
Jefferson City Mem	4/19/2011	14:57	0.88 in.	0	0
New Bloomfield	4/19/2011	15:06	0.88 in.	0	0
Mokane	4/19/2011	15:08	1.00 in.	0	0
Fulton	4/19/2011	15:12	1.00 in.	0	0
Williamsburg	4/22/2011	8:24	1.00 in.	0	0
New Bloomfield	4/22/2011	8:25	1.00 in.	0	0
Guthrie	4/22/2011	16:34	0.88 in.	0	0
Fulton Arpt	4/22/2011	16:42	1.00 in.	0	0
Dixie	4/22/2011	16:47	1.50 in.	0	0
Portland	4/22/2011	17:14	1.00 in.	0	0
New Bloomfield	4/23/2011	8:44	0.75 in.	0	0
Williamsburg	5/22/2011	16:16	1.00 in.	0	0
Mokane	5/22/2011	16:50	1.00 in.	0	0
Kingdom City	5/25/2011	13:39	1.00 in.	0	0

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgl.dll?wwevent-storms>

Figure 3.9.7e

Hailstorm Events in Callaway County 1/01/1960 - 1/31/2010

General Location	Date	Time	Magnitude (diameter)	Property Damage	Crop Damage
Boydsville	5/31/2011	6:34	1.25 in.	0	0
New Bloomfield	5/31/2011	6:35	0.75 in.	0	0
Mokane	6/10/2011	14:50	1.00 in.	0	0
Williamsburg	6/10/2011	15:35	1.75 in.	0	0
Fulton Arpt	6/13/2011	6:25	1.75 in.	0	0
New Bloomfield	6/18/2011	20:33	0.88 in.	0	0
Guthrie	6/18/2011	20:40	0.75 in.	0	0
Mokane	7/12/2011	15:30	0.88 in.	0	0
Fulton	3/2/2012	6:11	1.75 in.	0	0
Fulton	4/28/2012	12:18	1.00 in.	0	0
Millersburg	4/28/2012	15:30	1.00 in.	0	0
Fulton	5/31/2013	16:35	1.25 in.	0	0
Fulton Aprt	4/2/2014	6:45	1.25 in.	0	0
Hams Prarie	4/2/2014	7:28	1.00 in.	0	0
Mokane	4/3/2014	2:35	0.88 in.	0	0
Millersburg	4/13/2014	4:44	0.88 in.	0	0
Holts Summit	4/27/2014	17:55	1.00 in.	0	0
New Bloomfield	4/28/2014	11:32	0.75 in.	0	0
Holts Summit	4/28/2014	11:37	1.00 in.	0	0
Fulton	4/28/2014	11:54	1.00 in.	0	0
New Bloomfield	5/10/2014	20:44	1.00 in.	0	0
Williamsburg	5/10/2014	22:05	1.00 in.	0	0
Williamsburg	5/10/2014	22:40	1.5 in.	0	0
New Bloomfield	5/15/2014	12:25	0.75 in.	0	0
New Bloomfield	10/1/2014	16:10	1.00 in.	0	0
MC Credie	4/7/2015	5:05	1.75 in.	0	0
Williamsburg	4/7/2015	5:40	1.75 in.	0	0
Fulton	6/28/2015	16:10	1.00 in.	0	0
Mokane	6/28/2015	16:55	1.25 in.	0	0
New Bloomfield	4/26/2016	10:44	2 in.	0	0
Bryans	5/11/2016	9:35	1.00 in.	0	0
Fulton	5/11/2016	16:45	1.00 in.	0	0
Auxvasse	5/11/2016	16:47	1.00 in.	0	0
Millersburg	5/11/2016	20:29	1.00 in.	0	0
Eastville	3/6/2017	22:42	0.88 in.	0	0
Fulton	3/6/2017	22:51	1.00 in.	0	0
Pitcher	3/29/2017	18:29	1.75 in.	0	0

TOTALS: **156.8K** **0**

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Based on the number of past events that have occurred, the probability of occurrence is 100%. Using the criterion that one event occurred per year from 1970-2017, we can assume the probability that at least one hail event will occur in any given year is 81.4%. The years 1960 to 1970 can be assumed as outliers because an entire decade without hail is improbable based on the historical day from 1970-2017.

Measures of Probability and Severity

Probability: High

Severity: Moderate (property damage is expected to occur with large hail)

Existing Mitigation Strategies

Warning Systems

The following warning systems are used in the Planning Area:

Local television weather reports

Local radio weather reports

9-1-1 call center and emergency mass notification system (SMART-911)

Outdoor warning sirens

Hailstorm Vulnerability

Jurisdictions: All Jurisdictions

Overview

All jurisdictions in Callaway County are vulnerable to the effects of Hailstorms. All above ground structures, infrastructure, and vegetation are vulnerable to the effects of a Hailstorm and all other hazards associated with them (high winds, rain, flooding, flying debris, etc.) Damage from hail is dictated by the size and velocity of the stones and the location where they fall.

Potential Impact on Existing Structures

Previous occurrences of Hail damage, most recently in 2006, dictates that future damage will occur with the same results. Damages to windows, roofs, vehicles, siding, and vegetation are all possible, but would vary greatly in location, amount, and extent.

Potential Impact on Future Development

Because of the random nature of this hazard, potential impacts of this hazard on future development are not quantifiable with the resources available.

3.10 Tornado

Description of Hazard

A tornado is a violently rotating column of air which is usually generated by a supercell thunderstorm. The potential destruction posed by a tornado touching ground is well known.

Tornadoes occur most frequently in late afternoon and early evening, but can occur at any time. Tornadoes can move in any direction, but often move from southwest to northeast. The seasonal, temporal, and spatial uncertainties surrounding thunderstorms and tornadoes make widespread and year round preparedness essential.

The destructive effects of a tornado depend on the strength of the winds, proximity to people and structures, the strength of structures, and/or how well a person is sheltered. The average forward speed of a tornado is about 30 mph, but may vary from nearly stationary to 70 mph. Tornadoes are classified by the Fujita scale, which ranks tornadoes according to wind speed and damage caused (see Figure 3.9.4).

Figure 3.10.1			
The Fujita Scale			
F-Scale Number	Intensity Phrase	Wind Speed (mph)	Type of Damage Done
F0	Gale tornado	40-72	Some damage to chimneys; breaks branches off trees; pushes over shallow-rooted trees; damages sign boards.
F1	Moderate tornado	73-112	The lower limit is the beginning of hurricane wind speed; peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos pushed off the roads; attached garages may be destroyed.
F2	Significant tornado	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars pushed over; large trees snapped or uprooted; light object missiles generated.
F3	Severe tornado	158-206	Roof and some walls torn off well constructed houses; trains overturned; most trees in forest uprooted
F4	Devastating tornado	207-260	Well-constructed houses leveled; structures with weak foundations blown off some distance; cars thrown and large missiles generated.
F5	Incredible tornado	261-318	Strong frame houses lifted off foundations and carried considerable distances to disintegrate; automobile sized missiles fly through the air in excess of 100 meters; trees debarked; steel reinforced concrete structures badly damaged.
F6	Inconceivable tornado	319-379	These winds are very unlikely. The small area of damage they might produce would probably not be recognizable along with the mess produced by F4 and F5 wind that would surround the F6 winds. Missiles, such as cars and refrigerators would do serious secondary damage that could not be directly identified as F6 damage. If this level is ever achieved, evidence for it might only be found in some manner of ground swirl pattern, for it may never be identifiable through engineering studies

Tornadoes tend to dissipate as fast as they form. Unlike a hurricane, which can last for multiple hours, tornadoes are often in one place for no more than a few minutes.

Technological advances such as Doppler radar, computer modeling, and Emergency Warning Systems, have increased the amount of time the general public has to respond to a tornado. Despite these advances, tornadoes can still strike an area with little warning. Often people have no more than a few minutes to get to safety. Being able to quickly get to a safe place is absolutely imperative in order to prevent loss of life.

Geographic Location

The entire planning area is at risk from tornadoes.

While tornadoes can strike anywhere, there is a greater chance of loss of life and destruction of property in population centers. This is especially true of a tornado with a large path.

Previous Occurrences

Callaway County has experienced 34 tornado events between 1950 and 2009, as reported to and officially recorded by NOAA (see Figure 3.9.5a-c). There was one death reported from a tornado during this time (Fulton area, 2001) and five injuries. These tornadoes were also responsible for \$871,000 in reported property damages. Three F2 (“significant”) tornadoes are included in these statistics.

Figure 3.10.2a

Tornado Events in Callaway County 1/01/1950 - 1/01/2017

General Location	Date	Magnitude (Fujita rating)	Death	Injury	Property Damage	Injury/Damage Details
County	9/27/1959	F0	0	0	0	
County	6/30/1960	F1	0	0	25K	
County	6/7/1961	F1	0	0	3K	
County	7/20/1964	F1	0	1	3K	
County	5/23/1966	F1	0	0	25K	
County	5/23/1966	F2	0	0	25K	
County	7/17/1968	F0	0	0	3K	
County	9/7/1970	F1	0	0	3K	
County	11/1/1971	F1	0	0	3K	
County	7/20/1973	F1	0	0	3K	
County	5/12/1980	F2	0	0	25K	
County	5/12/1980	F1	0	0	250K	
County	3/15/1982	F0	0	0	250K	
County	5/15/1990	F0	0	0	0	
County	7/2/1992	F0	0	0	0	
County	9/7/1992	F0	0	0	3K	
County	9/7/1992	F1	0	0	25K	
Holts Summit	4/26/1994	F0	0	0	0	A few trees down.
Fulton area	7/8/1995	F0	0	0	0	A brief touchdown east of Fulton.
Highway 54 corridor between Kingdom City and Fulton	4/13/1998	F1	0	0	50K	4 mobile homes (unoccupied) destroyed and at least 6 others damaged; barn lost roof; storage sheds destroyed.
Central County area	2/25/2000	F0	0	0	0	Trees downed; outbuildings damaged.
Hatton area	2/25/2000	F1	0	0	0	Trees downed; outbuildings destroyed.
North County area	2/29/2000	F0	0	0	0	Barn destroyed; several trees downed or uprooted.

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms>

Figure 3.10.2b

Tornado Events in Callaway County 1/01/1950 - 1/01/2017

General Location	Date	Magnitude (Fujita rating)	Death	Injury	Property Damage	Injury/Damage Details
NW of Kingdom City to W of Auxvasse	2/29/2000	F0	0	0	0	Barn destroyed; several trees either uprooted or snapped off 4 to 5 feet above the ground along the path.
S of Williamsburg	4/20/2000	F1	0	0	50K	Barn and grain silo completely destroyed; three outbuildings severely damaged.
Fulton area	4/10/2001	F1	1	2	75K	Man killed when mobile home was destroyed, wife and son injured; trees snapped off; outbuildings destroyed; unoccupied school bus turned over; roof damaged at warehouse complex; several empty truck trailers pushed over.
Kingdom City	9/19/2005	F0	0	0	0	Damage in a corn field.
Tebbetts area	3/12/2006	F1	0	0	0	Mobile home flipped onto its side on County Road 4010.
Portland	3/12/2006	F0	0	0	0	Tree damage.
Portland area	3/12/2006	F0	0	0	0	Home along Highway 94 damaged; numerous trees were snapped off or uprooted.
NE of Guthrie to S of Fulton	3/13/2006	F2	0	2	0	Tornado track approximately 13 miles in length; tree damage; moderate damage to a home which was moved approximately 25 feet off the foundation; two people injured and hospitalized for several days; roof damage to another home; barn damaged along US Highway 54 with debris thrown onto the highway median; outbuildings damaged.
Shamrock area	6/10/2006	F0	0	0	0	Minor roof damage to home; two machine sheds damaged; several large trees downed; barn completely destroyed.

Source: <http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent~storms>

Figure 3.10.2c Tornado Events in Callaway County 1/01/1950 - 1/01/2017						
General Location	Date	Magnitude (Fujita rating)	Death	Injury	Property Damage	Injury/Damage Details
Stephens area	7/27/2008	F0	0	0	0	Roof and window damage to two homes and three mobile homes (in addition, hail up to ping pong size caused additional roof damage); damage to three vehicles from downed trees and large hail; a medium sized camper tossed by tornado and landed a quarter of a mile north of Stephens; damage to three additional mobile homes and three machine sheds; sheet metal roofing from the machine sheds partially uplifted and a number of windows broken by hail; large barn totally destroyed with the debris field extending over 150 yards.
Mokane	3/10/2010	F1	0	0	0	
Guthrie	6/28/2015	F0	0	0	0	A tornado briefly touched down in a field causing debris to be spotted flying in the air. The debris was dirt/brush and did not damage any structures.
TOTALS:			1	5	871K	
Source: http://www4.ncdc.noaa.gov/cgi-win/wwcgi.dll?wwevent-storms						

Based on the historical events, there is a probability of 43% that a tornado would happen in Callaway County (29 isolated events over a period of 67 years). This number is 29 rather than 34 tornadoes because five tornadoes occurred on the same date. Assuming these were different tornadoes and there were 34 isolated tornadoes over 67 years we can assume that the probability is 50.7%.

The following figures can be explained as follows:

Figure 3.10.3 and Figure 3.10.4 are the historical tornadoes paths and the historical tornado paths with present day structures. Note there are small marks on the map that represent tornado touchdowns that do not necessarily have an extensive path.

Figure 3.10.5 is a map with the Joplin Tornado path transposed to the most populated area of Callaway County, Fulton, and its structures.

Figure 3.10.3

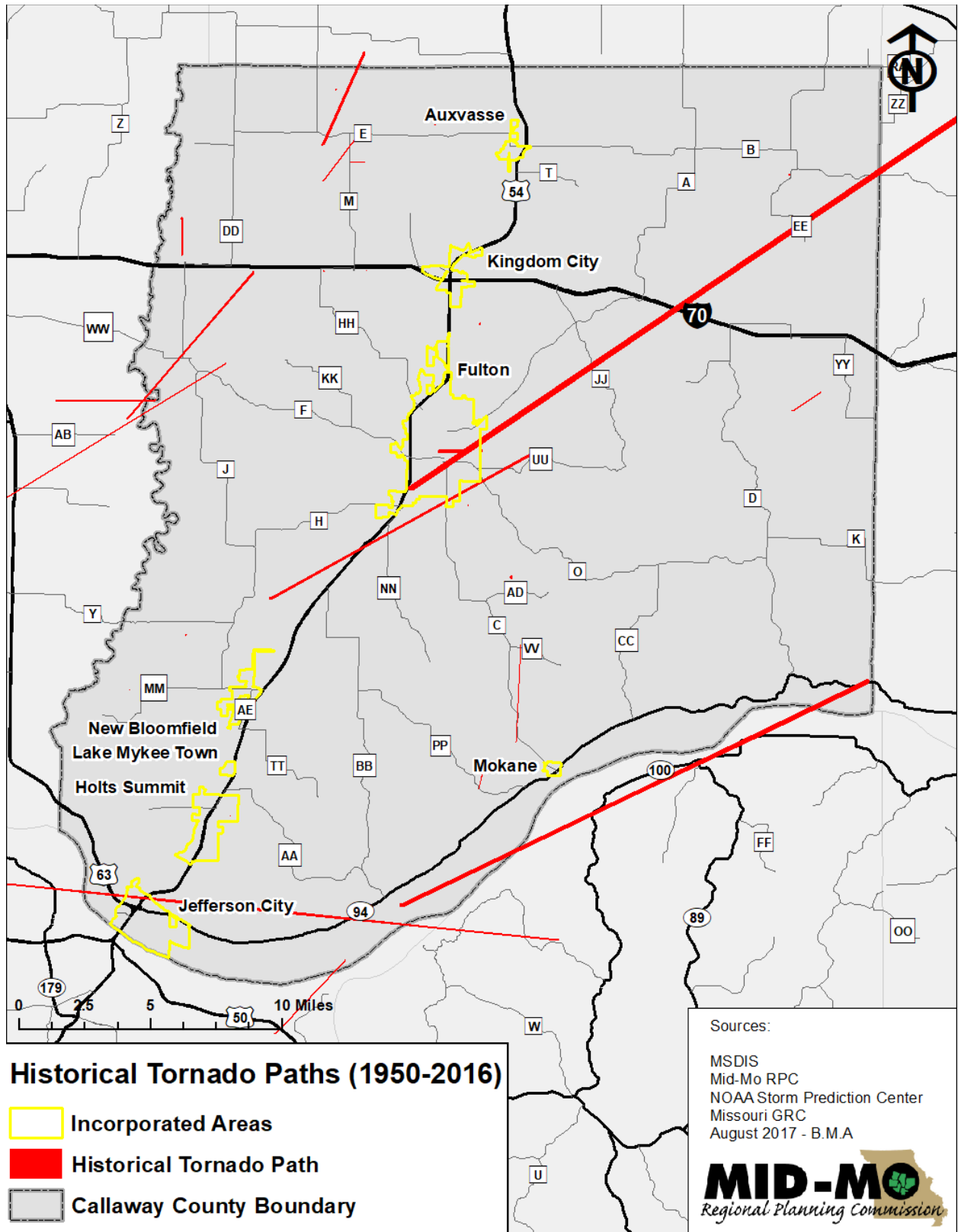


Figure 3.10.4

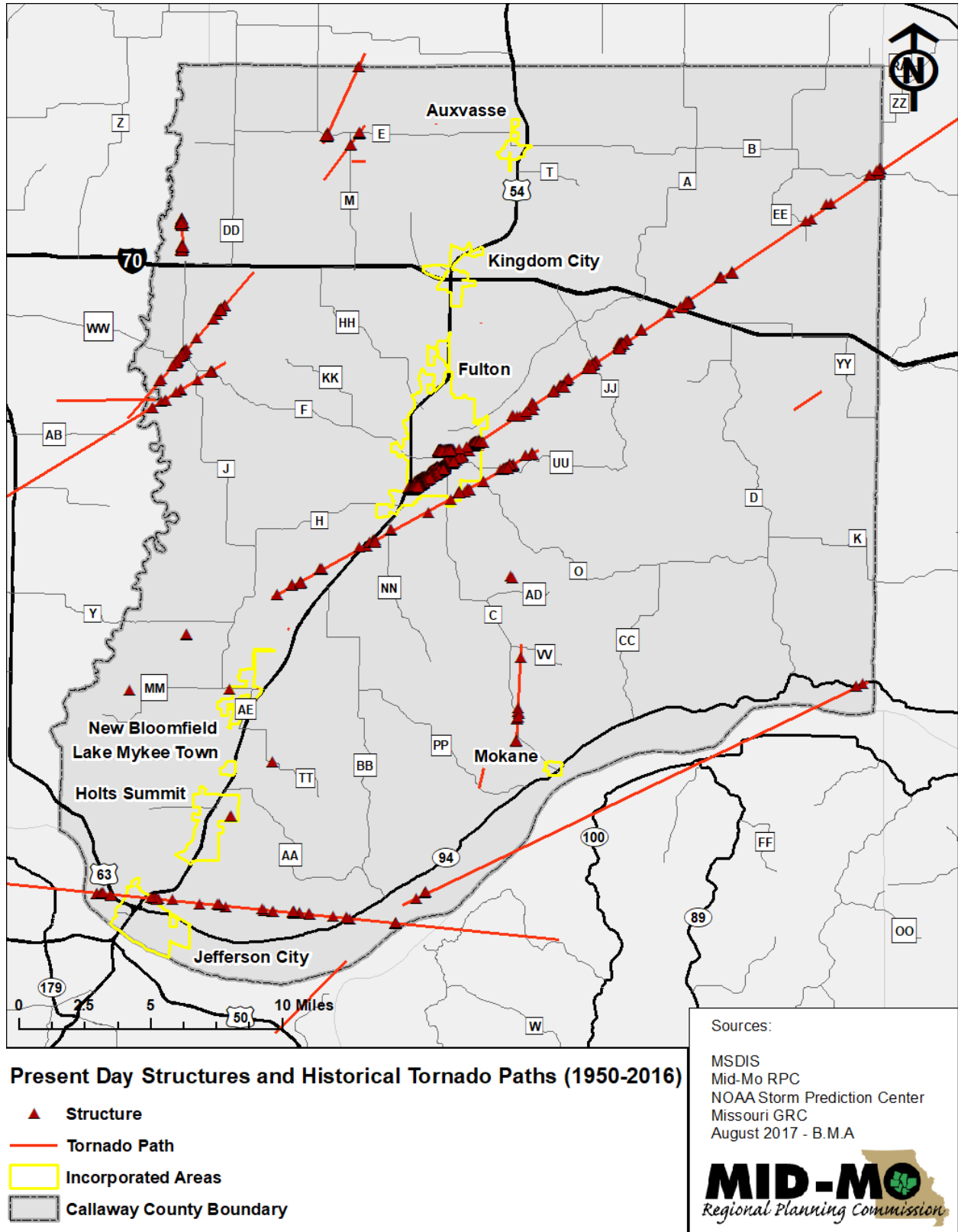
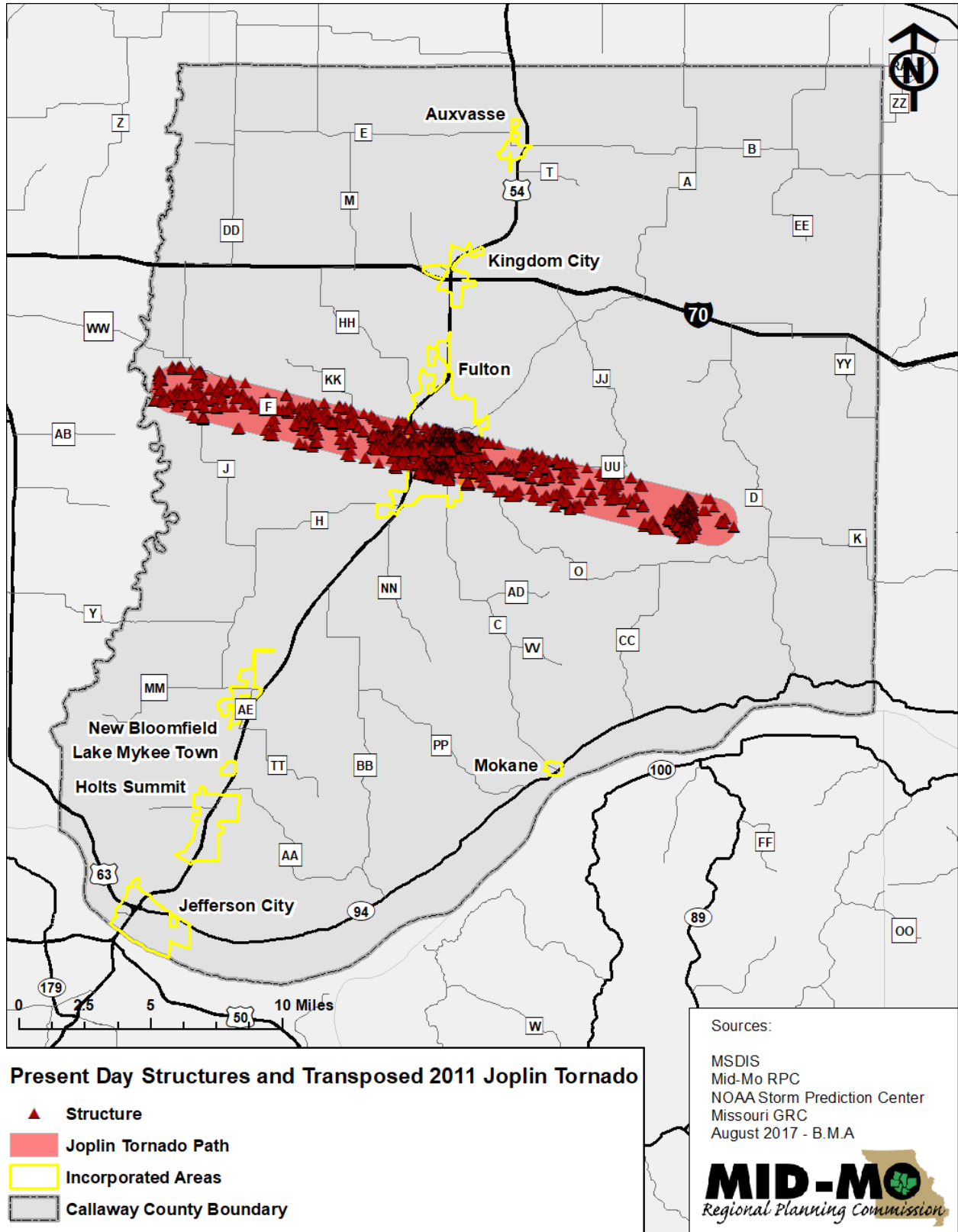


Figure 3.10.5



Measure of Probability and Severity

Probability: High

Severity: High

Existing Mitigation Strategies

Warning Systems

The following warning systems are used in the county:

Local television weather reports

Local radio weather reports

9-1-1 call center and emergency mass notification system

Outdoor warning sirens

Tornado Vulnerability

Jurisdictions: All Jurisdictions

Overview

All jurisdictions in Callaway County are vulnerable to the effects of a Tornado. All above ground structures are vulnerable to the effects of a Tornado and all other hazards associated with them (hail, rain, flooding, flying debris, etc.)

