



# ***Washington County Multi-Jurisdiction Natural Hazard Mitigation Plan***



Meramec Regional Planning Commission • November 2022



## CONTRIBUTORS

### Washington County Hazard Mitigation Planning Committee

The individuals who participated in the Washington County hazard mitigation planning committee are as follows:

#### **Jurisdictional Representatives**

Name	Title	Department	Jurisdiction/Agency/Organization
David Sansegraw	Presiding Commissioner	County Commission	Washington County
Doug Short	Associate Commissioner	County Commission	Washington County
Cody Brinley	Associate Commissioner	County Commission	Washington County
Nick Branson	EMD	Emergency Management	Washington County
Floyd Haworth	EMD	Emergency Management	Washington County
Jeanette Allen	County Clerk	County Clerk's Office	Washington County
Zach Jacobsen	Sheriff	Sheriff's Department	Washington County
Matthew Hart	EMS	Ambulance District	Washington County
Tom Degonia	Chairperson	Board of Trustees	City of Mineral Point
Tina Hammers	City Clerk	Administration	City of Mineral Point
Paula Williams	Manager	Water & Sewer	City of Mineral Point
Alex McCaul	Superintendent	Administration	Potosi R-III School District
Lindell Conway	Superintendent	Administration	Richwoods R-VII School District
Jason Samples	Superintendent	Administration	Valley R-VI School District

\*Sign in sheets from planning meetings are included in Appendix B.

The individuals who represented stakeholders on the Washington County hazard mitigation planning committee are as follows:

#### **Participating Stakeholder Representatives**

Name	Title	Agency/Organization
T.R. Dudley	Community Development Specialist	Great Mines Health Center
Rochelle Nickles		Public

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## EXECUTIVE SUMMARY

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The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Washington County and participating cities and school districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses to the county and its communities and schools resulting from hazard events. The plan is an update of a plan that was approved on May 24, 2018. The original plan was approved in 2005. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 and to achieve eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs.

The county Multi-Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following 9 jurisdictions that participated in the planning process:

- Washington County
- Village of Caledonia
- City of Irondale
- Village of Mineral Point
- City of Potosi
- Kingston K-14 School District
- Potosi R-III School District
- Richwoods R-VII School District
- Valley R-VI School District

Washington County and the jurisdictions listed above have developed a multi-jurisdictional Hazard Mitigation Plan that was originally approved by FEMA in 2005 with an update approved by FEMA on March 27, 2013 and five years later on May 24, 2018. This current planning effort serves as an update (hereafter referred to as the 2022 Hazard Mitigation Plan.)

The plan update process followed a methodology prescribed by FEMA, which began with the formation of a Mitigation Planning Committee (MPC) comprised of representative from Washington County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to Washington County and analyzed the vulnerability to these hazards. The MPC also examined the capabilities in place to mitigate them. The MPC determined that the planning area is vulnerable to several hazards that are identified, profiled and analyzed in this plan. Riverine and flash flooding, winter storms, severe thunderstorms/hail/ lightning/high winds and tornadoes are among the hazards that historically have had a significant impact.

Based upon the risk assessment, the MPC reviewed and revised goals for reducing risk from hazards. The revised goals are listed below:

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure, and the local economy.

**Goal 3:** Reduce the potential impact of natural disasters on the continuity of government and essential services.

To meet the identified goals, the MPC developed recommended mitigation actions, which are detailed in Chapter 4 of this plan. The MPC developed an implementation plan for each action, which identifies priority level, responsible agency, timeline, cost estimate, potential funding sources and progress to date.

## PREREQUISITES

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**44 CFR requirement 201.6(c)(5): The local hazard mitigation plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan. For multi-jurisdictional plans, each jurisdiction requesting approval of the plan must document that it has been formally adopted.**

This plan has been reviewed by and adopted with resolutions or other documentation of adoption by all participating jurisdictions and school districts. The documentation of adoptions is included in Appendix D.

The following jurisdictions participated in the development of this plan and have adopted the multi-jurisdictional plan.

- Washington County
- Village of Caledonia
- City of Irondale
- Village of Mineral Point
- City of Potosi
- Kingston K-14 School District
- Potosi R-III School District
- Richwoods R-VII School District
- Valley R-VI School District

# Model Resolution

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

## A RESOLUTION TO ADOPT THE WASHINGTON COUNTY MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN

**WHEREAS**, (Government/District) recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

**WHEREAS**, (Government/District) fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, (Government/District) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of (Government/District) demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that (Government/District) adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

\_\_\_\_\_  
Certifying Official

\_\_\_\_\_  
Date

\_\_\_\_\_  
Witness

\_\_\_\_\_  
Date

# 1 Introduction and Planning Process

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## 1.1 Purpose

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Washington County and eight other jurisdictions prepared this local hazard mitigation plan to guide hazard mitigation planning for the purpose of better protecting the people and property of the county from the effects of natural hazard events. Hazard mitigation is defined by FEMA as “any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event.” Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set and appropriate strategies to lessen impacts are determined, prioritized and implemented.

The mission of the Washington County Hazard Mitigation Plan is to substantially and permanently reduce the county’s vulnerability to natural hazards. This plan demonstrates the communities’ commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources for the next five years. The plan is intended to promote sound public policy designed to protect citizens, critical facilities, infrastructure, private property and the natural environment. This can be achieved by increasing public awareness, documenting resources for risk reduction and loss prevention and identifying activities to guide the community towards the development of a safer, more sustainable community.