Approximately 800 tornadoes are reported in the United States each year, causing an average of 80 fatalities and 1,500 injuries, according to data from NOAA,

Callaway County has been hit by 30 tornadoes since 1959 with one reported deaths and five injuries. That is not to say that the prevention of just one loss of life shouldn't be a high priority. When compared to other major tornado disasters experienced by other parts of the country the financial impact has been minimal at \$2.8 million since 1966.

Potential Impact on Existing Structures

While past impacts have been minimal, future disasters can cause extensive damage. There is a wide range of impact possible from a tornado and wind speeds affect all structure types differently. Non-permanent and wood framed structures are very vulnerable to destruction from high winds. While high winds are the force behind damage, it is the windblown debris from a tornado that causes the most damage and deaths.

Figure 3.10.5 Estimated exposed structures

Impact Assessment --- Windstorm							
High Vulnerability = 10 - 100% of buildings impacted							
Minimum Calculated Impact (10%)							
Building Type							
Jurisdiction	Residential	Commercial	Industrial	Agricultural	Religious	Governmental	Educational
Planning Area	1677	73	22	17	8	3	3
Callaway County (unincorporated areas)	1048	38	15	15	4	2	1
Auxvasse	49	2	0	0	0	0	0
Fulton	396	25	5	1	3	1	2
Holts Summit	121	6	1	0	1	0	0
Lake Mykee	12	0	0	0	0	0	0
New Bloomfield	26	1	0	0	0	0	0
HAZUS MH							

Section 4: Mitigation Strategy

4.1 Hazard Mitigation Goals

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.

Hazard mitigation goals were developed during the planning process for the original Callaway Hazard Mitigation Plan in 2004. For the current update, the Hazard Mitigation Technical Steering Committee reviewed these goals; language changes were made for clarification while retaining the essential intent of the original goals.

The five county hazard mitigation goals for the Callaway County Hazard Mitigation Plan are:

- Goal 1: Mitigation Planning - Mitigate effects of future natural hazards through public and private cooperation.
- Goal 2: Mitigation Policy - Develop policies that limit the impact of natural hazards on lives and property.
- Goal 3: Mitigation Programs - Implement cost effective and feasible mitigation programs to protect lives and property.
- Goal 4: Public Awareness - Increase public awareness of natural hazards.
- Goal 5: Future Development - Promote hazard-proof development.

4.2 Update of Mitigation Actions

Requirement
§201.6(c)(3)(ii):

[The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

The original Project Steering Committee (2004) was charged with developing a comprehensive range of mitigation actions to promote the agreed upon mitigation goals. Objectives were defined under each goal and mitigation actions were then developed to promote each objective. The following six categories of mitigation were considered in developing the mitigation actions:

- **Prevention tools** - regulatory methods such as planning and zoning, building regulations, open space planning, land development regulations, and storm water management.
- **Property protection measures** - acquisition of land, relocation of buildings, modifying at-risk structures, and flood proofing at-risk structures.
- **Natural resource protection** - erosion and sediment control or wetlands protection.
- **Emergency services measures** – warning systems, response capacity, critical facilities protection, and health and safety maintenance.
- **Structural mitigation** - reservoirs, levees, diversions, channel modifications and storm sewers.
- **Public information** - providing hazard maps and information, outreach programs, real estate disclosure, technical assistance and education.

No mitigation actions were eliminated from consideration when the original plan was written. The plan therefore contained a comprehensive list of mitigation actions which served as a starting point for update discussions.

The Technical Steering Committee for the update (2017) reviewed and discussed all the mitigation actions from the original plan. This was accomplished by analyzing and discussing each hazard and the actions focused on its mitigation. An individual focus on each hazard allowed for a comprehensive view of the hazard and possibilities for its mitigation. This approach was useful in developing appropriate new actions, when deemed important, or removing actions considered completed or unfeasible.

The existing mitigation actions were divided into three categories; the fourth category of new mitigation actions was added.

Descriptions of the four categories are as follows:

- **Completed (C)** – Actions have been completed; these actions have been included in the appropriate “Existing Mitigation Strategies” in Section 3.2 Profiling Hazards.
- **Deleted (D)** – Actions were deemed unrealistic or inappropriate for the jurisdictions involved. In some cases the jurisdiction did not have the legal capability, budget, or staffing to complete these actions.
- **Modified/Retained (M/R)** – Actions have not been completed but were deemed important and appropriate; in some cases, these actions have been edited or combined with other actions for the updated plan. Some actions were viewed as ongoing and thus retained in the update.
- **New** - Actions not included in the original plan but deemed important and appropriate for the updated plan; these were added to the plan.

The actions in each of these categories can be seen in Figures 4.2.1 – 4.2.2. The charts for completed, deleted, and modified/retained actions (Figure 4.2.1); the new actions (Figure 4.2.2)

Figure 4.2.1a

Mitigation Actions Evaluations from Callaway County Hazard Mitigation Plan 2012

Goals, Objectives, and Actions		C	D	M/R	Updated Action # (2017)
Goal #1: Mitigate effects of future natural hazards in the county.					
1.1	Create, Revise, and update Flood Insurance Rate Maps (FIRM)	x		x	1.1
1.2	Continue to encourage cooperative agreements between water providers and fire districts	x		x	1.2
1.3	Identify multiple sources of water in areas currently receiving water from minimal supplies	x		x	1.3
1.4	Have alternate power supplies for fueling emergency vehicles	x		x	1.4
1.5	Develop evacuation procedures for dams and maintain records of EAP's for dam owners where necessary	x		x	1.5
1.6	Review, prioritize, institute, and monitor needed upgrades or retrofits for critical buildings and infrastructure			x	1.6
Goal #2: Ensure continued operation of government and emergency functions in a disaster.					
2.1	Review emergency access/evacuation routes and mitigate any problem areas.	x		x	2.1
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies, and special districts	x		x	2.2
2.3	Review and update school plans on an annual basis to ensure they address all potential threats from natural hazards	x		x	2.3
2.4	Ensure the ability to respond to severe winter weather	x		x	2.4
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available			x	2.5

Figure 4.2.1b

Mitigation Actions Evaluations from Callaway County Hazard Mitigation Plan 2012

Goals, Objectives, and Actions		C	D	M/R	Updated Action #
Goal #3 Protect the County's most valuable assets and vulnerable populations through cost effective and feasible mitigation projects whenever financially possible					
3.1	Construct a training facility for fire and emergency services personnel	x	x		
3.2	Build a tornado safe room as funding is made available			x	3.1
3.3	Upgrade emergency alert system to automatic differentiated tone system		x		
3.4	Provide or coordinate back-up power to all critical infrastructure			x	3.2
3.5	Maintain clearance of vegetation and combustible material from critical infrastructure	x		x	3.3
3.6	Encourage camping facilities and mobile home parks to have safe rooms on premises	x		x	3.4
3.7	Install two-way radios on school buses that meet or exceed FCC standards and allow for monitoring of EOC traffic			x	3.5
3.8	Encourage shelters to have electric transfer switches and standardized plug up for generator	x		x	3.6
Goal #4: Increase the public awareness of natural hazards in the County in order to make the public a partner in hazard mitigation.					
4.1	Develop public education hazard awareness program	x		x	4.1
Goal #5: Promote hazard proof development.					
5.1	Encourage participation in Community Rating System (CRS) and the National Flood Insurance Program (NFIP).	x		x	5.1
5.2	Replace overhead utilities with underground utilities where possible.			x	5.2
5.3	Construct a parking shed for buses to keep busses free from hail, ice, and snow buildup.		x		

4.3 Mitigation Goals and Actions

A comprehensive list of the goals and mitigation actions for the Callaway County Natural Hazard Mitigation Plan (2017) are listed below. The mitigation actions listed are for the entire Planning Area; participating jurisdictions will differ in the specific actions undertaken in their jurisdictions.

Actions which address reducing the effects of hazards on new and/or existing buildings and infrastructure are indicated as such with an **N** (New), **E** (Existing), or **B** (Both).

1. Mitigation Planning - Mitigate effects of future natural hazards through public and private cooperation.

- 1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements **B**
- 1.2 Continue to encourage cooperative agreements between water providers and fire districts **B**
- 1.3 Identify multiple sources of water in areas currently receiving water from minimal supplies **B**
- 1.4 Have alternate power supplies for fueling emergency vehicles **B**
- 1.5 Develop evacuation procedures for dams and maintain records of EAP's for dam owners where necessary **B**
- 1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure **E**
- 1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans **B**
- 1.8 Continue to promote annual hazard drill participation throughout the county **B**
- 1.9 Include private businesses in county and city disaster response planning **B**
- 1.10 Publicize and grow the voluntary SMART-911 list with a particular emphasis on vulnerable populations **B**
- 1.11 Increase awareness of available county generators **B**
- 1.12 Work to reduce the number of Severe Repetitive Loss Properties through available FEMA resources **E**

2. Mitigation Policy - Develop policies that limit the impact of natural hazards on lives and property.

- 2.1 Review emergency access/evacuation routes and mitigate any problem areas **B**
- 2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts **B**
- 2.3 Review and update school plans on an annual basis to ensure they address all potential threats from natural hazards **B**
- 2.4 Ensure the ability to respond to severe winter weather **B**
- 2.5 Continue to encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available **B**
- 2.6 Revisit shelter agreements annually with the Red Cross to ensure the list is accurate, up to date, and accessible in need **B**
- 2.7 Establish heating and cooling centers in areas without existing heating and/or cooling centers **B**
- 2.8 Continue to maintain lines of communication between Missouri Department of Transportation, Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather **B**

3. Mitigation Programs - Implement cost effective and feasible mitigation programs to protect lives and property.

- 3.1 Build a Tornado safe room as funding is made available **N**
- 3.2 Provide or coordinate back-up power to all critical infrastructure **B**
- 3.3 Maintain clearance of vegetation and combustible material from critical infrastructure **B**
- 3.4 Encourage camping facilities and mobile home parks to have safe rooms on premises **B**
- 3.5 Equip all school buses with mobile battery chargers for cellular devices **B**
- 3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator **B**
- 3.7 Continue annual dam visits for unregulated and regulated dams with Callaway EMA and Missouri Department of Natural Resources **B**
- 3.8 Continue to trim trees and branches away from power lines and infrastructure as needed **B**
- 3.9 Work with MODOT to post safe driving signage on Highway 54 **B**
- 3.10 Install tornado warning sirens **B**

4. Public Awareness - Increase public awareness of natural hazards.

- 4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices **B**

5. Future Development - Promote hazard-proof development.

- 5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP) **B**
- 5.2 Replace overhead utilities with underground utilities where possible **B**

Organization of Mitigation Action Information

In order to make the information on mitigation actions easily accessible in this plan, the actions have been organized in four ways.

Overview of Mitigation Actions including Hazards and Jurisdictions (Figure 4.3.1a-d)

The comprehensive list of goals and mitigation actions is shown in charts along with the hazards addressed and applicable jurisdictions.

Mitigation Actions by Participating Jurisdiction (Section 4.3.2a-k)

The mitigation actions are listed by participating jurisdiction. The following abbreviations have been used for hazards in these charts:

- DF – Dam Failure
- DR – Drought
- EQ – Earthquake
- HT – Extreme Heat
- FL – Flood
- SK – Land Subsidence/Sinkhole
- LEV – Levee Failure
- SWW – Severe Winter Weather
- WF - Wildfire
- WND – Windstorm
- HST – Hailstorm
- TRN – Tornado

Mitigation Actions Addressing Compliance with NFIP Requirements (Figure 4.3.3)

The NFIP participation statuses of jurisdictions are shown, as well as actions that address NFIP compliance.

Individual Actions Administration, Implementation, and Prioritization (Section 4.4)

Finally, the mitigation actions are listed individually with plans for Prioritization, Implementation, and Administration (Section 4.4).

Figure 4.3.1a Overview of Mitigation Goals and Actions including Hazards and Jurisdictions																									
Action #	Goals and Actions	Callaway County	Auxvasse	Fulton	Holts Summit	Kingdom City	Mokane	New Bloomfield	Callaway Co. PWS# #1	Callaway Co. PWS# #2	Fulton Public Schools	New Bloomfield R-III	North Callaway R-I	South Callaway R-II	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Levee Failure	Severe Winter Weather	Wildfire	Windstorm	Hailstorm	Tornado
Goal 1: Mitigation Planning - Mitigate effects of future natural hazards through public and private cooperation.																									
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements	X		X	X	X	X												X	X					
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X	X	X	X	X	X	X	X					X	X		X				X			
1.3	Identify multiple sources of water in areas currently receiving water from minimal supplies	X		X		X		X	X	X						X		X				X			
1.4	Have alternate power supplies for fueling emergency vehicles	X	X	X	X	X	X	X									X	X	X		X	X	X		X
1.5	Develop evacuation procedures for dams and maintain records of EAP's for dam owners where necessary	X													X										
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans	X	X	X	X	X	X	X							X		X		X		X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county	X	X	X	X	X	X	X			X	X	X	X			X					X			X

Figure 4.3.1b Overview of Mitigation Goals and Actions including Hazards and Jurisdictions																									
Action #	Goals and Actions	Callaway County	Auxvasse	Fulton	Holts Summit	Kingdom City	Mokane	New Bloomfield	Callaway Co. PWS# #1	Callaway Co. PWS# #2	Fulton Public Schools	New Bloomfield R-III	North Callaway R-I	South Callaway R-II	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Levee Failure	Severe Winter Weather	Wildfire	Windstorm	Hailstorm	Tornado
1.9	Include private businesses in county and city disaster response planning	X	X	X	X	X	X	X							X		X		X		X	X			X
1.10	Publicize and grow the voluntary SMART-911 list with a particular emphasis on vulnerable populations	X													X		X	X	X	X	X	X	X	X	X
1.11	Increase awareness of available county generators	X															X		X		X	X			X
1.12	Work to reduce the number of Severe Repetitive Loss Properties through available FEMA resources	X																	X						
Goal 2: Mitigation Policy – Develop policies that limit the impact of natural hazards on lives and property.																									
2.1	Review emergency access /evacuation routes and mitigate any problem areas.	X	X	X	X	X	X	X	X	X	X	X	X	X			X		X		X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	X									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2.4	Ensure the ability to respond to severe winter weather	X									X	X	X	X							X				

Figure 4.3.1c Overview of Mitigation Goals and Actions including Hazards and Jurisdictions																									
Action #	Goals and Actions	Callaway County	Auxvasse	Fulton	Holts Summit	Kingdom City	Mokane	New Bloomfield	Callaway Co. PWS# #1	Callaway Co. PWS# #2	Fulton Public Schools	New Bloomfield R-III	North Callaway R-I	South Callaway R-II	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Levee Failure	Severe Winter Weather	Wildfire	Windstorm	Hailstorm	Tornado
2.5	Continue to encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available	X	X	X	X	X	X	X									X		X	X	X	X	X	X	X
2.6	Revisit shelter agreements annually with the Red Cross to ensure the list is accurate, up to date, and accessible in need	X															X		X		X	X			X
2.7	Establish heating and cooling centers in areas without existing heating and/or cooling centers	X					X											X			X				
2.8	Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather	X									X	X	X	X					X		X		X	X	X
Goal 3: Mitigation Programs - Implement cost effective and feasible mitigation programs to protect lives and property.																									
3.1	Build a Tornado safe room as funding is made available	X	X	X	X	X	X	X			X	X	X	X											X

Figure 4.3.1d Overview of Mitigation Goals and Actions including Hazards and Jurisdictions																									
Action #	Goals and Actions	Callaway County	Auxvasse	Fulton	Holts Summit	Kingdom City	Mokane	New Bloomfield	Callaway Co. PWS#1	Callaway Co. PWS#2	Fulton Public Schools	New Bloomfield R-III	North Callaway R-I	South Callaway R-II	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Levee Failure	Severe Winter Weather	Wildfire	Windstorm	Hailstorm	Tornado
3.2	Provide or coordinate back-up power to all critical infrastructure	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X			X	X	X		X
3.4	Encourage camping facilities and mobile home parks to have safe rooms on premises	X															X					X	X	X	X
3.5	Equip all school buses with mobile battery chargers for cellular devices	X									X	X	X	X	X		X	X	X		X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator	X	X	X	X	X	X	X	X	X							X	X			X				X
3.7	Continue annual dam visits for unregulated and regulated dams with Callaway EMA and Missouri Department of Natural Resources (DNR)	X													X										
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed	X	X	X	X	X	X	X	X	X	X	X	X	X							X		X	X	

Figure 4.3.1e Overview of Mitigation Goals and Actions including Hazards and Jurisdictions																									
Action #	Goals and Actions	Callaway County	Auxvasse	Fulton	Holts Summit	Kingdom City	Mokane	New Bloomfield	Callaway Co. PWS #1	Callaway Co. PWS #2	Fulton Public Schools	New Bloomfield R-II	North Callaway R-I	South Callaway R-II	Dam Failure	Drought	Earthquake	Extreme Heat	Flood	Levee Failure	Severe Winter Weather	Wildfire	Windstorm	Hailstorm	Tornado
3.9	Work with MODOT to post safe driving signage on Highway 54	X																			X				
3.10	Install tornado warning sirens	X					X	X																	X
Goal 4: Public Awareness - Increase public awareness of natural hazards.																									
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Goal 5: Future Development - Promote hazard-proof development.																									
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).	X		X	X	X	X												X	X					
5.2	Replace overhead utilities with underground utilities where possible.	X		X							X	X	X	X							X	X	X	X	X

Figure 4.3.2a CALLAWAY COUNTY Overview of Mitigation Actions		Hazard										
		DF	DR	EQ	EH	FL	LEV	SWW	WF	WND	HST	TRN
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements					X	X					
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X		X				X			
1.3	Identify multiple sources of water in areas currently receiving water from minimal supplies		X		X				X			
1.4	Have alternate power supplies for fueling emergency vehicles			X	X	X		X	X	X		X
1.5	Develop evacuation procedures for dams and maintain records of EAP's for dam owners where necessary	X										
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X	X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans	X		X		X		X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county			X					X			X
1.9	Include private businesses in county and city disaster response planning	X		X		X		X	X			X
1.10	Publicize and grow the voluntary SMART-911 list with a particular emphasis on vulnerable populations	X		X	X	X	X	X	X	X	X	X
1.11	Increase awareness of available county generators			X		X		X	X			X
1.12	Work to reduce the number of Severe Repetitive Loss Properties through available FEMA resources					X						
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X		X		X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X	X	X	X	X
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	X	X	X	X	X	X	X	X	X	X	X
2.4	Ensure the ability to respond to severe winter weather							X				
2.5	Continue to encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available			X		X	X	X	X	X	X	X
2.6	Revisit shelter agreements annually with the Red Cross to ensure the list is accurate, up to date, and accessible in need			X		X		X	X			X

2.7	Establish heating and cooling centers in areas without existing heating and/or cooling centers				X			X				
2.8	Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather					X		X		X	X	X
3.1	Build a tornado safe room as funding is made available											X
3.2	Provide or coordinate back-up power to all critical infrastructure			X	X			X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X				X	X	X		X
3.4	Encourage camping facilities and mobile home parks to have safe rooms on premises			X					X	X		X
3.5	Equip all school buses with mobile battery chargers for cellular devices	X		X	X	X		X	X	X		X
3.6	Encourage shelters to have electric transfer switches and standardized plug up for generator			X				X				
3.7	Continue annual dam visits for unregulated and regulated dams with Callaway EMA and Missouri Department of Natural Resources (DNR)	X										
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed							X		X	X	
3.9	Work with MODOT to post safe driving signage on Highway 54							X				
3.10	Install tornado warning sirens											X
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).					X	X					
5.2	Replace overhead utilities with underground utilities where possible.								X	X	X	X

Figure 4.3.2b AUXVASSE Overview of Mitigation Actions		Hazard								
		DR	EQ	EH	FL	SWW	WF	WND	HST	TRN
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X		X			X			
1.4	Have alternate power supplies for fueling emergency vehicles		X	X	X	X	X	X		X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans		X		X	X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county		X				X			X
1.9	Include private businesses in county and city disaster response planning		X		X	X	X			
2.1	Review emergency access /evacuation routes and mitigate any problem areas.		X		X	X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X	X	X
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available		X		X	X	X	X	X	X
3.1	Build a Tornado safe room as funding is made available									X
3.2	Provide or coordinate back-up power to all critical infrastructure		X	X		X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure		X			X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator		X			X				
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed					X		X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X	X	X

Figure 4.3.2c FULTON Overview of Mitigation Actions		Hazard									
		DF	DR	EQ	EH	FL	SWW	WF	WND	HST	TRN
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements					X					
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X		X			X			
1.4	Have alternate power supplies for fueling emergency vehicles			X	X	X	X	X	X		X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans			X		X	X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county			X				X			X
1.9	Include private businesses in county and city disaster response planning	X		X		X	X	X			X
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X		X	X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X	X	X	X
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available			X		X	X	X	X	X	X
3.1	Build a Tornado safe room as funding is made available										X
3.2	Provide or coordinate back-up power to all critical infrastructure			X	X		X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X			X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator			X			X				
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed						X		X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).					X					
5.2	Replace overhead utilities with underground utilities where possible.						X	X	X	X	X

Figure 4.3.2d HOLTS SUMMIT Overview of Mitigation Actions		Hazard									
		DF	DR	EQ	EH	FL	SWW	WF	WND	HST	TRN
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements					X					
1.4	Have alternate power supplies for fueling emergency vehicles			X	X	X	X	X	X		X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans	X		X		X	X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county			X				X			X
1.9	Include private businesses in county and city disaster response planning			X		X	X	X			
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X		X	X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X	X	X	X
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available			X		X	X	X	X	X	X
3.1	Build a Tornado safe room as funding is made available										X
3.2	Provide or coordinate back-up power to all critical infrastructure			X	X		X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X			X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator			X			X				
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed						X		X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).					X					

Figure 4.3.2e KINGDOM CITY Overview of Mitigation Actions		Hazard									
		DF	DR	EQ	EH	FL	SWW	WF	WND	HST	TRN
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements					X					
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X		X			X			
1.3	Identify multiple sources of water in areas currently receiving water from minimal supplies		X		X			X			
1.4	Have alternate power supplies for fueling emergency vehicles			X	X		X	X	X		X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X		X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans	X		X		X	X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county			X				X			X
1.9	Include private businesses in county and city disaster response planning			X		X	X	X			
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X			X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X		X	X	X	X	X
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available			X			X	X	X	X	X
3.1	Build a Tornado safe room as funding is made available										X
3.2	Provide or coordinate back-up power to all critical infrastructure			X	X		X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X			X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator			X			X				
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed						X		X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X		X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).					X					

Figure 4.3.2f MOKANE Overview of Mitigation Actions		Hazard									
		DF	DR	EQ	EH	FL	SWW	WF	WND	HST	TRN
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements					X					
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X		X			X			
1.4	Have alternate power supplies for fueling emergency vehicles			X	X		X	X	X		X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X		X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans	X		X		X	X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county			X				X			X
1.9	Include private businesses in county and city disaster response planning			X		X	X	X			
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X			X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X		X	X	X	X	X
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available			X			X	X	X	X	X
3.1	Build a Tornado safe room as funding is made available										X
3.2	Provide or coordinate back-up power to all critical infrastructure			X	X		X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X			X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator			X			X				
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed						X		X	X	
3.10	Install tornado warning sirens										X
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X		X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).					X					

Figure 4.3.2 g NEW BLOOMFIELD Overview of Mitigation Actions		Hazard								
		DR	EQ	EH	FL	SWW	WF	WND	HST	TRN
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements				X					
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X		X			X			
1.3	Continue to encourage cooperative agreements between water providers and fire districts	X		X			X			
1.4	Have alternate power supplies for fueling emergency vehicles		X	X	X	X	X	X		X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X	X	X	X
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans		X		X	X	X			X
1.8	Continue to promote annual hazard drill participation throughout the county		X				X			X
1.9	Include private businesses in county and city disaster response planning		X		X	X	X			
2.1	Review emergency access /evacuation routes and mitigate any problem areas.		X		X	X	X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X	X	X
2.5	Establish formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available		X		X	X	X	X	X	X
3.1	Build a Tornado safe room as funding is made available									X
3.2	Provide or coordinate back-up power to all critical infrastructure		X	X		X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure		X			X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator		X			X				
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed					X		X	X	
3.10	Install tornado warning sirens									X
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).				X					

Figure 4.3.2 h CALLAWAY CO. PUBLIC WATER SUPPLY DISTRICT NO. 1 Overview of Mitigation Actions for		Hazard							
		DF	DR	EQ	SWW	WF	WND	HST	TRN
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X			X			
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X		X	X		X	X	X
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X	X				
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X		X	X		X	X	X
3.2	Provide or coordinate back-up power to all critical infrastructure		X	X	X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X	X				
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator				X		X	X	
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed								X
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X		X	X		X	X	X

Figure 4.3.2 i CALLAWAY CO. PUBLIC WATER SUPPLY DISTRICT NO. 2 Overview of Mitigation Actions for		Hazard							
		DF	DR	EQ	SWW	WF	WND	HST	TRN
1.2	Continue to encourage cooperative agreements between water providers and fire districts	X	X			X			
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X		X	X		X	X	X
2.1	Review emergency access /evacuation routes and mitigate any problem areas.			X	X				
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X		X	X		X	X	X
3.2	Provide or coordinate back-up power to all critical infrastructure		X	X	X		X		X
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure			X	X	X	X		X
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator			X	X				X
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed								
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X		X	X		X	X	X

Figure 4.3.2 j FULTON PUBLIC SCHOOLS Overview of Mitigation Actions		Hazard					
		EQ	EH	SWW	WND	HST	TRN
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X
1.8	Continue to promote annual hazard drill participation throughout the county						
2.1	Review emergency access /evacuation routes and mitigate any problem areas.	X		X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	X	X	X	X	X	X
2.4	Ensure the ability to respond to severe winter weather			X			
2.8	Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather			X			
3.1	Build a Tornado safe room as funding is made available						X
3.2	Provide or coordinate back-up power to all critical infrastructure	X	X	X	X		X
3.5	Equip all school buses with mobile battery chargers for cellular devices	X	X	X	X		X
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed						
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X
5.2	Replace overhead utilities with underground utilities where possible.			X	X	X	X

Figure 4.3.2 k NEW BLOOMFIELD R-III SCHOOL DISTRICT Overview of Mitigation Actions		Hazard					
		EQ	EH	SWW	WND	HST	TRN
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X
1.8	Continue to promote annual hazard drill participation throughout the county	X					X
2.1	Review emergency access /evacuation routes and mitigate any problem areas.	X		X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	X	X	X	X	X	X
2.4	Ensure the ability to respond to severe winter weather			X			
2.8	Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather			X	X	X	X
3.1	Build a Tornado safe room as funding is made available						X
3.2	Provide or coordinate back-up power to all critical infrastructure	X	X	X	X		X
3.5	Equip all school buses with mobile battery chargers for cellular devices	X	X	X	X		X
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed			X	X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X
5.2	Replace overhead utilities with underground utilities where possible.			X	X	X	X

Figure 4.3.2 I NORTH CALLAWAY R-I SCHOOL DISTRICT Overview of Mitigation Actions		Hazard					
		EQ	EH	SWW	WND	HST	TRN
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X
1.8	Continue to promote annual hazard drill participation throughout the county	X					X
2.1	Review emergency access /evacuation routes and mitigate any problem areas.	X		X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	X	X	X	X	X	X
2.4	Ensure the ability to respond to severe winter weather			X			
2.8	Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather			X			
3.1	Build a Tornado safe room as funding is made available						X
3.2	Provide or coordinate back-up power to all critical infrastructure	X	X	X	X		X
3.5	Equip all school buses with mobile battery chargers for cellular devices	X	X	X	X		X
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed			X	X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X
5.2	Replace overhead utilities with underground utilities where possible.			X	X	X	X

Figure 4.3.2 m SOUTH CALLAWAY R-II SCHOOL DISTRICT Overview of Mitigation Actions		Hazard					
		EQ	EH	SWW	WND	HST	TRN
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X
1.8	Continue to promote annual hazard drill participation throughout the county	X					X
2.1	Review emergency access /evacuation routes and mitigate any problem areas.	X		X			
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	X	X	X	X	X	X
2.4	Ensure the ability to respond to severe winter weather			X			
2.8	Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather			X	X	X	X
3.1	Build a Tornado safe room as funding is made available						X
3.2	Provide or coordinate back-up power to all critical infrastructure	X	X	X	X		X
3.5	Install two-way radios on school busses that meet or exceed FCC standards and allow for monitoring of EOC traffic	X	X	X	X		X
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed			X	X	X	
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X
5.2	Replace overhead utilities with underground utilities where possible.			X	X	X	X

Mitigation Actions Addressing Compliance with NFIP Requirements

Requirement §201.6(c)(3)(ii): *[The mitigation strategy] must also address the jurisdiction’s participation in the National Flood Insurance program (NFIP), and continued compliance with NFIP requirements, as appropriate.*

Details of NFIP participation and flood mapping have been included in the Flood Profile in Section 3.5. The NFIP participation status of each jurisdiction is shown again in Figure 4.3.3, along with the reasons that jurisdictions are not participating.

Figure 4.3.3	
Jurisdictions Participating in NFIP	
Callaway County	
Fulton	
Holts Summit	
Mokane	
Jurisdictions Not Participating in NFIP	
Auxvasse	There is no portion of the community in the 100 yr. floodplain. The city does see NFIP as a priority at this time.
Kingdom City	There is no portion of the community in the 100 yr. floodplain. They do not currently see NFIP as a priority.
New Bloomfield	The city has only a small sliver of 100 year floodplain within the city limits. They do not currently see the program as a current priority.
Source: Community Surveys	

The participating jurisdictions of Callaway County, Fulton, Holts Summit, and Mokane participate in the NFIP. The following mitigation actions pertain to continued compliance with the NFIP; the participating jurisdiction to which each action applies is listed after the action. While Auxvasse, Kingdom City, and New Bloomfield are not participants in NFIP, they do list flood as a hazard in their communities and are also included in the figure.

Figure 4.3.3		Callaway Co.	Auxvasse	Fulton	Holts Summit	Kingdom City	Mokane	New Bloomfield
Mitigation Actions Addressing Compliance with NFIP Requirements								
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements	X	X	X	X	X	X	X
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.	X	X	X	X	X	X	X
1.12	Work to reduce the number of Severe Repetitive Loss Properties through available FEMA resources	X						
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.	X	X	X	X	X	X	X
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices.	X	X	X	X	X	X	X
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).	X	X	X	X	X	X	X

4.4 Prioritization, Implementation, and Administration

<p>Requirement §201.6(c)(3)(iii):</p>	<p><i>[The mitigation strategy section shall include] an action plan describing how the actions identified in section (c) (3) (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 benefit review of the proposed projects and their associated costs.</i></p>
<p>Requirement §201.6(c)(3)(iv):</p>	<p><i>For multi-jurisdictional plans, there must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.</i></p>

Prioritization of Actions using STAPLEE and Benefit/Cost Reviews

After the comprehensive list of mitigation actions for the entire Planning Area had been developed, the Technical Steering Committee carried out a STAPLEE review and Benefit/Cost review on the actions. The following guidelines were used:

STAPLEE Review

The questions below were used as starting points for evaluating each action according to the STAPLEE criteria. Scoring:

- 3 = Definitely YES**
- 2 = Maybe YES**
- 1 = Probably NO**
- 0 = Definitely NO**

- **Social:** Is the action socially acceptable to the community?
- **Technical:** Will the proposed strategy work? Will the action independently solve the problem?
- **Administrative:** Is there someone to coordinate and lead the effort?
- **Political:** Is the action politically acceptable? Is there public support both to implement and to maintain the project?
- **Legal:** Is there legal authority to implement the action?
- **Economic:** Will the action benefit the area economically? Does the cost seem reasonable for the size of the problem and the likely benefits?
- **Environmental:** Is the action consistent with local, state, and federal environmental laws and regulations? Will the project have a positive impact on the environment? Will historic structures be saved or protected?

Benefit/Cost Review

Benefit

Two (2) points were added for each of the following *avoided* damages (8 points maximum = highest benefit)

- Injuries and/or casualties
- Property damages
- Loss-of-function/displacement impacts
- Emergency management costs/community costs

Cost

Points were subtracted according to the following cost scale (-5 points maximum = highest cost)

- (-1) = Minimal – little cost to the jurisdiction involved
- (-3) = Moderate – definite cost involved but could likely be worked into operating budget
- (-5) = Significant – cost above and beyond most operating budgets; would require extra appropriations to finance or to meet matching funds for a grant

Total Score

The scores for the STAPLEE Review and Benefit/Cost Review were added to determine a Total Score for each action.

Priority Scale

To achieve an understanding of how a Total Score might be translated into a Priority Rating, a sample matrix was filled out for the possible range of ratings an action might receive on both the STAPLEE and Benefit/Cost Review (see Figure 4.4.1). The possible ratings tested ranged between:

- A hypothetical action with “Half probably NO and half maybe YES” answers on STAPLEE (i.e. poor STAPLEE score) and Low Benefit/High Cost: Total Score = 7
- A hypothetical action with “All definitely YES” on STAPLEE and High Benefit/Little Cost: Total Score = 28

Figure 4.4.1

Range of Ratings - STAPLEE and Benefit/Cost	3=Def YES 2=Maybe YES							1=Prob NO 0=Def NO		STAPLEE Total	Benefit	Cost	B/C Total	TOTAL	PRIORITY
	S	T	A	P	L	E	E								
Half prob NO, half maybe YES on STAPLEE, Low Benefit, High cost	1	2	1	2	1	2	1	10	2	-5	-3	7	L		
Half prob NO, half maybe YES on STAPLEE, Mod Benefit, Mod cost	1	2	1	2	1	2	1	10	5	-3	2	12	L		
Half prob NO, half maybe YES on STAPLEE, High Benefit, Little cost	1	2	1	2	1	2	1	10	8	-1	7	17	M		
All maybe YES on STAPLEE, Low Benefit, High cost	2	2	2	2	2	2	2	14	2	-5	-3	11	L		
All maybe YES on STAPLEE, Moderate Benefit, Moderate cost	2	2	2	2	2	2	2	14	5	-3	2	16	M		
All maybe YES on STAPLEE, High Benefit, Little cost	2	2	2	2	2	2	2	14	8	-1	7	21	H		
Half maybe YES, half def YES on STAPLEE, Low Benefit, High cost	2	3	2	3	2	3	2	17	2	-5	-3	14	M		
Half maybe YES, half def YES on STAPLEE, Mod Benefit, Mod cost	2	3	2	3	2	3	2	17	5	-3	2	19	M		
Half maybe YES, half def YES on STAPLEE, High Benefit, Little cost	2	3	2	3	2	3	2	17	8	-1	7	24	H		
All def YES on STAPLEE, Low Benefit, High cost	3	3	3	3	3	3	3	21	2	-5	-3	18	M		
All def YES on STAPLEE, Moderate Benefit, Moderate cost	3	3	3	3	3	3	3	21	5	-3	2	23	H		
All def YES on STAPLEE, High Benefit, Little cost	3	3	3	3	3	3	3	21	8	-1	7	28	H		

An inspection of the possible scores within this range led to the development of the following Priority Scale based on the Total Score in the STAPLEE-Benefit/Cost Review process:

- 20-28 points = High Priority
- 14-19 points = Medium Priority
- 13 points and below = Low Priority

The results of the STAPLEE Review, Benefit/Cost Review, and Final Priority for each of the mitigation actions are shown in Figures 4.4.1a and 4.4.1b. It should be noted that most of the actions attained a high priority rating; this is reflective of the fact that many actions which would have scored poorly on the STAPLEE review were deleted for the update during the initial discussion/review of the actions in the original plan (see Section 4.2). Also, many of the actions are ongoing and already in place but remain high priorities of the jurisdictions.

Figure 4.4.1 Overview of Prioritization of Actions		S	T	A	P	L	E	E	STAPLEE Total	Benefit	Cost	B/C Total	Total
1.1	Continue to enforce floodplain management ordinances in compliance with NFIP requirements	3	2	2	2	3	2	3	17	8	-5	3	20
1.2	Continue to encourage cooperative agreements between water providers and fire districts	3	2	2	2	1	2	3	15	8	-5	3	18
1.3	Identify multiple sources of water in areas currently receiving water from minimal supplies	2	1	3	3	1	3	3	16	8	-1	7	23
1.4	Have alternate power supplies for fueling emergency vehicles	3	2	3	3	3	2	2	18	4	-1	3	21
1.5	Develop evacuation procedures for dams and maintain records of EAP's for dam owners where necessary	3	2	3	3	2	3	3	19	8	-1	7	26
1.6	Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure	3	2	2	2	3	2	1	15	8	-3	5	20
1.7	Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans	3	2	2	3	3	3	3	19	8	-1	7	26
1.8	Continue to promote annual hazard drill participation throughout the county	3	2	2	3	3	3	3	19	6	-1	5	24
1.9	Include private business in county and city disaster response planning to ensure public places are all disaster ready	3	2	3	3	3	3	3	20	8	-5	3	23
1.10	Publicize and grow the voluntary SMART-911 list with a particular emphasis on vulnerable populations, facilities and promote RAVE Alert	3	3	3	3	3	3	2	20	8	-1	7	27
1.11	Increase awareness of available county generators	3	3	3	3	3	3	2	20	8	-1	7	27
1.12	Work to reduce the number of Severe Repetitive Loss Properties through available FEMA resources	2	3	3	3	2	3	3	19	4	-5	-1	18
2.1	Review emergency access /evacuation routes and mitigate any problem areas	3	2	3	3	3	1	2	17	6	-1	5	22
2.2	Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts	3	3	3	3	3	2	1	18	8	-1	7	25
2.3	Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards	3	3	3	3	3	1	2	18	8	-1	7	25
2.4	Ensure the ability to respond to severe winter weather	3	2	3	3	3	2	3	19	8	-3	5	24
2.5	Continue to encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available	3	3	3	3	3	2	2	19	6	-5	1	20
2.6	Revisit shelter agreements annually with the Red Cross to ensure the list is accurate, up to date, and accessible in need	3	2	3	3	3	2	1	17	8	-3	5	22
2.7	Establish heating and cooling centers in areas without existing heating and/or cooling centers	3	3	3	3	3	3	2	20	6	-1	5	25

2.8	Continue to maintain lines of communication between Missouri Department of Transportation, Callaway Road and Bridge, and schools regarding road conditions and clearance before and during inclement weather	3	3	3	3	3	3	3	21	8	-1	7	28
3.1	Build a Tornado safe room as funding if made available	3	3	3	3	3	3	3	21	4	-5	-1	20
3.2	Provide or coordinate back-up power to all critical infrastructure	3	2	3	3	3	2	2	18	8	-5	3	21
3.3	Maintain clearance of vegetation and combustible material from critical infrastructure	3	3	2	2	3	2	3	18	4	-1	3	21
3.4	Encourage camping facilities and mobile home parks to have safe rooms on premises	2	2	3	2	3	2	2	16	6	-3	3	19
3.5	Equip all school buses with mobile batter chargers for cellular devices	3	3	3	3	3	1	1	17	6	-3	3	20
3.6	Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator	3	3	3	3	3	3	3	21	8	-5	1	24
3.7	Continue annual dam visits for unregulated dams with Callaway EMA and Missouri Department of Natural Resources.	3	2	3	3	2	3	3	19	6	-3	3	22
3.8	Continue to trim trees and branches away from power lines and infrastructure as needed.	3	2	3	3	3	3	3	20	6	-3	3	23
3.9	Work with MODOT to post safe driving signage on Highway 54	3	2	2	3	3	2	1	16	6	-3	3	19
3.1	Install tornado warning sirens	3	2	3	3	3	3	2	19	6	-5	1	20
4.1	Develop and distribute natural hazard awareness information to the public and encourage best practices	3	3	3	3	3	3	3	21	8	-3	5	26
5.1	Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).	3	2	3	3	3	3	3	20	2	-1	1	21
5.2	Replace overhead utilities with underground utilities where possible	3	3	3	3	3	3	2	20	8	-5	3	23

Individual Actions Administration, Implementation, and Prioritization

The following pages will include all information pertaining to the administration, implementation, and prioritization of each action.

Callaway County

1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements

Hazard(s) addressed	Flood, Levee Failure	
Plan for Implementation and Administration: Callaway County will continue to enforce floodplain management ordinances in accordance with NFIP participation. This will also include the supplying updated information to FEMA when Flood Insurance Rate Maps are being edited and revised.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County Commission, City Council	
Partners, if any	SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Compliance with floodplain ordinances. Sharing of data and approval of new FIRM when revised or updated	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 17	Priority: 20 (High)

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration: Cooperative agreements between water districts/providers and fire districts are not as widespread in the county as fire districts would like. Ease of access to water facilities would allow fire districts to mitigate the effects of fire in many places in the county. The county will work with the fire districts and the water providers to facilitate these agreements and the establishment of more agreements throughout the county.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Fire districts, City Councils, water districts	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	

Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)
---------------------------------	--------------------------	------------------------------

1.3 Identify multiple sources of water in areas currently receiving water from minimal supplies

Hazard(s) addressed	Drought	Wildfire
	Extreme Heat	
Plan for Implementation and Administration: The Callaway County Commission and rural fire districts within the county would like to identify areas where water pressure and/or availability is limited so that they are aware of different capabilities in those area. The County will work with the water districts to identify areas with the most dire need of expanding their water supply.		
2017 Update	The public water supply districts of Callaway County reported they are consistently looking for additional water sources. This action is retained for the update because it is ongoing.	
Lead Department or Agency	Callaway County	
Partners, if any	Water Districts, Fire Districts, local communities	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Areas receiving minimal amounts of water are identified	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 16	Priority: 23 (High)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration: All jurisdictions have identified a need for additional fueling sites and generator backup for emergency vehicles. The Callaway EMA will work with jurisdictions within the county to establish alternative fueling plans. The County will also continue to include alternative fueling locations in their EOP.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Callaway County EMA, City Councils	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

1.5 Develop evacuation procedures for dams and maintain records of EAP's for dam owners where necessary

Hazard(s) addressed	Dam Failure	
Plan for Implementation and Administration:	Callaway County EMA will maintain a record of all dams in the county, as well as Emergency Action Plans for each High Hazard State Regulated dam.	
2017 Update	This has not been completed but is in progress.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Dam owners, Missouri DNR	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	EAP's are on file with the county EMD	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:	<p>Callaway County will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. The County will also work with local jurisdictions to ensure they are able to complete this task as well. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:</p> <ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Develop cost estimates of protecting a facility vs. buyout • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 	
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	Callaway County Commission, Callaway County EMA, Local Jurisdiction	
Partners, if any	Local, State, and Federal	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Callaway County EMA will work to encourage public places in the county to create emergency plans if they currently do not have plans in place. The EMA will also encourage businesses and facilities to have a continuity of operations plans to ensure that they are ready to respond to a natural disaster or prevent loss of productivity or services.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA	
Partners, if any	FEMA, SEMA	
Potential Funding Sources	None	
Projected Completion Date	Continuous	
Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Jurisdictions	Callaway County	Holts Summit
	Fulton	Kingdom City
	Mokane	New Bloomfield
	Fulton Public Schools	New Bloomfield R-III
	North Callaway R-I	South Callaway R-II
Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
County and cities governments will encourage community wide participation in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council	
Partners, if any	FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration: Callaway and the participating jurisdictions in the plan will work to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response. This action will require the county and cities to encourage business participation and is expected to be a minimal effort.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA	
Partners, if any	FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

1.10 Publicize and grow the voluntary SMART-911 list with a particular emphasis on vulnerable populations.

Hazard(s) addressed	Dam Failure	Earthquake
	Extreme Heat	Levee Failure
	Flood	Severe Winter Weather
	Windstorm	Hailstorm
	Wildfire	Tornado
Plan for Implementation and Administration: Callaway County and the Callaway County EMA will prioritize publicizing the SMART-911 program to residents of the county. There will be an effort to enroll vulnerable populations in the program, allowing the county to have information on those with special needs during a natural disaster or who might need urgent attention following a disaster. This also allows emergency dispatchers in the county to push vital alerts to anyone enrolled in the program (e.g. tornado warnings, nuclear emergencies, etc.).		
2017 Update	This is done on an ongoing basis and will be continued for the next five years.	

Lead Department or Agency	Callaway County EMA, Callaway County Commission	
Partners, if any	City Councils	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in the SMART-911 system. Ideally, the entire population would enroll in SMART-911, but it is more realistic to gauge the completion as an annual increase in enrollment.	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 20	Priority: 27 (HIGH)

1.11 Increase awareness of available county generators.

Hazard(s) addressed	Earthquake	Flood
	Severe Winter Weather	Wildfire
	Tornado	
Plan for Implementation and Administration:		
Callaway County has back-up generators they are able to loan if needed, but it is not widely known throughout the county. The county is also able to access the Regional Homeland Security Council network of generators as well. To implement this action, the Callaway County EMA will provide information to communities about accessing these generators.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters and critical infrastructure know about the available backup generators.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	LF, PD, EMCC, I/C	
Benefit/Cost Score: 8/-1	STAPLEE score: 20	Priority: 27 (HIGH)

1.12 Work to reduce the number of Severe Repetitive Loss Properties through available FEMA resources.

Hazard(s) addressed	Flood	
Plan for Implementation and Administration:		
Currently Callaway County one of the highest severe repetitive loss rates in the state. This action will work to reduce this number using available federal resources. Callaway County will work to identify		

ways to reduce the number of losses or properties within the County and within cities/towns in the county.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, Callaway County Flood Plain Manager	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	All severe repetitive loss properties are mitigated	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	PD, EMCC	
Benefit/Cost Score: 4/5	STAPLEE score: 19	Priority: 18 (MEDIUM)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: All jurisdictions will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. Additionally, the Callaway County EMA will establish and maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Callaway County EMA, Local Jurisdiction	
Partners, if any	Local agencies, SEMA, FEMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration: All jurisdictions will continue to participate in various mutual aid agreements. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.	

Callaway County EMA will lead the effort to encourage these collaborations among the different jurisdictions, agencies, and special districts within the county.

2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County, Local Jurisdiction	
Partners, if any	Local agencies, SEMA, FEMA, USACE, USFW, etc...	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.3 Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
This action is already taking place through the Callaway County EMA and the school district superintendents. Both the county and schools will also continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. This action will continue to work as it currently does with both the Callaway County EMA and school districts working together on school natural hazard plans and emergency operations plans.		
2017 Update	This is done annually by school districts and is retained to encourage them to continue with this action.	
Lead Department or Agency	Callaway County EMA, School District Safety Coordinator	
Partners, if any	Local agencies, SEMA, FEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	School hazard plans are consistently reviewed and updated as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.4 Ensure the ability to respond to severe winter weather

Hazard(s) addressed	Severe Winter Weather	
Plan for Implementation and Administration:		
School districts will maintain contracts with local snow plow companies to ensure access to facilities as needed. The Callaway County Commission and Emergency Management Agency will ensure that		

resources from the county are available during severe winter weather and the response put forth minimizes accidents or injuries due to weather conditions.

2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Superintendent	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Contracts are in place prior to winter season	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 19	Priority: 24 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration:		
In cooperation with the local Red Cross and SEMA, all communities will encourage partnerships between sheltering facilities and local agencies as well as identify areas where shelter construction is needed. Callaway County will have to take the lead on this issue since there appears to be a communication breakdown regarding previous shelter agreements. Involving the county aims to encourage more agreements and agreements to be honored during a natural disaster.		
2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County Commission, Local Councils	
Partners, if any	Red Cross	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

2.6 Revisit shelter agreements annually with the Red Cross to ensure the list is accurate, up to date, and accessible in need.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Wildfire	
Plan for Implementation and Administration:		
<p>Reports from the update meetings made it evident there is a disconnect between the Red Cross and shelter locations or the communities the shelters are located. This action is aimed to reduce that disconnect and ensure that the shelter agreements in place will be honored during disaster events, severe weather, or when necessary. This action can be combined with the previous action, but the Callaway County EMA will be the lead on ensuring that shelter agreements involving the Red Cross going forward are up to date, honored, and the shelter involved knows protocol.</p>		
2017 Update	New action	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Callaway County Commission, Local Council	
Potential Funding Sources	None	
Projected Completion Date	Ongoing	
Criterion for Completion	Agreements are revisited in collaboration with communities	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 17	Priority: 22 (HIGH)

2.7 Establish heating and cooling centers in areas without existing heating and/or cooling centers.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration:		
<p>During the update process it was noted that cooling and warming centers are located primarily in the middle of the county. This action will help to diversify the location of cooling or warming centers to ensure that all residents are located near a cooling or warming center. The Callaway County EMA will work with the Callaway County Health Department and Missouri Department of Health and Senior Services to cover the entire county with official heating and cooling centers. The EMA will work with jurisdictions within the county to identify possible heating and cooling centers.</p>		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, Local Council	
Partners, if any	DHSS	
Potential Funding Sources	None	
Projected Completion Date	Ongoing	
Criterion for Completion	Cooling and warming centers are located throughout the entire county	
Projected Cost	Minimal	

Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 20	Priority: 25 (HIGH)

2.8 Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather.

Hazard(s) addressed	Windstorm	Severe Winter Weather
	Flood	Tornado
	Hailstorm	
Plan for Implementation and Administration:		
<p>School superintendents expressed interest in working closer with MODOT in the upcoming year to ensure that school closings or early releases are coordinated with the entities clearing roads. When inclement weather occurs during the school day was determined by school leadership in update meetings, that it is safer to keep students in school until roads are cleared than send them home as roads are being cleared or have not been cleared yet, assuming the weather conditions are stagnant or not worsening.</p> <p>The Callaway EMA will follow up with districts on this action and the Callaway County Commission will ensure that districts have lines of communication with Callaway County Road and Bridge.</p>		
2017 Update	New action	
Lead Department or Agency	School districts	
Partners, if any	Callaway Road & Bridge, MODOT	
Potential Funding Sources	Local, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Regular communication is established and ongoing	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 21	Priority: 28 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado
Plan for Implementation and Administration:	
<p>All jurisdictions are currently reviewing their need for a tornado safe room. The City of Holts Summit has constructed such a facility as part of a new facility, but would like to maintain interest in construction of a second facility if needed in the future. Auxvasse, Fulton, and New Bloomfield do not currently have specific sites identified, but will review their need in the next five years. All school districts have expressed need, but a full benefit cost analysis will be needed. This task is listed under the Callaway County lead, but only so the Callaway EMD to follow up on this issue throughout the next five years.</p>	
2017 Update	<p>This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.</p>

Lead Department or Agency	Callaway County EMA, City Council, District Superintendent or District Manager	
Partners, if any	SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
All jurisdictions would like to have funding for additional generators. The school districts, specifically, would like to purchase and install emergency generators at each campus. The Callaway County EMA will work to accomplish this task through partnerships and awareness of potential funding opportunities.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, School Districts	
Partners, if any	Red Cross, SEMA, FEMA	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
All jurisdictions currently have plans in place for maintenance of vegetation in their jurisdiction. This action will be used to reinforce this effort. Callaway County will continue to clear vegetation near county facilities. Critical infrastructure within the county will be encouraged by the county to clear combustible material and vegetation as well.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Local Jurisdiction	
Partners, if any	Utility Providers	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	

Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.4 Encourage camping facilities and mobile home parks to have safe rooms on premises

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	Windstorm
Plan for Implementation and Administration: Callaway County will encourage all mobile home parks and camping facilities to have a safe room on their premises. This can be achieved through new construction or designation of hardened facilities that may already exist nearby.		
2017 Update	Camping facilities and mobile home parks are encouraged to do this.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Mobile Home park owners, campsite owners	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Facilities will be educated on the importance of a safe room.	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 16	Priority: 19 (MEDIUM)

3.5 Equip all school buses with mobile battery chargers for cellular devices.

Hazard(s) addressed	Dam Failure	Severe Winter Weather
	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
Plan for Implementation and Administration: During a winter weather event in 2016, school districts reported that bus radios were not able to get signal and drivers were on the roads so long that cell phone batteries ran out of power. This was an issue for both the buses on the road, schools attempting to contact buses, and parents who did not have information about the whereabouts of their children during inclement weather. Communication between the schools and buses is critical in non-inclement weather but even more important during severe weather. This action is to place battery chargers for cell phones in all school buses to be kept charged and used in case of emergency. The Callaway County EMA will work with the schools to ensure completion of this task.		
2017 Update	This is a new action.	
Lead Department or Agency	School District Superintendents, Callaway County EMA	
Partners, if any	Local Agencies, SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2017-2018	

Criterion for Completion	All buses equipped with battery chargers	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 17	Priority: 20 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: All jurisdictions, in cooperation with Callaway County EMA, will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so. This action will be done when shelter agreements are put into place.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.7 Continue annual dam visits for unregulated and regulated dams with Callaway EMA and Missouri Department of Natural Resources (DNR).

Hazard(s) addressed	Dam Failure	
Plan for Implementation and Administration: Callaway County EMA visits dams annual with a DNR engineer. This action will continue annually.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA	
Partners, if any	DNR, Dam Owners	
Potential Funding Sources	Local, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Both regulated and unregulated dams are visited annually	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 19	Priority: 22 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration:		
This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. Callaway County will continue to trim trees and braches from infrastructure. They will encourage electric service providers to continue trimming trees and branches away from power.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, Local Councils	
Partners, if any	Utility providers	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

3.9 Work with MODOT to post safe driving signage on Highway 54.

Hazard(s) addressed	Severe Winter Weather	
Plan for Implementation and Administration:		
Callaway County Commission will work with Missouri Department of Transportation (MODOT) to post safe driving signs along Highway 54 like they are on I-70. Highway 54 has a significant amount of traffic, particularly during vacation season. The Commission with work with MODOT to post signage along the highway.		
2017 Update	New Action	
Lead Department or Agency	Callaway County Commission	
Partners, if any	MODOT	
Potential Funding Sources	State	
Projected Completion Date	2018	
Criterion for Completion	Safe driving signs are posted on Highway 54	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 16	Priority: 19 (MEDIUM)

3.10 Install tornado warning sirens.

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
Callaway County will work with the Mid-MO RPC to secure funding for communities within the county without tornado warning sirens: New Bloomfield and Mokane.		
2017 Update	New action	

Lead Department or Agency	Callaway County Commission, Local Councils	
Partners, if any	Mid-MO Regional Planning Commission, USDA	
Potential Funding Sources	Local, Federal	
Projected Completion Date	2018	
Criterion for Completion	Sirens are installed	
Projected Cost	Moderate to significant	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
<p>The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:</p> <ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).

Hazard(s) addressed	Flood	Levee Failure
Plan for Implementation and Administration: Currently there are no communities in Callaway County that are enrolled in the CRS. This program can be somewhat cost prohibitive, but Callaway County, Fulton, and Holts Summit would like to investigate if the program would be cost effective for them. In the next five years, this will continue to be considered by Callaway County.		
2017 Update	This is done on an ongoing basis and will be continued for the next five years.	
Lead Department or Agency	Callaway County Commission, City Council	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Jurisdictions have reviewed the potential benefits of participating in the CRS and NFIP and have made an informed decision to maintain or not maintain participation	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/3	STAPLEE score: 20	Priority: 19 (MEDIUM)

5.2 Replace overhead utilities with underground utilities where possible.

Hazard(s) addressed	Hailstorm	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration: If funds permit, Callaway County will bury overhead utility lines.		
2017 Update	This is not frequently done because of the cost. It is dramatically more expensive to replace the overhead utilities with underground utilities, but when given the option and the resources, Fulton and schools will do it when possible.	
Lead Department or Agency	Fulton Utility Department, School Superintendent	
Partners, if any	Callaway Electric Coop, Ameren UE, other providers of phone, cable, and electricity	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Lines are prioritized and buried where applicable	
Projected Cost	Significant	

Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

Auxvasse

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration: Cooperative agreements between water districts/providers and fire districts are not as widespread in the county as fire districts would like. Ease of access to water facilities would allow fire districts to mitigate the effects of fire in many places in the county. Auxvasse will work with the local fire protection district(s) and the water district to continue to create or improve cooperative agreements.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Mayor, City Council	
Partners, if any	SEMA, FEMA, Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration: Auxvasse in coordination with Callaway County EMA has identified alternative fueling locations for emergency vehicles. They will continue to do this throughout the life of this plan.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Fire districts, City Council, water districts	
Partners, if any	Callaway County EMA, Mayor	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Auxvasse will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following is a general list including activities that are currently in place for jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Develop cost estimates of protecting a facility vs. buyout (Callaway County and Fulton) • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	Callaway County EMA, Auxvasse City Council	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration: Auxvasse will work with Callaway County EMA to encourage public places in the county to create emergency plans if they currently do not have plans in place. Auxvasse will encourage businesses and facilities to have a continuity of operations plans to ensure that they are ready to respond to a natural disaster or prevent loss of productivity or services.		
2017 Update	New Action	
Lead Department or Agency	Auxvasse City Administrator	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction, Mayor, City Council	
Potential Funding Sources	None	
Projected Completion Date	Continuous	
Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	

Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration: Auxvasse will encourage citizens and organizations within the town to participate in the annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council, Mayor	
Partners, if any	FEMA, SEMA, Public Locations in Auxvasse	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration: Auxvasse will work with Callaway County EMA to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA, Mayor	
Partners, if any	FEMA, SEMA, Any public location in Auxvasse	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	

Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)
---------------------------------	--------------------------	----------------------------

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: Auxvasse will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP and any local EOP.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Auxvasse Mayor, Auxvasse City Administrator	
Partners, if any	Local agencies, SEMA, FEMA, Callaway County EMA, Auxvasse City Council	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Auxvasse will continue to participate in various Callaway County mutual aid agreements. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County, Auxvasse City Council, City Administrator	
Partners, if any	Communities in Callaway County, Callaway County EMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration: In cooperation with the local Red Cross and SEMA, Auxvasse along with Callaway County EMA will encourage partnerships between sheltering facilities and local agencies as well as identify areas where shelter construction is needed.		
2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County Commission, Mayor, City Administrator	
Partners, if any	Red Cross, Businesses or churches within Auxvasse, City Council, Callaway County EMA	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration: Auxvasse does not currently have specific sites identified, but will review their need in the next five years and move forward if funding, desire, and location permits the town to move forward.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	Callaway County EMA, City Council, Mayor, City Administrator	
Partners, if any	SEMA, FEMA, School Districts	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
This action prioritizes planning within the jurisdiction for providing or coordinating back-up power to critical infrastructure located in the jurisdiction. Auxvasse will work to ensure that all critical infrastructure has access to back-up power.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Callaway County, Utility Providers, School Districts	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
Auxvasse already maintains clearance of vegetation and combustible material from critical infrastructure. This action will be used to reinforce this effort.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	City Administrator	
Partners, if any	Utility Providers, Callaway County, Mayor, City Council	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator.

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: In coordination with Callaway County EMA, Auxvasse will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters, Auxvasse Mayor, City Administrator	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration: Auxvasse and electrical providers will trim away branches and trees from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided.		
2017 Update	New action	
Lead Department or Agency	City Administrator	
Partners, if any	Utility providers, Callaway County, Mayor, City Council	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
<p>The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. Auxvasse will participate with those programs. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:</p> <ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Mayor, City Council, City Administrator, Callaway County Health Department, School Districts	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

Fulton

1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements

Hazard(s) addressed	Flood, Levee Failure	
Plan for Implementation and Administration:		
Fulton will continue to enforce floodplain management ordinances in accordance with NFIP participation. This will also include the supplying updated information to FEMA when Flood Insurance Rate Maps are being edited and revised.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Fulton City Administrator, Mayor	
Partners, if any	SEMA, FEMA, Callaway County Commission, City Council	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Compliance with floodplain ordinances. Sharing of data and approval of new FIRM when revised or updated	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 17	Priority: 20 (High)

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration:		
Fulton will work with the fire department and water district to ensure that the fire department has access to adequate supplies of water.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Fire districts, City Council, City Administrator	
Partners, if any	Callaway County EMA, Water Districts	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration:		
Fulton will continue to have a list of alternate fueling locations for emergency vehicles. If necessary, this list will be revisited and/or expanded.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Callaway County EMA, City Council, City Administrator	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
Fulton will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:	
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Develop cost estimates of protecting a facility vs. buyout (Callaway County and Fulton) • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 	
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.
Lead Department or Agency	City Administrator, City Council, Mayor, City Utilities
Partners, if any	Callaway County Commission, Callaway County EMA
Potential Funding Sources	Local
Projected Completion Date	Ongoing
Criterion for Completion	Upgrades and/or retrofits are identified
Projected Cost	Significant
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC

Benefit/Cost Score: 8/-3**STAPLEE score: 15****Priority: 20 (HIGH)**

1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Callaway County EMA will work to encourage public places in the county to create emergency plans if they currently do not have plans in place. Fulton will work with the Callaway EMA to accomplish this action for locations within Fulton or near it.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Mayor	
Partners, if any	City Council, City Administrator, Businesses, School Districts, and other agencies	
Potential Funding Sources	None	
Projected Completion Date	Continuous	
Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
Fulton will encourage community wide participation in annual hazard drills with an emphasis on public entities. This action is aimed to encourage more annual hazard drill participation in the city's businesses.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council	
Partners, if any	FEMA, SEMA, City Administrator, Callaway County Health Department	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	

Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)
---------------------------------	--------------------------	----------------------------

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Fulton will work to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response. The effort expected for this action is minimal.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA	
Partners, if any	FEMA, SEMA, Businesses	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration:		
Fulton will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP and any local EOP.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Callaway County EMA, City Administrator	
Partners, if any	Local agencies, SEMA, FEMA, City Council, Mayor, City Buildings, School Districts	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Fulton will continue to participate in various mutual aid agreements with other jurisdictions/communities in the County. Fulton cooperates with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County EMA, City Council, City Administrator	
Partners, if any	Callaway County Commission, Special Purpose Districts, Red Cross, Public Areas (businesses, churches, non-profits)	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration: In cooperation with the local Red Cross, SEMA, and Callaway County EMA, Fulton will encourage partnerships between sheltering facilities and local agencies as well as identify areas where shelter construction is needed.		
2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County EMA, City Administrator	
Partners, if any	Red Cross, Callaway County Commission, Shelter Locations, Mayor, City Council	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	

Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
Fulton is always considering a safe room, but at the current time, it is cost prohibitive. The city will continue to consider a tornado safe room if funding and a location are made available.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	City Council, City Administrator, Mayor	
Partners, if any	SEMA, FEMA, Callaway County EMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
Fulton would like to have funding for additional generators. If funding becomes available, Fulton will pursue adding additional sources of back-up power for critical infrastructure. In the meantime, Fulton will work with Callaway County to publicized the available network of generators within Callaway and in neighboring counties.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, City Administrator, City Utilities	
Partners, if any	Red Cross, SEMA, FEMA, School Districts, Callaway County Commission	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	

Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)
---------------------------------	--------------------------	----------------------------

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration: Fulton will continue to clear vegetation and combustible material from critical infrastructure in the city.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	City Administrator	
Partners, if any	Utility Providers	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: Fulton, in cooperation with Callaway County EMA, will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters, City Council, Mayor, City Administrator	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
----------------------------	-----------------------	-----------

	Hailstorm	
Plan for Implementation and Administration:		
Fulton encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided.		
2017 Update	New action	
Lead Department or Agency	City Administrator	
Partners, if any	Utility providers, Callaway County Commission, Mayor	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
<p>The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. Fulton will work with the Callaway County EMA to implement this information. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:</p> <ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies, City Administrator, City Council, Mayor	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	

Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).

Hazard(s) addressed	Flood	Levee Failure
Plan for Implementation and Administration:		
Currently there are no communities in Callaway County that are enrolled in the CRS. Fulton will continue to consider if the program would be cost effective for them.		
2017 Update	This is done on an ongoing basis and will be continued for the next five years.	
Lead Department or Agency	Callaway County Commission, City Council	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Jurisdictions have reviewed the potential benefits of participating in the CRS and NFIP and have made an informed decision to maintain or not maintain participation	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/-3	STAPLEE score: 20	Priority: 19 (MEDIUM)

5.2 Replace overhead utilities with underground utilities where possible.

Hazard(s) addressed	Hailstorm	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
The City of Fulton and all school districts in the county would like to replace above ground utility lines with underground lines where applicable. The City of Fulton is currently in the process of placing line underground. All School districts have identified that the lines closest to buildings and athletic fields are the primary areas where this is needed.		
2017 Update	This is not frequently done because of the cost. It is dramatically more expensive to replace the overhead utilities with underground utilities, but when given the option and the resources, Fulton and schools will do it when possible.	

Lead Department or Agency	Fulton Utility Department	
Partners, if any	Callaway Electric Coop, Ameren UE, other providers of phone, cable, and electricity, City County, City Administrator	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Lines are prioritized and buried where applicable	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

Holts Summit

1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements

Hazard(s) addressed	Flood, Levee Failure	
Plan for Implementation and Administration:		
Holts Summit will continue to enforce floodplain management ordinances in accordance with NFIP participation. This will also include the supplying updated information to FEMA when Flood Insurance Rate Maps are being edited and revised.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Holts Summit City Administrator, Mayor, City Council	
Partners, if any	SEMA, FEMA, Callaway County Commission, City Council	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Compliance with floodplain ordinances. Sharing of data and approval of new FIRM when revised or updated	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 17	Priority: 20 (High)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration:		
Holts Summit has identified a need for additional fueling sites and generator backup for emergency vehicles. They will continue to have alternative fueling sites and adding them as identified.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Callaway County EMA, City Council, City Administrator	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	

Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)
---------------------------------	--------------------------	----------------------------

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Holts Summit will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions within Callaway County including Fulton:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Develop cost estimates of protecting a facility vs. buyout • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	City Manager, City Council, Mayor, City Utilities	
Partners, if any	Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration: Holts Summit will work with the Callaway County EMA to encourage public places in the county to create emergency plans if they currently do not have plans in place. They will also encourage businesses and facilities to have a continuity of operations plans to ensure that they are ready to respond to a natural disaster or prevent loss of productivity or services.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Mayor	
Partners, if any	City Council, City Administrator, Businesses, School Districts, and other agencies	
Potential Funding Sources	None	
Projected Completion Date	Continuous	

Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
Holts Summit will encourage community wide participation in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council	
Partners, if any	FEMA, SEMA, City Administrator, Callaway County Health Department	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Holts Summit will work with Callaway County to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response. This action will require the county and cities to encourage business participation and is expected to be a minimal effort.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA	
Partners, if any	FEMA, SEMA, Private Businesses in Holts Summit	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	

Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: Holts Summit will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. They will work with the Callaway County EMA will establish and maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Callaway County EMA, City Administrator	
Partners, if any	Local agencies, SEMA, FEMA, City Council, Mayor, City Buildings, School Districts	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Holts Summit will continue to participate in various mutual aid agreements with other communities within Callaway County. Holts Summit will cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan and how it pertains to their community. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County EMA, City Council, City Administrator	
Partners, if any	Callaway County Commission, Special Purpose Districts, Red Cross, Public Areas (businesses, churches, non-profits)	
Potential Funding Sources	Local, State, and Federal	

Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration:		
In cooperation with the local Red Cross and SEMA, Holts Summit along with Callaway County EMA will encourage partnerships between sheltering facilities and local agencies as well as identify areas where shelter construction is needed.		
2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County EMA, City Administrator	
Partners, if any	Red Cross, Callaway County Commission, Shelter Locations, Mayor, City Council	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
Holts Summit is reviewing their need for an additional tornado safe room. The City of Holts Summit constructed such a facility as part of a new facility, but would like to maintain interest in construction of a second facility if needed in the future. All school districts have expressed need, but a full benefit cost analysis will be needed. Holts Summit schools are part of the Jefferson City School District.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	City Council, City Administrator, Mayor	

Partners, if any	SEMA, FEMA, Callaway County EMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
Holts Summit would like to have funding for additional generators. The school districts, specifically, would like to purchase and install emergency generators at each campus.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, City Administrator, City Utilities	
Partners, if any	Red Cross, SEMA, FEMA, School Districts, Callaway County Commission	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
Holts Summit will continue to clear vegetation and combustible material from critical infrastructure.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	City Administrator	
Partners, if any	Utility Providers	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	

Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)
---------------------------------	--------------------------	----------------------------

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: Holts Summit, in cooperation with Callaway County EMA, will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters, City Council, Mayor, City Administrator	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration: Holts Summit will continue tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. They will also encourage their local energy provider to continue the practice.		
2017 Update	New action	
Lead Department or Agency	City Administrator	
Partners, if any	Utility providers, Callaway County Commission, Mayor	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
<p>Holts Summit will work with the Callaway County EMA on this action. The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:</p> <ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies, City Administrator, City Council, Mayor	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).

Hazard(s) addressed	Flood	Levee Failure
Plan for Implementation and Administration:		
<p>Holts Summit is not currently enrolled in the CRS. This program can be somewhat cost prohibitive, but Holts Summit will continue to consider if the program would be cost effective for them.</p>		

2017 Update	This is done on an ongoing basis and will be continued for the next five years.	
Lead Department or Agency	Callaway County Commission, City Council	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Jurisdictions have reviewed the potential benefits of participating in the CRS and NFIP and have made an informed decision to maintain or not maintain participation	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/-3	STAPLEE score: 20	Priority: 19 (MEDIUM)

Kingdom City

1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements

Hazard(s) addressed	Flood, Levee Failure	
Plan for Implementation and Administration:		
Kingdom City will continue to enforce floodplain management ordinances in accordance with NFIP participation. This will also include the supplying updated information to FEMA when Flood Insurance Rate Maps are being edited and revised.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Kingdom City Administrator, Mayor, City Council	
Partners, if any	SEMA, FEMA, Callaway County Commission, City Council	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Compliance with floodplain ordinances. Sharing of data and approval of new FIRM when revised or updated	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 17	Priority: 20 (High)

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration:		
Kingdom City will continue to encourage agreements between water providers and fire districts to ensure that fire districts have adequate water resources to be effective.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Fire districts, City Council, City Administrator	
Partners, if any	Callaway County EMA, Water Districts	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.3 Identify multiple sources of water in areas currently receiving water from minimal supplies

Hazard(s) addressed	Drought	Wildfire
	Extreme Heat	
Plan for Implementation and Administration: The Callaway County Commission and rural fire districts within the county would like to identify areas where water pressure and/or availability is limited so that they are aware of different capabilities in those areas. Kingdom City will assist Callaway County in accomplishing this task.		
2017 Update	The public water supply districts of Callaway County reported they are consistently looking for additional water sources. This action is retained for the update because it is ongoing.	
Lead Department or Agency	City Utilities, City Manager	
Partners, if any	Water Districts, Fire Districts, Mayor, Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Areas receiving minimal amounts of water are identified	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 16	Priority: 23 (High)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration: Kingdom City have identified a need for additional fueling sites and generator backup for emergency vehicles. They will work to find more alternate power supplies and fueling locations in addition to the current ones.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Callaway County EMA, City Council, City Administrator	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Kingdom City will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	City Manager, City Council, Mayor, City Utilities	
Partners, if any	Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration: Kingdom City with Callaway County EMA will work to encourage public places in the county to create emergency plans if they currently do not have plans in place. The EMA will also encourage businesses and facilities to have a continuity of operations plans to ensure that they are ready to respond to a natural disaster or prevent loss of productivity or services.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Mayor	
Partners, if any	City Council, City Administrator, Businesses, School Districts, and other agencies	
Potential Funding Sources	None	
Projected Completion Date	Continuous	
Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	

Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
Kingdom City will encourage community wide participation in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council	
Partners, if any	FEMA, SEMA, City Administrator, Callaway County Health Department	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Kingdom City along with Callaway EMA will work to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response. This action will require the county and cities to encourage business participation and is expected to be a minimal effort.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA	
Partners, if any	FEMA, SEMA, Private Businesses in Kingdom City	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	

Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: Kingdom City will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. The Callaway County EMA will establish and maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans accessible by Kingdom City.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Callaway County EMA, City Administrator	
Partners, if any	Local agencies, SEMA, FEMA, City Council, Mayor, City Buildings, School Districts	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Kingdom City will continue to participate in various mutual aid agreements with other communities in Callaway County. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County EMA, City Council, City Administrator	
Partners, if any	Callaway County Commission, Special Purpose Districts, Red Cross, Public Areas (businesses, churches, non-profits)	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	

Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration: In cooperation with the local Red Cross, SEMA, and Callaway County EMA, Kingdom City will encourage partnerships between sheltering facilities and local agencies as well as identify areas where shelter construction is needed.		
2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County EMA, City Administrator	
Partners, if any	Red Cross, Callaway County Commission, Shelter Locations, Mayor, City Council	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado
Plan for Implementation and Administration: Kingdom City will review their need for a tornado safe room. At the current time, it is a cost prohibitive measure. All school districts have expressed need, but a full benefit cost analysis will be needed.	
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.
Lead Department or Agency	City Council, City Administrator, Mayor
Partners, if any	SEMA, FEMA, Callaway County EMA
Potential Funding Sources	Federal and State
Projected Completion Date	Ongoing
Criterion for Completion	Funding identified and site location identified

Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
Kingdom City would like to have funding for additional generators. The school districts, specifically, would like to purchase and install emergency generators at each campus.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, City Administrator, City Utilities	
Partners, if any	Red Cross, SEMA, FEMA, School Districts, Callaway County Commission	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
Kingdom City currently clears vegetation and combustible material from critical infrastructure. This action will be continued.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	City Administrator	
Partners, if any	Utility Providers	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: Kingdom City, in cooperation with Callaway County EMA, will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters, City Council, Mayor, City Administrator	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration: This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided.		
2017 Update	New action	
Lead Department or Agency	City Administrator	
Partners, if any	Utility providers, Callaway County Commission, Mayor	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
Kingdom City will work with the Callaway County Emergency Management Agency (EMA) which currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:		
<ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies, City Administrator, City Council, Mayor	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).

Hazard(s) addressed	Flood	Levee Failure
Plan for Implementation and Administration:		
Kingdom City is not considering participation in the CRS, but this action is included to assist Callaway County with any location specific planning in regards to their consideration in participating in the CRS.		

2017 Update	This is done on an ongoing basis and will be continued for the next five years.	
Lead Department or Agency	Callaway County Commission, City Council	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Jurisdictions have reviewed the potential benefits of participating in the CRS and NFIP and have made an informed decision to maintain or not maintain participation	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/-3	STAPLEE score: 20	Priority: 19 (MEDIUM)

Mokane

1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements

Hazard(s) addressed	Flood, Levee Failure	
Plan for Implementation and Administration:		
Mokane with Callaway County will continue to enforce floodplain management ordinances in accordance with NFIP participation. This will also include the supplying updated information to FEMA when Flood Insurance Rate Maps are being edited and revised.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Mayor, City Council	
Partners, if any	SEMA, FEMA, Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Compliance with floodplain ordinances. Sharing of data and approval of new FIRM when revised or updated	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 17	Priority: 20 (High)

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration:		
Mokane will work with its local water district to ensure that fire protection districts have adequate access to water supplies near and in Mokane.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Fire districts, City Council, water districts	
Partners, if any	Callaway County EMA, Mayor	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration:		
Mokane will work with Callaway County EMA to identify alternative fueling site and alternative sources of power for emergency situations.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Callaway County EMA, Mokane City Council	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
Mokane will work with Callaway County to continue inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Develop cost estimates of protecting a facility vs. buyout (Callaway County and Fulton) • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	Mokane Mayor	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	

Benefit/Cost Score: 8/-3**STAPLEE score: 15****Priority: 20 (HIGH)****1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.**

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Callaway County EMA will work with Mokane to create an EOP specific to the jurisdiction.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Mokane City Council, Mokane Mayor	
Partners, if any	FEMA, SEMA, School Districts, Public locations in Mokane	
Potential Funding Sources	None	
Projected Completion Date	Continuous	
Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
Mokane will encourage community wide participation in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council, Mayor	
Partners, if any	FEMA, SEMA, Public Locations in Mokane	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
Mokane will work with Callaway County EMA to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response. This action will require the county and cities to encourage business participation and is expected to be a minimal effort.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA, Mayor	
Partners, if any	FEMA, SEMA, Any public location in Mokane	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration:		
Mokane will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. Additionally, the Callaway County EMA will establish and maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Mokane Mayor	
Partners, if any	Local agencies, SEMA, FEMA, Callaway County EMA, Mokane City Council	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Mokane will work toward participating in various mutual aid agreements with other communities in Callaway County. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County, Mokane City Council	
Partners, if any	Communities in Callaway County, Callaway County EMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration: In cooperation with the local Red Cross, SEMA, and Callaway County EMA, Mokane will encourage partnerships between sheltering facilities to provide adequate shelter during natural disasters.		
2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County Commission, Mokane City Council, Mokane Mayor	
Partners, if any	Red Cross, Businesses or churches within Mokane	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration: Mokane currently does not have a safe room within the community, but if funding and a location were available, it would be a consideration.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	Callaway County EMA, Mokane City Council, Mokane Mayor	
Partners, if any	SEMA, FEMA, School Districts	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration: Mokane will consider sources of back-up power for critical infrastructure and work with utility providers to ensure there is back-up power for critical infrastructure. Callaway County EMA will be able to assist with this action if necessary.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Callaway County, Utility Providers, School Districts	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration: Mokane will continue to clear vegetation and combustible material from critical infrastructure.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Mokane City Council, Mokane Mayor	
Partners, if any	Utility Providers, Callaway County	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: Mokane, in cooperation with Callaway County EMA, will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters, Mokane City Council	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	

Plan for Implementation and Administration:		
This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. Mokane will continue to trim trees and branches away from power lines and infrastructure as needed or work with local energy providers to ensure they continue to trim trees and branches.		
2017 Update	New action	
Lead Department or Agency	Mokane Mayor and City Council	
Partners, if any	Utility providers, Callaway County	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

3.10 Install tornado warning sirens.

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
Mokane currently does not have a Mokane specific tornado siren. The siren located in Mokane is a part of a large network of sirens operated by Ameren as a part of the nuclear plant in Callaway County. If one siren is sounded, all of the sirens are sounded. Installing a Mokane specific tornado siren will allow the community to receive community specific warnings of tornadoes.		
2017 Update	New action	
Lead Department or Agency	Mokane Mayor and City Council	
Partners, if any	Mid-MO Regional Planning Commission, USDA, Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Local, Federal	
Projected Completion Date	2018	
Criterion for Completion	Sirens are installed	
Projected Cost	Moderate to significant	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
Mokane will work with the Callaway County Emergency Management Agency (EMA) ,which currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:	

<ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Mokane mayor and city council, Callaway County Health Department	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).

Hazard(s) addressed	Flood	Levee Failure
Plan for Implementation and Administration:		
Currently there are no communities in Callaway County that are enrolled in the CRS. This program can be somewhat cost prohibitive, but Callaway County would like to investigate if the program would be cost effective for them. Mokane will work with Callaway County on anything they might need for CRS related to Mokane. This action is lead by Callaway County, but included for Mokane to encourage assistance.		
2017 Update	This is done on an ongoing basis and will be continued for the next five years.	
Lead Department or Agency	City Council, Mayor	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA, Callaway County Commission	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	

Criterion for Completion	Jurisdictions have reviewed the potential benefits of participating in the CRS and NFIP and have made an informed decision to maintain or not maintain participation	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/-3	STAPLEE score: 20	Priority: 19 (MEDIUM)

New Bloomfield

1.1 Continue to enforce floodplain management ordinances in compliance with NFIP requirements

Hazard(s) addressed	Flood, Levee Failure	
Plan for Implementation and Administration:		
New Bloomfield will continue to enforce floodplain management ordinances in accordance with NFIP participation. This will also include the supplying updated information to FEMA when Flood Insurance Rate Maps are being edited and revised.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	City Council, Mayor, City Administrator	
Partners, if any	SEMA, FEMA, Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Compliance with floodplain ordinances. Sharing of data and approval of new FIRM when revised or updated	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 17	Priority: 20 (High)

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration:		
Cooperative agreements between water districts/providers and fire districts are not as widespread in the county as fire districts would like. Ease of access to water facilities would allow fire districts to mitigate the effects of fire in many places in the county. New Bloomfield will work with water providers and local fire district(s) to ensure that cooperative agreements are in place between water providers and fire district(s).		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	

Lead Department or Agency	Fire districts, City Councils, water districts	
Partners, if any	Callaway County EMA, City Council, City Administrator	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.4 Have alternate power supplies for fueling emergency vehicles

Hazard(s) addressed	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
	Severe Winter Weather	
Plan for Implementation and Administration:		
New Bloomfield will continue to identify additional fueling sites and generator backup for emergency vehicles.		
2017 Update	Emergency departments know where they are able to fuel in the case they need an alternate or additional fueling site. The county and cities are able to use each other's fuel sources in the case of an emergency. These agreements are informal, but acknowledged as existing.	
Lead Department or Agency	Callaway County EMA, New Bloomfield City Council	
Partners, if any	Private fuel owners	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Alternative sites are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
New Bloomfield will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:	
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 	
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.
Lead Department or Agency	New Bloomfield Mayor

Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.7 Encourage businesses and public facilities to create or maintain emergency preparedness, response, and continuity of operations plans.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
New Bloomfield will work with Callaway County EMA to encourage public places in the county to create emergency plans if they currently do not have plans in place. They will also encourage businesses and facilities to have a continuity of operations plans to ensure that they are ready to respond to a natural disaster or prevent loss of productivity or services.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, New Bloomfield City Council, New Bloomfield Mayor	
Partners, if any	FEMA, SEMA, School Districts, Public locations in New Bloomfield	
Potential Funding Sources	None	
Projected Completion Date	Continuous	
Criterion for Completion	An increasing number of businesses and public entities have disaster plans in place.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
New Bloomfield will encourage community wide participation in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	Callaway County EMA, Callaway County Commission, City Council, Mayor	
Partners, if any	FEMA, SEMA, Public Locations in New Bloomfield	

Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)

1.9 Include private businesses in county and city disaster response planning.

Hazard(s) addressed	Dam Failure	Earthquake
	Flood	Severe Winter Weather
	Wildfire	Tornado
Plan for Implementation and Administration:		
New Bloomfield will work with Callaway County EMA to incorporate private businesses in their disaster planning to further public/private partnerships and relationships regarding disaster planning and response. This action will require the county and cities to encourage business participation and is expected to be a minimal effort.		
2017 Update	New action	
Lead Department or Agency	Callaway County Commission, City Council, Callaway County EMA, Mayor	
Partners, if any	FEMA, SEMA, Any public location in New Bloomfield	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of business participants in local disaster planning and response planning	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration:		
New Bloomfield will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. Additionally, the Callaway County EMA along with New Bloomfield will establish and maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	New Bloomfield Mayor	

Partners, if any	Local agencies, SEMA, FEMA, Callaway County EMA, New Bloomfield City Council	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: New Bloomfield will continue to participate in various mutual aid agreements with other communities in Callaway County. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Callaway County, New Bloomfield City Council	
Partners, if any	Communities in Callaway County, Callaway County EMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.5 Encourage formal agreements with appropriate shelter locations and/or construct sheltering facilities where needed as funding is made available

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Tornado
	Levee Failure	Wildfire
	Hailstorm	Windstorm
Plan for Implementation and Administration:		

In cooperation with the local Red Cross, SEMA, and Callaway County, New Bloomfield will encourage partnerships between sheltering facilities and local agencies.

2017 Update	This action is modified from “establish” to “encourage.”	
Lead Department or Agency	Callaway County Commission, New Bloomfield City Council, New Bloomfield Mayor	
Partners, if any	Red Cross, Businesses or churches within New Bloomfield	
Potential Funding Sources	Local, Private	
Projected Completion Date	Ongoing	
Criterion for Completion	Shelters are identified and sheltering needs are identified	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration: All jurisdictions are currently reviewing their need for a tornado safe room. The City of Holts Summit has constructed such a facility as part of a new facility, but would like to maintain interest in construction of a second facility if needed in the future. Auxvasse, Fulton, and New Bloomfield do not currently have specific sites identified, but will review their need in the next five years. All school districts have expressed need, but a full benefit cost analysis will be needed.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	Callaway County EMA, New Bloomfield City Council, New Bloomfield Mayor	
Partners, if any	SEMA, FEMA, School Districts	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		

New Bloomfield, like other jurisdictions, would like to have funding for additional generators. If funding becomes available, they will pursue purchasing generators. Otherwise, they will ensure that back-up power is available or identified for critical infrastructure.

2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Callaway County, Utility Providers, School Districts	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
New Bloomfield will continue to maintain clearance of vegetation and combustible material from critical infrastructure.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	New Bloomfield City Council, New Bloomfield Mayor	
Partners, if any	Utility Providers, Callaway County	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration:		
New Bloomfield, in cooperation with Callaway County EMA, will encourage shelters and critical infrastructure to install these switches and assist in finding funding sources to do so.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	

Lead Department or Agency	Callaway County EMA	
Partners, if any	Red Cross, Shelters, New Bloomfield City Council	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration:		
New Bloomfield will continue to trim trees and branches away from power lines and infrastructure as needed. They will also encourage electric providers to continue to do the same.		
2017 Update	New action	
Lead Department or Agency	New Bloomfield Mayor and City Council	
Partners, if any	Utility providers, Callaway County	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

3.10 Install tornado warning sirens.

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
New Bloomfield does not have a tornado siren that is specific to the community. They have a siren in the community that is part of a large network of sirens associated with the Callaway Nuclear Plant. It is not possible to sound only one siren to a specific location. New Bloomfield will consider adding a community specific tornado warning siren.		
2017 Update	New action	
Lead Department or Agency	New Bloomfield Mayor and City Council	

Partners, if any	Mid-MO Regional Planning Commission, USDA, Callaway County Commission, Callaway County EMA	
Potential Funding Sources	Local, Federal	
Projected Completion Date	2018	
Criterion for Completion	Sirens are installed	
Projected Cost	Moderate to significant	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-5	STAPLEE score: 19	Priority: 20 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
<p>New Bloomfield will work with the Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:</p> <ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	New Bloomfield mayor and city council, Callaway County Health Department	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	

Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.1 Encourage participation in Community Rating System (CRS) and the National Flood insurance Program (NFIP).

Hazard(s) addressed	Flood	Levee Failure
Plan for Implementation and Administration:		
Currently there are no communities in Callaway County that are enrolled in the CRS. This program can be somewhat cost prohibitive, but Callaway County would like to investigate if the program would be cost effective for them. Although this task is not specific to New Bloomfield, this is listed as New Bloomfield will assist Callaway County with any location specific information if necessary.		
2017 Update	This is done on an ongoing basis and will be continued for the next five years.	
Lead Department or Agency	City Council, Mayor	
Partners, if any	Mid-Missouri Regional Planning Commission, FEMA, SEMA, Callaway County Commission	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Jurisdictions have reviewed the potential benefits of participating in the CRS and NFIP and have made an informed decision to maintain or not maintain participation	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/-3	STAPLEE score: 20	Priority: 19 (MEDIUM)

Callaway County Public Water Supply District #1

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration: Cooperative agreements between water districts/providers and fire districts are not as widespread in the county as fire districts would like. Ease of access to water facilities would allow fire districts to mitigate the effects of fire in many places in the county. Callaway PWSD1 will work with fire districts in Callaway to establish cooperative agreements to ensure adequate water supplies.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Water District Board and Director	
Partners, if any	Callaway County EMA, Fire districts, City Councils	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Callaway PWSD1 will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	Water District Director	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction	
Potential Funding Sources	Local, Internal funds	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: Although Callaway PWSD1 does not have to evacuate people in the case of an emergency, they do have to plan for access to their infrastructure in an emergency. Callaway PWSD1 already does this, this action will encourage them to continue doing it in future years.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Water District Director	
Partners, if any	Callaway County EMA, Communities within district	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Callaway PWSD1 will continue to participate in various mutual aid agreements with communities in Callaway County. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the district will try to expand their current scope of this action.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Callaway County, Communities within the water district, Other water districts and special purpose districts	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
Callaway PWSD1 currently has a back-up generator for their systems. This action ensures they will continue to have back up generation for their system.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Water District Director	
Partners, if any	Red Cross, SEMA, FEMA, Callaway County EMA, Communities within water district	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
Callaway PWSD1 currently clears all vegetation and combustible material from its infrastructure. It will continue to do so throughout the life of this plan.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Water District Director	
Partners, if any	Utility Providers, Callaway County, Communities located in the water district	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: Callaway PWSD1 currently has transfer switches for generators. This action is a continuation of current practice.		
2017 Update	This is a continuation of current practice.	
Lead Department or Agency	Water District Director	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration: This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. This already a practice by the water supply district, but they will continue this practice.		
2017 Update	New action	
Lead Department or Agency	Water District Director and Communities Served by Water District	
Partners, if any	Utility providers, Callaway County	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	

Callaway PWSD1 will work with the Callaway County EMA on education for natural hazard response. Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:

- Continue to establish or distribute educational materials for public regarding earthquakes in Missouri
- Provide public education materials concerning the dangers of icy roads
- Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training
- Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards
- Create agreements and distribute information on available cooling centers
- Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system.
- Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure
- Encourage safe driving through public education campaigns, websites, community events

2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Public and Private agencies, Callaway County EMA, Communities within the Water District	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

Callaway County Public Water Supply District #2

1.2 Continue to encourage cooperative agreements between water providers and fire districts

Hazard(s) addressed	Dam Failure	Extreme Heat
	Drought	Wildfire
Plan for Implementation and Administration: Cooperative agreements between water districts/providers and fire districts are not as widespread in the county as fire districts would like. Ease of access to water facilities would allow fire districts to mitigate the effects of fire in many places in the county. Callaway PWSD2 will work with fire districts in Callaway to establish cooperative agreements to ensure adequate water supplies.		
2017 Update	This is informally done, but is retained in the update to encourage the action in the future.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Callaway County, Communities Served by Water District, Fire Districts	
Potential Funding Sources	Local, State, and/or Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	agreements are in place and maintained as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 15	Priority: 18 (Medium)

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Callaway PWSD2 will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Communities serviced by water district, Callaway County	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: Although Callaway PWSD2 does not have to evacuate people in the case of an emergency, they do have to plan for access to their infrastructure in an emergency. Callaway PWSD2 already does this, this action will encourage them to continue doing it in future years.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Water District Director	
Partners, if any	Callaway County EMA, City Councils, Communities serviced by Water District	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Callaway PWSD2 will continue to participate in various mutual aid agreements with communities in Callaway County. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Water District	
Partners, if any	Callaway County EMA, Callaway County, Other Callaway County water districts and water providers, Communities serviced by the water district	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
Callaway PWSD2 currently has a back-up generator for their systems. This action ensures they will continue to have back up generation for their system.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Red Cross, SEMA, FEMA, Callaway County EMA, School Districts	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.3 Maintain clearance of vegetation and combustible material from critical infrastructure

Hazard(s) addressed	Earthquake	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
Callaway PWSD2 currently clears all vegetation and combustible material from its infrastructure. It will continue to do so throughout the life of this plan		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Water District Director	
Partners, if any	Utility Providers, Communities serviced by the water district, Callaway County	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Vegetation is removed or maintained properly	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	PD, LF	
Benefit/Cost Score: 4/-1	STAPLEE score: 18	Priority: 21 (HIGH)

3.6 Encourage shelters and critical infrastructure to have electric transfer switches and standardized plug up for generator

Hazard(s) addressed	Earthquake	Severe Winter Weather
Plan for Implementation and Administration: Callaway PWSD2 currently has transfer switches for generators. This action is a continuation of current practice.		
2017 Update	This is still encouraged for shelters. Critical infrastructure was added to the action for the update as it is vital for businesses and agencies providing essential services (power, water, etc.) to citizens.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Callaway County EMA, Callaway County, Communities Served by Water District, City Councils in Water District Area	
Potential Funding Sources	Local, Federal, State	
Projected Completion Date	2018	
Criterion for Completion	Shelters and critical infrastructure are provided with cost and transfer switch information	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 21	Priority: 24 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration: This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. This already a practice by the water supply district, but they will continue this practice.		
2017 Update	New action	
Lead Department or Agency	Water District Director	
Partners, if any	Utility providers, Callaway County Commission, Communities Services by Water District	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
<p>Callaway PWSD2 will work with the Callaway County EMA on education for natural hazard response. The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:</p> <ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Water District Director and Board	
Partners, if any	Callaway County EMA, Callaway County, Communities within water district	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

Fulton Public Schools

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Fulton Public Schools will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	School Safety Coordinator, Facilities Management Office, School Principals	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction, Local, State, and Federal	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration: Schools take part in annual hazard drills and will continue to do so.		
2017 Update	New Action	
Lead Department or Agency	School District Safety Coordinator, Superintendent, School Principals	
Partners, if any	FEMA, SEMA, Callaway County EMA, Callaway County Commission, City Council	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	

Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)
---------------------------------	--------------------------	----------------------------

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: Fulton Public Schools will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. Additionally, they will work with the Callaway County EMA will establish and maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Superintendent, School Principals	
Partners, if any	Callaway County EMA, Local Jurisdiction, Local agencies, SEMA, FEMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: Fulton Public Schools will continue to participate in various mutual aid agreements. All participating jurisdictions cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan. Mutual aid agreements exist between utility districts, fire districts, and law enforcement. Collaboration also exists between local agencies and state and federal agencies. Sheltering agreements with local non-profits, businesses, and houses of worship are also maintained.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Superintendent and school board	
Partners, if any	Callaway County, Local Jurisdiction , Local agencies, SEMA, FEMA, USACE, USFW	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.3 Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: This action is already taking place through the Callaway County EMA and Fulton Public Schools. Both the county and school district will also continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system.		
2017 Update	This is done annually by school districts and is retained to encourage them to continue with this action.	
Lead Department or Agency	Callaway County EMA, School District Safety Coordinator	
Partners, if any	Local agencies, SEMA, FEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	School hazard plans are consistently reviewed and updated as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.4 Ensure the ability to respond to severe winter weather

Hazard(s) addressed	Severe Winter Weather	
Plan for Implementation and Administration: Fulton Public Schools will maintain contracts with local snow plow companies to ensure access to facilities as needed. They also gauge the weather during events and make the necessary decisions regarding school cancellations.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Superintendent, School Board	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Contracts are in place prior to winter season	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 19	Priority: 24 (HIGH)

2.8 Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather.

Hazard(s) addressed	Windstorm	Severe Winter Weather
	Flood	Tornado
	Hailstorm	
Plan for Implementation and Administration:		
School superintendents expressed interest in working closer with MODOT in the upcoming year to ensure that school closings or early releases are coordinated with the entities clearing roads. When inclement weather occurs during the school day was determined by school leadership in update meetings, that it is safer to keep students in school until roads are cleared than send them home as roads are being cleared or have not been cleared yet, assuming the weather conditions are stagnant or not worsening. Fulton Public Schools will be a part of this communication with MODOT and Callaway County.		
2017 Update	New action	
Lead Department or Agency	Superintendent, Bus Company or Transportation Director within school, School District Safety Coordinator	
Partners, if any	Callaway Road & Bridge, MODOT, Callaway County EMA	
Potential Funding Sources	Local, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Regular communication is established and ongoing	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 21	Priority: 28 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado
Plan for Implementation and Administration:	
If the funding were to become available, Fulton Public Schools would construct a tornado safe room(s). It is a continuous consideration of the school.	
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.
Lead Department or Agency	District Superintendent, District Manager, School Board
Partners, if any	SEMA, FEMA, Callaway County EMA, City Council,
Potential Funding Sources	Federal and State
Projected Completion Date	Ongoing
Criterion for Completion	Funding identified and site location identified
Projected Cost	Significant
Benefits (Avoided Losses/Damages)	I/C, EMCC

Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)
---------------------------------	--------------------------	----------------------------

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
Fulton Public Schools would like to purchase and install emergency generators at each campus, but this is entirely dependent on available funding.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, School Superintendent, School Board	
Partners, if any	Red Cross, SEMA, FEMA	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.5 Equip all school buses with mobile battery chargers for cellular devices.

Hazard(s) addressed	Dam Failure	Severe Winter Weather
	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
Plan for Implementation and Administration:		
During a winter weather event in 2016, school districts reported that bus radios were not able to get signal and drivers were on the roads so long that cell phone batteries ran out of power. This was an issue for both the buses on the road, schools attempting to contact buses, and parents who did not have information about the whereabouts of their children during inclement weather. Communication between the schools and buses is critical in non-inclement weather but even more important during severe weather. This action is to place battery chargers for cell phones in all school buses to be kept charged and used in case of emergency. Fulton will work with Callaway County EMA to identify a funding source for these chargers.		
2017 Update	This is a new action.	
Lead Department or Agency	School District Superintendents, Callaway County EMA, School Boards	
Partners, if any	Local Agencies, SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2017-2018	
Criterion for Completion	All buses equipped with battery chargers	
Projected Cost	Moderate	

Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 17	Priority: 20 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration:		
This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. Fulton School District currently does this, but it will continue to trim trees and branches.		
2017 Update	New action	
Lead Department or Agency	School Facilities/Maintenance	
Partners, if any	Utility providers	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
Fulton Public Schools will continue to work with the Callaway County Emergency Management Agency to implement natural hazard awareness within the school district. The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The agency is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:	
<ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. 	

	<ul style="list-style-type: none"> • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 	
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies, School Superintendents, and School Principals	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.2 Replace overhead utilities with underground utilities where possible.

Hazard(s) addressed	Hailstorm	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
Fulton school district would like to replace above ground utility lines with underground lines where applicable. They have identified that the lines closest to buildings and athletic fields are the primary areas where this is needed. This was an action in the previous update, but due to cost prohibition, it was not completed. If funds become available, the school district will complete this action.		
2017 Update	This is not frequently done because of the cost. It is dramatically more expensive to replace the overhead utilities with underground utilities, but when given the option and the resources, Fulton and schools will do it when possible.	
Lead Department or Agency	Utility Provider, School Superintendent, and School Facility/Maintenance	
Partners, if any	Callaway Electric Coop, Ameren UE, other providers of phone, cable, and electricity	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Lines are prioritized and buried where applicable	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

New Bloomfield R-III School District

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: New Bloomfield will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	School Safety Coordinator, Facilities Management Office, School Principals	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction, Local, State, and Federal	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration: New Bloomfield School District will continue their participation in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	School District Safety Coordinator, Superintendent, School Principals	
Partners, if any	FEMA, SEMA, Callaway County EMA, Callaway County Commission, City Council	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	

Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)
---------------------------------	--------------------------	----------------------------

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: New Bloomfield School District will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. New Bloomfield Public Schools work with the Callaway County EMA to maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Superintendent, School Principals	
Partners, if any	Callaway County EMA, Local Jurisdiction, Local agencies, SEMA, FEMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: New Bloomfield Public Schools will continue to participate in various mutual aid agreements with communities in Callaway County and other school districts. New Bloomfield Schools will cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Superintendent and school board	
Partners, if any	Callaway County, Local Jurisdiction , Local agencies, SEMA, FEMA, USACE, USFW	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.3 Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: This action is already taking place through the Callaway County EMA and the school district superintendents. Both the county and schools will also continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system		
2017 Update	This is done annually by school districts and is retained to encourage them to continue with this action.	
Lead Department or Agency	Callaway County EMA, School District Safety Coordinator	
Partners, if any	Local agencies, SEMA, FEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	School hazard plans are consistently reviewed and updated as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.4 Ensure the ability to respond to severe winter weather

Hazard(s) addressed	Severe Winter Weather	
Plan for Implementation and Administration: New Bloomfield Public Schools will maintain contracts with local snow plow companies to ensure access to facilities as needed. They will also ensure that the school district responds to severe winter weather adequately with late starts, school closings, or early releases.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Superintendent, School Board	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Contracts are in place prior to winter season	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 19	Priority: 24 (HIGH)

2.8 Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather.

Hazard(s) addressed	Windstorm	Severe Winter Weather
	Flood	Tornado
	Hailstorm	
Plan for Implementation and Administration:		
New Bloomfield Public Schools, along with other school superintendents, expressed interest in working closer with MODOT in the upcoming year(s) to ensure that school closings or early releases are coordinated with the entities clearing roads. When inclement weather occurs during the school day was determined by school leadership in update meetings, that it is safer to keep students in school until roads are cleared than send them home as roads are being cleared or have not been cleared yet, assuming the weather conditions are stagnant or not worsening. They will work with other schools, Callaway Road and Bridge, and MODOT to accomplish this task.		
2017 Update	New action	
Lead Department or Agency	Superintendent, Bus Company or Transportation Director within school, School District Safety Coordinator	
Partners, if any	Callaway Road & Bridge, MODOT, Callaway County EMA	
Potential Funding Sources	Local, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Regular communication is established and ongoing	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 21	Priority: 28 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
New Bloomfield School District does not have a tornado safe room at the current time, as it has been cost prohibitive. If funding were to become available, they would install a tornado safe room.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	District Superintendent, District Manager, School Board	
Partners, if any	SEMA, FEMA, Callaway County EMA, City Council,	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	

Benefit/Cost Score: 4/5	STAPLEE score: 21	Priority: 20 (HIGH)
--------------------------------	--------------------------	----------------------------

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
New Bloomfield Public Schools would like to purchase and install emergency generators at each campus, but like with other actions, it is cost prohibitive and if funding becomes available, the school will pursue purchasing generators.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, School Superintendent, School Board	
Partners, if any	Red Cross, SEMA, FEMA	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/5	STAPLEE score: 18	Priority: 21 (HIGH)

3.5 Equip all school buses with mobile battery chargers for cellular devices.

Hazard(s) addressed	Dam Failure	Severe Winter Weather
	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
Plan for Implementation and Administration:		
During a winter weather event in 2016, school districts reported that bus radios were not able to get signal and drivers were on the roads so long that cell phone batteries ran out of power. This was an issue for both the buses on the road, schools attempting to contact buses, and parents who did not have information about the whereabouts of their children during inclement weather. Communication between the schools and buses is critical in non-inclement weather but even more important during severe weather. This action is to place battery chargers for cell phones in all school buses to be kept charged and used in case of emergency. New Bloomfield Schools will work with Callaway County EMA to identify funding and completion of this action.		
2017 Update	This is a new action.	
Lead Department or Agency	School District Superintendents, Callaway County EMA, School Boards	
Partners, if any	Local Agencies, SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2017-2018	
Criterion for Completion	All buses equipped with battery chargers	
Projected Cost	Moderate	

Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 17	Priority: 20 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration:		
This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. New Bloomfield Public Schools currently completes this action and will continue to complete this action.		
2017 Update	New action	
Lead Department or Agency	School Facilities/Maintenance	
Partners, if any	Utility providers	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
New Bloomfield Public Schools will The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:	
<ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure 	

<ul style="list-style-type: none"> Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies, School Superintendents, and School Principals	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.2 Replace overhead utilities with underground utilities where possible.

Hazard(s) addressed	Hailstorm	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
<p>New Bloomfield Schools has identified that the lines closest to buildings and athletic fields are the primary areas where this is needed. This action is expensive and if funding becomes available, they will complete this action, but it is depending on the fund availability.</p>		
2017 Update	This is not frequently done because of the cost. It is dramatically more expensive to replace the overhead utilities with underground utilities, but when given the option and the resources, Fulton and schools will do it when possible.	
Lead Department or Agency	Utility Provider, School Superintendent, and School Facility/Maintenance	
Partners, if any	Callaway Electric Coop, Ameren UE, other providers of phone, cable, and electricity	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Lines are prioritized and buried where applicable	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

North Callaway R-I School District

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: North Callaway School District will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place for all jurisdictions:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	School Safety Coordinator, Facilities Management Office, School Principals	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction, Local, State, and Federal	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration: North Callaway School District will continue to participate in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	School District Safety Coordinator, Superintendent, School Principals	
Partners, if any	FEMA, SEMA, Callaway County EMA, Callaway County Commission, City Council	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	

Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)
---------------------------------	--------------------------	----------------------------

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: North Callaway School District will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. North Callaway School District will work with the Callaway EMA to maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Superintendent, School Principals	
Partners, if any	Callaway County EMA, Local Jurisdiction, Local agencies, SEMA, FEMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: North Callaway School District will continue to participate in various mutual aid agreements with other school districts and communities in Callaway County. They will cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Superintendent and school board	
Partners, if any	Callaway County, Local Jurisdiction , Local agencies, SEMA, FEMA, USACE, USFW, etc...	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.3 Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: This action is already taking place through the Callaway County EMA and the school district superintendents. Both the county and school will continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system		
2017 Update	This is done annually by school districts and is retained to encourage them to continue with this action.	
Lead Department or Agency	Callaway County EMA, School District Safety Coordinator	
Partners, if any	Local agencies, SEMA, FEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	School hazard plans are consistently reviewed and updated as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.4 Ensure the ability to respond to severe winter weather

Hazard(s) addressed	Severe Winter Weather	
Plan for Implementation and Administration: North Callaway School District will maintain contracts with local snow plow companies to ensure access to facilities as needed. They will continue to assess winter weather conditions to take action on school closings, delay start, or early releases to minimize student, faculty, and staff risk in severe winter weather conditions.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Superintendent, School Board	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Contracts are in place prior to winter season	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 19	Priority: 24 (HIGH)

2.8 Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather.

Hazard(s) addressed	Windstorm	Severe Winter Weather
	Flood	Tornado
	Hailstorm	
Plan for Implementation and Administration:		
School superintendents expressed interest in working closer with MODOT in the upcoming year to ensure that school closings or early releases are coordinated with the entities clearing roads. When inclement weather occurs during the school day was determined by school leadership in update meetings, that it is safer to keep students in school until roads are cleared than send them home as roads are being cleared or have not been cleared yet, assuming the weather conditions are stagnant or not worsening. North Callaway Schools will work with Callaway EMA, Callaway Road and Bridge, and MODOT to establish this action. They will also work with other school districts to accomplish the task.		
2017 Update	New action	
Lead Department or Agency	Superintendent, Bus Company or Transportation Director within school, School District Safety Coordinator	
Partners, if any	Callaway Road & Bridge, MODOT, Callaway County EMA	
Potential Funding Sources	Local, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Regular communication is established and ongoing	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 21	Priority: 28 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
North Callaway School District plans to construct a tornado safe room in the next year to two years.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	District Superintendent, District Manager, School Board	
Partners, if any	SEMA, FEMA, Callaway County EMA, City Council,	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
North Callaway School District would like to purchase and install emergency generators at each campus. This action is cost prohibitive, but if funding were to be made available, they would pursue completing the action.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, School Superintendent, School Board	
Partners, if any	Red Cross, SEMA, FEMA	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 18	Priority: 21 (HIGH)

3.5 Equip all school buses with mobile battery chargers for cellular devices.

Hazard(s) addressed	Dam Failure	Severe Winter Weather
	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
Plan for Implementation and Administration:		
During a winter weather event in 2016, school districts reported that bus radios were not able to get signal and drivers were on the roads so long that cell phone batteries ran out of power. This was an issue for both the buses on the road, schools attempting to contact buses, and parents who did not have information about the whereabouts of their children during inclement weather. Communication between the schools and buses is critical in non-inclement weather but even more important during severe weather. This action is to place battery chargers for cell phones in all school buses to be kept charged and used in case of emergency. North Callaway School District will work with the Callaway EMA to identify funding for this action to ensure its completion.		
2017 Update	This is a new action.	
Lead Department or Agency	School District Superintendents, Callaway County EMA, School Boards	
Partners, if any	Local Agencies, SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2017-2018	
Criterion for Completion	All buses equipped with battery chargers	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 17	Priority: 20 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration:		
This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. North Callaway School District currently does this and will continue to do this in the future.		
2017 Update	New action	
Lead Department or Agency	School Facilities/Maintenance	
Partners, if any	Utility providers	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
North Callaway Public schools with work with the Callaway County Emergency Management Agency on this action. The Callaway County Emergency Management Agency (EMA) currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:	
<ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 	
2017 Update	This is done on an ongoing basis.
Lead Department or Agency	Callaway County EMA
Partners, if any	Public and Private agencies, School Superintendents, and School Principals

Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 21	Priority: 26 (HIGH)

5.2 Replace overhead utilities with underground utilities where possible.

Hazard(s) addressed	Hailstorm	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
North Callaway Public Schools have identified that the lines closest to buildings and athletic fields are the primary areas where this is needed. This action is a high cost action and if funding becomes available to do this, they will complete this action.		
2017 Update	This is not frequently done because of the cost. It is dramatically more expensive to replace the overhead utilities with underground utilities, but when given the option and the resources, Fulton and schools will do it when possible.	
Lead Department or Agency	Utility Provider, School Superintendent, and School Facility/Maintenance	
Partners, if any	Callaway Electric Coop, Ameren UE, other providers of phone, cable, and electricity	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Lines are prioritized and buried where applicable	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

South Callaway R-III School District

1.6 Review, prioritize, institute and monitor needed upgrades or retrofits for critical buildings and infrastructure.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration:		
South Callaway School District will continue their current practice of inspecting critical infrastructure and making repairs and upgrades as needed. Prioritization of upgrades and retrofitting is dependent on funding need. The following list includes activities that are currently in place:		
<ul style="list-style-type: none"> • Evaluate access problems to critical infrastructure • Ensure architectural features are constructed to minimize windborne debris • Brace high value equipment 		
2017 Update	This is not done as frequently as the county would like, but it is done when possible and financially feasible.	
Lead Department or Agency	School Safety Coordinator, Facilities Management Office, School Principals	
Partners, if any	Callaway County Commission, Callaway County EMA, Local Jurisdiction, Local, State, and Federal	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Upgrades and/or retrofits are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 15	Priority: 20 (HIGH)

1.8 Continue to promote annual hazard drill participation throughout the county.

Hazard(s) addressed	Earthquake	Wildfire
	Tornado	
Plan for Implementation and Administration:		
South Callaway School District will continue to participate in annual hazard drills.		
2017 Update	New Action	
Lead Department or Agency	School District Safety Coordinator, Superintendent, School Principals	
Partners, if any	FEMA, SEMA, Callaway County EMA, Callaway County Commission, City Council	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	An increasing number of participants in annual drills each year.	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	

Benefit/Cost Score: 6/-1	STAPLEE score: 19	Priority: 24 (HIGH)
---------------------------------	--------------------------	----------------------------

2.1 Review emergency access /evacuation routes and mitigate any problem areas.

Hazard(s) addressed	Earthquake	Severe Winter Weather
	Flood	Wildfire
Plan for Implementation and Administration: South Callaway School District will continue to review access to their critical infrastructure and review evacuation plans in accordance with the Callaway EOP. They will work with the Callaway County EMA to maintain a system for emergency evacuation or sheltering of school population to include parent reunification plans.		
2017 Update	This is an ongoing action that will be continued throughout the lifespan of this update.	
Lead Department or Agency	Superintendent, School Principals	
Partners, if any	Callaway County EMA, Local Jurisdiction, Local agencies, SEMA, FEMA	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Routes are consistently assessed for viability	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C , LF, EMCC	
Benefit/Cost Score: 6/-1	STAPLEE score: 17	Priority: 22 (HIGH)

2.2 Identify, review, and implement mechanisms to foster collaboration among jurisdictions, agencies and special districts.

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: South Callaway School District will continue to participate in various mutual aid agreements with other communities and school districts in Callaway County. South Callaway School District will continue to cooperate with Callaway County EMA in the maintenance of the county Emergency Operations Plan.		
2017 Update	This is done already, but the jurisdictions will try to expand their current scope of this action.	
Lead Department or Agency	Superintendent and school board	
Partners, if any	Callaway County, Local Jurisdiction , Local agencies, SEMA, FEMA, USACE, USFW	
Potential Funding Sources	Local, State, and Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Mutual aid agreements are in place and regularly maintained	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.3 Review and Update school plans on an annual basis to ensure they address all potential threats from natural hazards

Hazard(s) addressed	All Hazards	
Plan for Implementation and Administration: This action is already taking place through the Callaway County EMA and the school district superintendents. Both the county and schools will also continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. South Callaway School District will continue to update their school plans on an annual basis.		
2017 Update	This is done annually by school districts and is retained to encourage them to continue with this action.	
Lead Department or Agency	Callaway County EMA, School District Safety Coordinator	
Partners, if any	Local agencies, SEMA, FEMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	School hazard plans are consistently reviewed and updated as needed	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 18	Priority: 25 (HIGH)

2.4 Ensure the ability to respond to severe winter weather

Hazard(s) addressed	Severe Winter Weather	
Plan for Implementation and Administration: South Callaway School District will maintain contracts with local snow plow companies to ensure access to facilities as needed. They will continue to assess severe winter weather to ensure that the risk of students, faculty, and staff is minimized by school closings, delayed start, or early release. They will continue to work with other school districts, road maintenance crews, and the Callaway EMA on this action.		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Superintendent, School Board	
Partners, if any	Callaway County EMA	
Potential Funding Sources	Local	
Projected Completion Date	Ongoing	
Criterion for Completion	Contracts are in place prior to winter season	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-3	STAPLEE score: 19	Priority: 24 (HIGH)

2.8 Continue to maintain lines of communication between Missouri Department of Transportation (MODOT), Callaway Road & Bridge, and schools regarding road conditions and clearance before and during inclement weather.

Hazard(s) addressed	Windstorm	Severe Winter Weather
	Flood	Tornado
	Hailstorm	
Plan for Implementation and Administration:		
School superintendents expressed interest in working closer with MODOT in the upcoming year to ensure that school closings or early releases are coordinated with the entities clearing roads. When inclement weather occurs during the school day was determined by school leadership in update meetings, that it is safer to keep students in school until roads are cleared than send them home as roads are being cleared or have not been cleared yet, assuming the weather conditions are stagnant or not worsening. This action will be in coordination with the Callaway EMA, Callaway Road and Bridge, MODOT, and other school districts to ensure that decisions are made with the most information about current and future road conditions.		
2017 Update	New action	
Lead Department or Agency	Superintendent, Bus Company or Transportation Director within school, School District Safety Coordinator	
Partners, if any	Callaway Road & Bridge, MODOT, Callaway County EMA	
Potential Funding Sources	Local, State	
Projected Completion Date	Ongoing	
Criterion for Completion	Regular communication is established and ongoing	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 21	Priority: 28 (HIGH)

3.1 Build a Tornado safe room as funding is made available

Hazard(s) addressed	Tornado	
Plan for Implementation and Administration:		
South Callaway School District is always considering a tornado safe room, but at the current time the action is cost prohibitive. If funds were to come available, South Callaway School District would construct a tornado safe room.		
2017 Update	This is always a consideration for participating jurisdictions, but due to funding limitations, it is not feasible for many of them to meet a match or even access funding for any percentage. If that funding comes available, any of the jurisdictions would construct a safe room.	
Lead Department or Agency	District Superintendent, District Manager, School Board	
Partners, if any	SEMA, FEMA, Callaway County EMA, City Council,	
Potential Funding Sources	Federal and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Funding identified and site location identified	

Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/5	STAPLEE score: 21	Priority: 20 (HIGH)

3.2 Provide or coordinate back-up power to all critical infrastructure

Hazard(s) addressed	Earthquake	Windstorm
	Extreme Heat	Tornado
	Severe Winter Weather	
Plan for Implementation and Administration:		
South Callaway School District would like to purchase and install emergency generators at each campus. This action is cost prohibitive at the current time, but if funds were to become available, they would purchase and install emergency generators at each campus.		
2017 Update	This is ongoing and has been elaborated with action 3.2.	
Lead Department or Agency	Callaway County EMA, School Superintendent, School Board	
Partners, if any	Red Cross, SEMA, FEMA	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Generators are installed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/5	STAPLEE score: 18	Priority: 21 (HIGH)

3.5 Equip all school buses with mobile battery chargers for cellular devices.

Hazard(s) addressed	Dam Failure	Severe Winter Weather
	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
Plan for Implementation and Administration:		
During a winter weather event in 2016, school districts reported that bus radios were not able to get signal and drivers were on the roads so long that cell phone batteries ran out of power. This was an issue for both the buses on the road, schools attempting to contact buses, and parents who did not have information about the whereabouts of their children during inclement weather. Communication between the schools and buses is critical in non-inclement weather but even more important during severe weather. This action is to place battery chargers for cell phones in all school buses to be kept charged and used in case of emergency. South Callaway School District will work with the Callaway EMA to identify funding to ensure the completion of this action.		
2017 Update	This is a new action.	
Lead Department or Agency	School District Superintendents, Callaway County EMA, School Boards	
Partners, if any	Local Agencies, SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2017-2018	

Criterion for Completion	All buses equipped with battery chargers	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 17	Priority: 20 (HIGH)

3.8 Continue to trim trees and branches away from power lines and infrastructure as needed.

Hazard(s) addressed	Severe Winter Weather	Windstorm
	Hailstorm	
Plan for Implementation and Administration:		
This action encourages tree trimming away from critical infrastructure to minimize the potential impact from trees or tree branches damaging critical infrastructure and preventing critical services from being provided. South Callaway School District currently completes this action and will continue to trim trees and branches away from power lines and infrastructure.		
2017 Update	New action	
Lead Department or Agency	School Facilities/Maintenance	
Partners, if any	Utility providers	
Potential Funding Sources	Local, private	
Projected Completion Date	Ongoing	
Criterion for Completion	Trees and branches are maintained	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	PD, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 20	Priority: 23 (HIGH)

4.1 Develop and distribute natural hazard awareness information to the public and encourage best practices.

Hazard(s) addressed	All Hazards
Plan for Implementation and Administration:	
South Callaway School District will work with the Callaway County Emergency Management Agency (EMA) to complete this action. The Callaway County EMA currently has several educational programs in place. The Callaway County EMA is very involved with public education and awareness of natural hazards and other hazards. The following actions are taken by the Callaway County EMA on a regular basis:	
<ul style="list-style-type: none"> • Continue to establish or distribute educational materials for public regarding earthquakes in Missouri • Provide public education materials concerning the dangers of icy roads • Encourage Schools and nursing homes to include earthquake safety programs with other emergency preparedness training • Encourage all communities to be aware of or enroll in Firewise Communities/USA Program and Standards • Create agreements and distribute information on available cooling centers 	

<ul style="list-style-type: none"> • Continue to meet Revised Statutes of Missouri's earthquake emergency response and safety system. • Provide educational materials for outdoor workers and school athletic organizations on the dangers of excessive heat exposure • Encourage safe driving through public education campaigns, websites, community events 		
2017 Update	This is done on an ongoing basis.	
Lead Department or Agency	Callaway County EMA	
Partners, if any	Public and Private agencies, School Superintendents, and School Principals	
Potential Funding Sources	Local, Federal, and State	
Projected Completion Date	Ongoing	
Criterion for Completion	Callaway County EMA will continue its roll in public safety education	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/3	STAPLEE score: 21	Priority: 26 (HIGH)

5.2 Replace overhead utilities with underground utilities where possible.

Hazard(s) addressed	Hailstorm	Wildfire
	Severe Winter Weather	Windstorm
	Tornado	
Plan for Implementation and Administration:		
South County School District would like to replace above ground utility lines with underground lines where applicable. All School districts have identified that the lines closest to buildings and athletic fields are the primary areas where this is needed. Funding for this action is an issue, but if funding were to come available, the school district would replace the above ground utility lines with underground lines.		
2017 Update	This is not frequently done because of the cost. It is dramatically more expensive to replace the overhead utilities with underground utilities, but when given the option and the resources, Fulton and schools will do it when possible.	
Lead Department or Agency	School Superintendent, and School Facility/Maintenance	
Partners, if any	Callaway Electric Coop, Ameren UE, other providers of phone, cable, and electricity	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	Ongoing	
Criterion for Completion	Lines are prioritized and buried where applicable	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/5	STAPLEE score: 20	Priority: 23 (HIGH)

Deleted Actions from 2012

DELETED (2017): 3.1 Construct a training facility for fire and emergency services personnel

Hazard(s) addressed	Earthquake	Wildfire
Plan for Implementation and Administration: Callaway County and the City of Fulton, in cooperation with local fire and EMS districts, would like to construct a new training facility open to county or regional responders to facilitate better training of Callaway County emergency management staff.		
2017 Update	This was completed.	
Lead Department or Agency	Callaway County EMA, Fulton Protective Services Dept.	
Partners, if any	SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2016	
Criterion for Completion	Site and funding for facility are identified	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-5	STAPLEE score: 20	Priority: 23 (HIGH)

DELETED (2017): 3.3 Upgrade emergency alert system to automatic differentiated tone system.

Hazard(s) addressed	Earthquake	Tornado
	Wildfire	
Plan for Implementation and Administration: This action eliminates having to manually activate different tones for different hazards. All school districts would like to install this capability for every building on each campus.		
2017 Update	This was deleted because although it was in the last plan update, it was not seen as a priority or an action worth pursuing for the update or it was completed by the school.	
Lead Department or Agency	School District Superintendent and school safety coord.	
Partners, if any	Callaway EMA	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	2017	
Criterion for Completion	System installed	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, EMCC	
Benefit/Cost Score: 4/-3	STAPLEE score: 19	Priority: 20 (HIGH)

DELETED: 3.7 Install two-way radios on school busses that meet or exceed FCC standards and allow for monitoring of EOC traffic

Hazard(s) addressed	Dam Failure	Severe Winter Weather
	Earthquake	Tornado
	Extreme Heat	Wildfire
	Flood	Windstorm
Plan for Implementation and Administration: Callaway County EMA and School Districts will work together to secure funding to equip busses with these radios. This is needed due to poor communication between the school district main office and busses en route. Monitoring of EOC traffic can allow busses to alter their routes to accommodate traffic and help promote public safety.		
2017 Update	This action is being replaced with the new action 3.7.	
Lead Department or Agency	School District Superintendents, Callaway County EMA	
Partners, if any	Local Agencies, SEMA, FEMA	
Potential Funding Sources	Federal and State	
Projected Completion Date	2013	
Criterion for Completion	Radios installed	
Projected Cost	Moderate	
Benefits (Avoided Losses/Damages)	I/C, LF, EMCC	
Benefit/Cost Score: 6/-3	STAPLEE score: 19	Priority: 22 (HIGH)

DELETED (2017): 4.2 Install "fire danger level" signs at all fire stations

Hazard(s) addressed	Wildfire	
Plan for Implementation and Administration: The Callaway County Fire Chiefs Association will investigate the cost of installing fire danger signs at all fire stations in the county. This action will better educate the public on current fire conditions.		
2017 Update	This was deleted as it is not feasible.	
Lead Department or Agency	Callaway County Commission	
Partners, if any	Missouri Dept. of Conservation, USFS	
Potential Funding Sources	Local, State, Federal	
Projected Completion Date	2013	
Criterion for Completion	Purchase of signs and installation at stations	
Projected Cost	Minimal	
Benefits (Avoided Losses/Damages)	I/C, PD, LF, EMCC	
Benefit/Cost Score: 8/-1	STAPLEE score: 19	Priority: 26 (HIGH)

DELETED (2017): 5.3 Construct a parking shed for buses to keep busses free from hail, ice, and snow buildup.

Hazard(s) addressed	Severe Winter Weather	Hailstorm
Plan for Implementation and Administration:		
All school districts would like to construct new facilities that will shelter busses and possibly other key infrastructure from the damaging effects of hail, ice, and snow. School districts will review budgetary needs to achieve this action. Outside funding will likely be needed to complete these projects.		
2017 Update	Not all schools own their buses but it is not financially feasible for the schools that own their own buses nor is it a financial priority. If resources become available for this purpose, schools will pursue a parking shed, but at the current time it is not a priority.	
Lead Department or Agency	School District Superintendents	
Partners, if any	Local Agencies or financial donors	
Potential Funding Sources	Private, Local, Federal, and State	
Projected Completion Date	2015	
Criterion for Completion	Parking Shed constructed	
Projected Cost	Significant	
Benefits (Avoided Losses/Damages)	PD	
Benefit/Cost Score: 2/5	STAPLEE score: 20	Priority: 17 (Medium)

4.5 Funding Sources

There are numerous ways which local mitigation projects can be funded.

Local Funds

These funds come predominantly from property and sales tax revenues; they are generally allocated directly to school, public works, and other essential government functions. While there may be little room for mitigation funding within this revenue stream, mitigation activities frequently will be a part of essential government functions. For example, money that is allocated for a new school can fund stronger than normal roofs to help the school in the event of a tornado.

Non-Governmental Funds

Another potential source of revenue for local mitigation efforts are contributions of non-governmental organizations such as churches, charities, community relief funds, the Red Cross, hospitals, businesses, and nonprofit organizations. A variety of these local organizations can be tapped to help carry out local hazard mitigation initiatives.

Federal Funds

The bulk of federal funding for mitigation is available through the FEMA Mitigation Grants Programs; another possible funding source is Community Development Block Grants (CDBG) after a Presidential Disaster Declaration.

FEMA Mitigation Grant Funding - Jurisdictions which have adopted a FEMA approved Hazard Mitigation Plan are eligible for hazard mitigation funding through FEMA grant programs. The following five FEMA grant programs currently provide hazard mitigation funding:

- Hazard Mitigation Grant Program (HMGP)
- Pre-Disaster Mitigation (PDM)
- Flood Mitigation Assistance (FMA)

Mitigation activities which are eligible for funding vary between the programs (see Figure 4.5.1). All potential projects must match the stated goals and objectives of the Cole County/Jefferson City Natural Hazard Mitigation Plan and the State of Missouri Hazard Mitigation Plan.

Figure 4.5.1

Eligible Activities for FEMA Mitigation Grant Programs

Activity	HMGP	PDM	FMA
1. Mitigation Projects	X	X	X
Property Acquisition and Structure Demolition or Relocation	X	X	X
Structure Elevation	X	X	X
Mitigation Reconstruction			
Dry Flood proofing of Historic Residential Structures	X	X	X
Dry Flood proofing of Non-residential Structures	X	X	X
Minor Localized Flood Reduction Projects	X	X	X
Structural Retrofitting of Existing Buildings	X	X	
Non-structural Retrofitting of Existing Buildings and Facilities	X	X	
Safe Room Construction	X	X	
Infrastructure Retrofit	X	X	
Soil Stabilization	X	X	
Wildfire Mitigation	X	X	
Post-disaster Code Enforcement	X		
5% Initiative Projects	X		
2. Hazard Mitigation Planning	X	X	X
3. Management Costs	X	X	X

Source: www.fema.gov/library/viewRecord.do?id=3648

Application and Cost Share Requirements:

The application process for the FEMA Mitigation Grant Programs includes a Benefit Cost Analysis (BCA). A potential project must have a Benefit Cost Ratio of at least 1.0 to be considered for funding; a ratio of 1.0 indicates at least \$1 benefit for each \$1 spent on the project.

A BCA is the first step in assessing if a project has the potential to be funded. The BCA for a potential project is run on FEMA’s BCA Software; planners at the Mid-MO RPC are trained on this software.

Application for most of the mitigation grant programs must be made through eGrants, FEMA’s web-based, electronic grants management system. HMGP has a paper application.

Cost share requirements and the application format for these five programs are shown in Figure 4.5.2. Contributions of cash, in-kind services or materials, or any combination thereof, may be accepted as part of the non-Federal cost share. For FMA, not more than one half of the non-Federal contribution may be provided from in-kind contributions.

Figure 4.5.2			
FEMA Mitigation Grant Programs – Local Match and Application Information			
Grant Program	Cost Share		Application
	Federal/Local Match	Notes	
HMGP	75/25		Paper
PDM	75/25		e-grants
PDM (Small Impoverished Community)	90/10	Qualification Requirements for "small impoverished": <ul style="list-style-type: none"> • A community of 3,000 or fewer individuals identified by the State as a rural community that is not a remote area within the corporate boundaries of a larger city • An average per capita annual income not exceeding 80 percent of the national per capita income, based on best available data. (For current information: http://www.bea.gov) • A local unemployment rate exceeding by 1 percentage point or more the most recently reported, average yearly national unemployment rate. (For current information: http://www.bls.gov/eag/eag.us.htm) • Meet other criteria required by the State/Tribe/Territory in which the community is located 	e-grants
FMA	75/25	The FMA is broken into (match share Federal/Local): <ul style="list-style-type: none"> -Insured properties and planning grants (75/25) -Repetitive loss property (90/10) -Severe repetitive loss property (100/0) 	e-grants

Details of each program are discussed below.

Hazard Mitigation Grant Program (HMGP)

The Hazard Mitigation Grant Program (HMGP) was created in November 1988 through Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act. The HMGP assists states and local communities in implementing long-term mitigation measures following a Presidential disaster declaration. After a major disaster, communities may be able to identify additional areas where mitigation can help prevent losses in the future.

HMGP funding is allocated using a “sliding scale” formula based on the percentage of the funds spent on Public and Individual Assistance programs for each Presidential Disaster Declaration.

The HMGP can be used to fund projects to protect either public or private property; the proposed projects must fit within the state and local government's overall mitigation strategy for the disaster area, and comply with program guidelines.

Eligibility for funding under the HMGP is limited to state and local governments, certain private nonprofit organizations or institutions that serve a public function, Indian tribes and authorized tribal organizations. Applicants work through their state which is responsible for setting priorities for funding and administering the program.

More information on this program is available at: www.fema.gov/government/grant/hmgrp/

Pre-Disaster Mitigation Program (PDM)

With the Disaster Mitigation Act of 2000, Congress approved the creation of a national program to provide a funding mechanism that is not dependent on a Presidential Disaster Declaration.

The Pre-Disaster Mitigation (PDM) Program provides funding for cost-effective hazard mitigation activities that complement a comprehensive mitigation program, and reduce injuries, loss of life, and damage and destruction of property. The PDM grant funds are provided to the state which then provides sub-grants to local governments for eligible mitigation activities.

More information on this program is available at: www.fema.gov/government/grant/pdm/

Flood Mitigation Assistance Program (FMA)

FMA was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101) with the goal of reducing or eliminating claims under the NFIP. Applicants must be participants in good standing in NFIP and properties to be mitigated must have flood insurance.

States administer the FMA program and are responsible for selecting projects for funding from the applicants submitted by all communities within the state. The state forwards selected applications to FEMA for an eligibility determination. Although individuals cannot apply directly for FMA funds, their local government may submit an application on their behalf.

FMA funding for the state depends on the number of repetitive losses in the state. The frequency of flooding in Missouri in recent years, coupled with the losses incurred, has caused Missouri's funding to rise. This is a good program for smaller projects like low water crossings, according to Sheila Huddleston, Missouri State Hazard Mitigation Officer.

For FMA, not more than one half of the non-Federal may be provided from in-kind contributions.

More information on this program is available at: www.fema.gov/government/grant/fma/

Community Development Block Grant (CDBG)

The objective of the CDBG program is to assist communities in rehabilitating substandard dwelling structures and to expand economic opportunities, primarily for low-to-moderate-income families. After a Presidential Disaster Declaration CDBG funds may be used for long-term needs

such as acquisition, reconstruction, and redevelopment of disaster-affected areas. There is no low-to-moderate income requirement after a Presidential Disaster Declaration.

Section 5: Plan Maintenance Process

Requirement
§201.6(c)(4)(i):

[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 Plan Monitoring and Evaluation

The Callaway County Hazard Mitigation Plan will be monitored and evaluated on a yearly basis during the months of March and April, beginning in the year following approval and adoption. This would mean there will be four monitoring/evaluation periods (spring 2013, spring 2014, spring 2015, spring 2016). The last monitoring and evaluation in 2016 will lead into the 5-year update process.

The monitoring and evaluation will be facilitated through the Mid-MO Regional Planning Commission. It will consist of the following:

1. Surveys will be sent to all participating jurisdictions for information including: mitigation actions which have been implemented in the jurisdiction, changes in priorities of mitigation actions within the jurisdiction, needs not addressed by the current plan. A sample survey is shown in Figure 5.1.1.
2. Survey information will be collated by planners at the Mid-MO RPC.
3. Meeting(s) of the Hazard Mitigation Technical Steering Committee will be convened by the Mid-MO RPC to discuss survey feedback, any changes in hazard risks in the county, and any other pertinent information.
4. A yearly report will be written and included as an addendum to the current plan.

Figure 5.1.1

Yearly Survey of Mitigation Actions for (Sample)

Action #	Mitigation Action	Priority	Plan for Implementation and Administration	Lead Department or Agency	Projected Completion Date	Criterion for Completion	Current Status of Mitigation Action	Comments

Please indicate the current status of each mitigation action on the above chart. Please note any change to the priorities of actions.

Are there any changes in your jurisdiction which may affect the content of the Callaway County Hazard Mitigation Plan? If so, please describe.

5.2 Plan Updating

FEMA requires that a local hazard mitigation plan, such as the Callaway Natural Hazard Mitigation Plan, be updated and reapproved by FEMA every five years. This five year period, until the next expiration date, is measured from FEMA's acceptance of the first adoption resolutions submitted for an approved plan.

Assuming approval and adoption of the current plan sometime in 2012, the Callaway County Natural Hazard Mitigation Plan will need to be updated and reapproved by FEMA in 2017. A proposed timeline for the update is shown in Figure 5.2.1.

Figure 5.2.1 Proposed Timeline for 5-year Update of Hazard Mitigation Plan		
KEY: PED = Plan Expiration Date		
Activity	Timeline to Begin	Responsible Party
Preliminary update of data	Yearly during maintenance/review of plan	Mid-MO RPC
Prepare cost estimates for update of plan and submit to SEMA	PED - 14 months	Mid-MO RPC
Receive Memorandum of Agreement from SEMA for update	PED - 12 months	SEMA
Review data for any additional updates	PED - 12 months	Mid-MO RPC
Contact participating jurisdictions re: representation on Technical Steering Committee for update of plan	PED - 12 months	Mid-MO RPC
Meetings to conduct preliminary review and update of plan	PED - 11 months	Technical Steering Committee
Survey to participating jurisdictions re: capabilities, vulnerable assets, future development	PED - 11 months	Mid-MO RPC
Public Meeting #1 for comment and input on draft update	PED - 9 months	Mid-MO RPC/Technical Steering Committee
Draft of update due at SEMA	PED - 8 months	Mid-MO RPC
Participating jurisdictions hold meetings to discuss plan and mitigation actions	PED - 8 months	Participating Jurisdictions
Public Meeting #2 for comment and input on final update	PED - 6 months	Mid-MO RPC/Technical Steering Committee
Final plan due at SEMA for review before submission to FEMA	PED - 5 months	Mid-MO RPC
Plan reviewed by SEMA	PED - 4 months	SEMA
Required changes/additions made to plan	PED - 4 months	Mid-MO RPC
Plan submitted to FEMA	PED - 3 months	SEMA
Participating jurisdictions adopt approved plan	PED - 2 months	Participating Jurisdictions

The ongoing yearly maintenance and evaluation of the plan, as described previously, will be of great value when undertaking the five year update. Continuity of personnel on the Hazard Mitigation Technical Steering Committee throughout the five year process would be highly beneficial in taking mitigation planning to the next level.

The following data gaps in the current plan should be examined during the 2016 update process:

Dam Failure

Information from the mapping of the high hazards dams in the county should be completed before 2016. Emergency Action Plans (EAPs) may have been written for some, or all, of the regulated dams in the county by this time. The following sites may be helpful in obtaining current information on the progress of this work: DNR's Dam Safety Program (<http://www.dnr.mo.gov/env/wrc/damsft/damsfthp.htm>) and DamSafetyAction.org,

Levee Failure

There are some data gaps in assessing vulnerability to levee failure which, while not critical to gaining an overall perspective on vulnerability, would increase accuracy if available.

Inundation information is not readily available for areas protected by levee districts and areas protected by non-district or private levees are not known.

The US Army Corps of Engineers (USACE), working with FEMA and other federal, state, and local agencies, assembled a Regional Interagency Levee Task Force (ILTF) in 2008 to provide a uniform approach across the area impacted by flooding in the Midwest. Data is currently being updated and made more available through this task force. Following the intense flooding throughout the Missouri River Valley in 2011, the USACE added significant content to their website. This information is continuously being updated and the new mapping capability may be useful during the maintenance of this plan and during the next five year update. The webpage for the National Levee Database can be found at <http://nld.usace.army.mil/egis/f?p=471:1:3352100546410181>.

5.3 Integration of Hazard Mitigation into Other Planning Mechanisms

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.

Successful mitigation depends on the actual implementation of the mitigation actions arrived at through the planning process. The composition of the Technical Steering Committee for the update of the Callaway County Natural Hazard Mitigation Plan bodes well for the successful incorporation of the hazard mitigation strategy into other planning processes throughout the Planning Area.

In addition to the core members of the Technical Steering Committee, the representatives from Callaway County were resourceful in bringing other knowledgeable staff to meetings on subjects in their particular areas of expertise. The entire process thus drew on experience and knowledge from: elected officials/staff from the incorporated communities; senior department members from Callaway County in key areas such as Emergency Management, Road and Bridge, and Fire; and representatives from the educational institutions, water districts, and fire districts.

This diverse group worked to produce a thoughtful and useful document. The sheer number of different people involved in the update process has raised the level of awareness of hazard mitigation planning within the Planning Area; this will also be helpful when integrating the *Hazard Mitigation Plan* into other planning processes.

Callaway County

The primary planning document for the unincorporated area of the county is *The Callaway County Emergency Operations Plan*. An update of this plan is currently underway. During the next update process, the requirements of the *Hazard Mitigation Plan* will be integrated with this document.

In the meantime, the Callaway County Commission and the Callaway County EMA will adopt the Hazard Mitigation Plan as an additional planning document for the County.

The Callaway County Emergency Management Director was a key member of the Technical Steering Committee for the update of the *Hazard Mitigation Plan*; she also involved in developing the plan for implementing and administering those County mitigation actions which fall under their scope of duties. They will ensure that the mitigation actions are included in the EMA work program according to the prioritizations in the plan.

Incorporated Communities of Auxvasse, Fulton, Holts Summit, Kingdom City, Mokane, and New Bloomfield

The smaller incorporated communities in the Planning Area do not have Master or Comprehensive Plans. They are, however, part of the *Callaway County EOP*; the integration of the *Hazard Mitigation Plan* with the *EOP* will serve to integrate the actions under the lead of the EMD for these jurisdictions also.

In all of these communities, the City Council or the Board of Aldermen/Trustees serves as the main planning body. These bodies were informed of the hazard mitigation update planning process as it was taking place. The councils/boards approved the specific mitigation actions for their jurisdictions, in addition to the plans for implementation and administration. In most of these communities, the Council/Mayor is responsible for implementing most of the specific mitigation actions.

Callaway County PWSD #1 & Callaway County PWSD #2

PWSD#1 and PWSD#2 maintain an annually reviewed work plan that will incorporate actions and information from this plan. The water district managers were present at most of the Steering Committee Meetings and is also in charge of maintaining the work plan.

School Districts

The mitigation actions in the *Hazard Mitigation Plan* will be integrated into the ***Crisis Management Plan*** for all school districts. These actions will be maintained as goals in the schools plans and will be updated on a regular basis.

All Participating Jurisdictions

In addition to the specific incorporation/integration methods described for each participating jurisdiction, it should be emphasized that the yearly maintenance of the *Hazard Mitigation Plan*, as discussed in Section 5.1, will serve to help incorporate and integrate its requirements into the planning in the jurisdictions.

5.4 Public Participation in Plan Maintenance

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 Callaway Natural Hazard Mitigation Plan will remain posted on the website of the Mid-Missouri Regional Planning Commission (<http://mmrpc.org/reports-library/hazard-mitigation-reports/>) for public review and comment. Either the plan itself or links to the plan will also be posted on as many websites of participating jurisdictions as possible.

The Callaway County Emergency Management Director will facilitate presenting the plan at the annual Local Emergency Operation Plan (LEOP) Review. This review is attended by representative of the following groups:

- Health Department Personnel
- City Fire and Rural Fire Protection Districts
- City Elected Officials/Administrators
- Educational Personnel
- Local Emergency Planning Committees
- Local Police/Sheriff Department Personnel
- Levee Districts
- Callaway County Commissioners
- Fulton Planning Directors

In addition, all meetings of the Technical Steering Committee for the review and maintenance of the plan will be publicly posted as required by Missouri's Sunshine Law and open to the public.

Appendix A
Adoption Resolutions

CITY OF AUXVASSE

Resolution No. 34-2017

WHEREAS, the Callaway County Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 CFR 201.6; and,

WHEREAS, the City of Auxvasse participated in the preparation of the Callaway County Hazard Mitigation Plan; and,

WHEREAS, the citizens of the City of Auxvasse have been afforded the opportunity to comment and provide input on the Plan and the mitigation actions therein; and,

WHEREAS, the City of Auxvasse has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW THEREFORE, BE IT RESOLVED by the City of Auxvasse adopts the Callaway County Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 14 day of November, 2017 at the meeting of the City of Auxvasse, Missouri.

 11-14-17

Attested by: City Clerk

Date

 11/14/2017

Mayor

Date

**CALLAWAY COUNTY
HAZARD MITIGATION PLAN ADOPTION**

ORDINANCE NO. _____

WHEREAS, the Callaway County Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 CFR 201.6; and,


WHEREAS, the County of Callaway participated in the preparation of the Callaway County Hazard Mitigation Plan; and,

WHEREAS, the citizens of Callaway county have been afforded the opportunity to comment and provide input on the Plan and the mitigation actions therein; and,

WHEREAS, the County of Callaway has reviewed the Plan and affirms the Plan will be updated every five years.

NOW THEREFORE, BE IT RESOLVED by the County Commission adopts the Callaway County Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 27th day of November, 2017



Gary Jungemann, Presiding Commissioner

IN THE CITY OF HOLTS SUMMIT, MISSOURI

RESOLUTION NO. 2017-28

A RESOLUTION AUTHORIZING A HAZARD MITIGATION PLAN FOR THE CITY OF HOLTS SUMMIT, MISSOURI.

WHEREAS, the Callaway County Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 CFR 201.6; and,

WHEREAS, the City of Holts Summit participated in the preparation of the Callaway County Hazard Mitigation Plan; and,

WHEREAS, the citizens of Holts Summit have been afforded the opportunity to comment and provide input on the Plan and the mitigation actions therein; and,

WHEREAS, the city of Holts Summit has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW THEREFORE, BE IT RESOLVED by the city of Holts Summit adopts the Callaway County Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 9th day of November, 2017 at the meeting of the Holts Summit Board of Aldermen

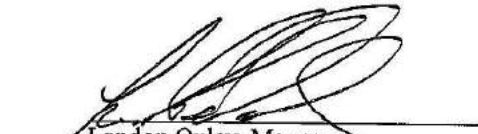
NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF ALDERMEN OF THE CITY OF HOLTS SUMMIT, MISSOURI, AS FOLLOWS:

Section 2. Effective Date. This resolution shall therefore be in full force and effect immediately upon its passage and approval.

RESOLVED BY THE BOARD OF ALDERMEN OF THE CITY OF HOLTS SUMMIT, MISSOURI, ON THIS 9TH DAY OF NOVEMBER 2017.

ATTEST:


Amy Burec, City Clerk


Landon Oxley, Mayor

VILLAGE OF KINGDOM CITY
5584 Dunn Drive
Kingdom City, Missouri 65262

Resolution No. 2017-1

WHEREAS, the Callaway County Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 CFR 201.6; and,

WHEREAS, the Village of Kingdom City participated in the preparation of the Callaway County Hazard Mitigation Plan; and,

WHEREAS, the citizens of Kingdom City have been afforded the opportunity to comment and provide input on the Plan and the mitigation actions therein; and,

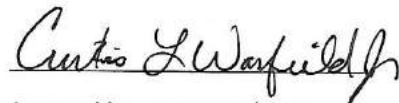
WHEREAS, the Village of Kingdom City has reviewed the Plan and affirms that the Plan will be updated no less than every five years.

NOW THEREFORE, BE IT RESOLVED by the Village of Kingdom City adopts the Callaway County Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan, and resolves to execute the actions in the Plan.

ADOPTED this 14 day of November, 2017 at the meeting of the Trustees of the Village of Kingdom City, Missouri



Chairman, Board of Trustees



Attested by: Manager/ Clerk





Fulton Public Schools

Dr. Jacque Cowherd, Superintendent of Schools
Dr. Ty Crain, Assistant Superintendent

Karrie Millard, Director of Special Services
Karen Snethen, PD & School/Community Programs

November 27, 2017

To Whom It May Concern:

The Callaway County Natural Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 C.F.R. 201.6.

The Fulton 58 School District has participated in the preparation of, and reviewed the Callaway County Natural Hazard Mitigation Plan.

The Fulton 58 School District adopts the Callaway County Natural Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan and resolves to execute the actions in the Plan.

Sincerely,

A handwritten signature in blue ink that reads "Jacque A. Cowherd".

Jacque A. Cowherd, Ed.D.
Superintendent

**NEW BLOOMFIELD R-III SCHOOLS
307 REDWOOD DRIVE
NEW BLOOMFIELD, MO 65063**

Superintendent of Schools
Sarah Wisdom, Superintendent

Central Office
Phone: 573/491-3700
Fax: 573/491-3772

Board President
Mrs. Terri Sweeten

November 27, 2017

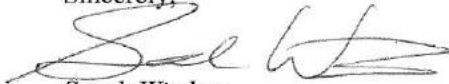
To Whom It May Concern:

The Callaway County Natural Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 C.F.R. 201.6.

New Bloomfield R-III School District has participated in the preparation of, and reviewed, the Callaway County Natural Hazard Mitigation Plan.

New Bloomfield R-III School District adopts the Callaway County Natural Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan and resolves to execute the actions in the Plan.

Sincerely,



Sarah Wisdom
Superintendent
New Bloomfield R-III Schools

North Callaway R-1 School District
2690 Thunderbird Drive
Kingdom City, Missouri 65262



Phone: (573) 386-2214

"Go Thunderbirds"

Fax: (573) 386-2169

November 20, 2017

To Whom It May Concern:

The Callaway County Natural Hazard Mitigation Plan is a multi-jurisdictional hazard mitigation plan prepared in accordance with FEMA requirements at 44 C.F.R. 201.6.

North Callaway R-1 School District has participated in the preparation of, and reviewed, the Callaway County Natural Hazard Mitigation Plan.

North Callaway R-1 adopts the Callaway County Natural Hazard Mitigation Plan as this jurisdiction's Hazard Mitigation Plan and resolves to execute the actions in the Plan.

Thanks,

A handwritten signature in black ink, appearing to read "Bryan Thomsen", followed by a long horizontal line.

Dr. Bryan Thomsen
Superintendent of Schools
North Callaway County R-1 School District

Dr. Bryan Thomsen
Superintendent

Mrs. Nicky Kemp
Assistant Superintendent

Mrs. Sarah Baumgartner
Special Programs Director

Ms. Kellie Chapin
Business Manager

THIS PAGE INTENTIONALLY LEFT BLANK

Appendix B
Meeting Agendas

Kickoff Meeting

Callaway County

Hazard Mitigation Plan Update

PRELIMINARY AGENDA

August 8, 2017

10:00 am

**Callaway County
Emergency
Operations Center**

- Welcome and Introductions
- General Overview
 - Hazard mitigation planning
 - Callaway County Plan
 - Update process/requirements
 - Hazards included
 - Planning meeting schedule
- Begin review of 2017 mitigation strategy
 - Severe winter weather events
 - Tornado, windstorm, hailstorm events
- Next meeting date and adjournment
- Lunch provided



This announcement is in accordance with Sec. 610.011 of the Missouri Sunshine Law. Posted 08/02/2017

Meeting #2

Callaway County Hazard Mitigation Plan Update

AGENDA

Tuesday,

August 29, 2017

10 a.m.

Callaway County
Emergency
Operations Center

- Welcome and Introductions
- Recap first meeting
- Hazard Overview & 2012 Mitigation
Activities Review
 - Severe Thunderstorm
 - Windstorm
 - Tornado
 - Hailstorm
- Update of 2012 Mitigation Activities
and Discussion of 2017 Hazard
Mitigation Activities
- Next meeting date and adjournment

MID-MO
Regional Planning Commission

This announcement is in accordance with Sec. 610.011 of the Missouri Sunshine Law. Posted 8/22/2017.

Meeting #3

Callaway County Hazard Mitigation Plan Update

PRELIMINARY AGENDA

**Tuesday,
September 12, 2017
10 a.m.**

**Callaway County
Emergency
Operations Center**

- Welcome and Introductions**
- Recap second meeting**
- Hazard Overview & 2012 Mitigation Activities Review**
 - **Severe Winter Weather**
 - **Extreme temperatures**
 - **Drought**
 - **Wildfire**
- Update of 2012 Mitigation Activities and Discussion of 2017 Hazard Mitigation Activities**
- Next meeting date and adjournment**



This announcement is in accordance with Sec. 610.011 of the Missouri Sunshine Law. Posted 8/22/2017.

Meeting #4

Callaway County Hazard Mitigation Plan Update

AGENDA

Thursday,
September 28, 2017

10 a.m.

Callaway County
Emergency
Operations Center

- Welcome and Introductions
- Recap third meeting
- Hazard Overview & 2012 Mitigation Activities Review
 - Flood
 - Dam Failure
 - Levee Failure
 - Wildfire
- New hazards overview and mitigation actions discussion
- Follow up on hazards discussed previously
- STAPLEE Analysis
- Final discussions and adjournment

MID-MO
Regional Planning Commission

Presentations can be found at: goo.gl/PjbwaQ