This plan was also developed to make Washington County and participating cities and school districts eligible for certain federal disaster assistance as required by the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Those programs include the Federal Emergency Management Agency’s (FEMA) Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program and Flood Mitigation Assistance Program. The plan has been prepared in accordance with the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and developed and organized within the rules and regulations established under 44 CFR 201.6 published in the *Federal Register* on February 26, 2002 and finalized in October 31, 2007.

Guidance for the development of this plan includes FEMA's Local Mitigation Planning Handbook, March 2013 and FEMA's Local Mitigation Plan Review Guide, October 1, 2011. Those jurisdictions within Washington County that do not adopt the 2021 plan will not be eligible for funding through these grant programs.

Neither Washington County, nor any cities in Washington County participate in the NFIP Community Rating System (CRS).

## **1.2 Background and Scope**

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The 2022 Washington Hazard Mitigation Plan is an update of the original plan developed and approved in 2005. The first update of the 2005 plan was approved by FEMA in 2013. The second update of the plan was approved on June, 2018. The revised document will be valid for five years from approval by FEMA. It is a multi-jurisdictional plan that covers the participating jurisdictions within the County's borders, all of whom adopted both the 2013 and 2018 plan, including the following:

- Washington County
- Village of Caledonia
- City of Irondale
- Village of Mineral Point
- City of Potosi
- Kingston K-14 School District
- Potosi R-III School District
- Richwoods R-VII School District
- Valley R-VI School District

The information and guidance in this plan document will be used to help guide and coordinate mitigation activities and decisions for local jurisdictions and organizations. Proactive mitigation planning will help reduce the cost of disaster response and recover to local communities and residents by protecting critical infrastructure, reducing liability exposure and minimizing overall community impacts and disruptions. Washington County has been affected by natural disasters in the past and participating jurisdictions and organizations are committed to reducing the impacts of future incidents and becoming eligible for hazard mitigation-related funding opportunities.

## **1.3 Plan Organization**

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The plan contains a mitigation action listing, a discussion of the purpose and methodology used to develop the plan, a profile on Washington County, as well as the hazard identification and vulnerability assessment of natural hazards. In addition, the plan offers a discussion of the community's current capability to implement the goals, objectives and strategies identified through the planning process.

The plan is organized as follows:

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

Changes made to the 2021 plan are detailed in Table 1.1.

**Table 1.1 Changes Made in Plan Update**

Plan Section	Summary of Updates
<b>Chapter 1 – Introduction and Planning Process</b>	Updated members of the Mitigation Planning Committee (MPC) and participating jurisdictions formally adopted the MPC.
<b>Chapter 2 – Planning Area Profile and Capabilities</b>	Noted new GIS capabilities for participating jurisdictions, updated demographics and information provided in jurisdictional questionnaires, updated jurisdictional capabilities.
<b>Chapter 3 – Risk Assessment</b>	Combined extreme heat and extreme cold into one hazard: extreme temperatures. Updated data on hazards, updated demographic data.
<b>Chapter 4 – Mitigation Strategy</b>	The mitigation category of each action was added to the action worksheets. The goals and action items were reviewed and updated, and progress made updated in the action worksheets.
<b>Chapter 5 – Plan Implementation and Maintenance</b>	Updated MPC meetings for evaluating and updating the plan quarterly.

To assist in the explanation of the above identified contents, there are several appendices included which provide more detail on specific subjects. This plan is intended to improve the ability of Washington County and the jurisdictions within to handle disasters and will document valuable local knowledge on the most efficient and effective ways to reduce loss.

## 1.4 Planning Process

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

The Washington County Hazard Mitigation Planning Committee first organized in 2020 when the Missouri State Emergency Management Agency (SEMA) provided grant funds and contracted with the Meramec Regional Planning Commission (MRPC) to develop a hazard mitigation plan for the county. MRPC is a council of local governments in south central Missouri serving Crawford, Dent, Gasconade, Maries, Osage, Phelps, Pulaski and Washington counties.

MRPC's role in developing and updating the Washington County Hazard Mitigation plan included assisting in the formation of the mitigation planning committee (MPC) and facilitating

the planning meetings; soliciting public input; and producing the draft and final plan for review by the MPC, SEMA and FEMA. Staff carried out the research and documentation necessary for the planning process. In addition, MRPC compiled and presented the data for the plan, helped the MPC with the prioritization process and insured that the final document met the DMA requirements established by federal regulations and the most current planning guidance.

In 2020, SEMA secured a grant to develop the Washington County Multi-Hazard Mitigation Plan and contracted with MRPC to facilitate the planning process for the plan development. MRPC staff has followed the most current planning guidance provided by FEMA for the purpose of ensuring that the plan meets all of the requirements of the Disaster Mitigation Act as established by federal regulations.

The Washington County Multi-Hazard Mitigation Plan was developed as the result of a collaborative effort among Washington County, the village of Caledonia, City of Irondale, village of Mineral Point, City of Potosi, Kingston K-14 School District, Potosi R-III School District, Richwoods R-VII School District, Valley R-VI School District, public agencies, non-profit organizations, the private sector as well as regional, state and federal agencies. MRPC contacted and asked for volunteers to serve on the planning committee from the county and local city governments, school districts, the county health department, local businesses and utility companies. The mailing list is included in **Appendix B: Planning Process**. This cross-section of local representatives was chosen for their experience and expertise in emergency planning and community planning in Washington County. Staff worked with the Washington County MPC to collect and analyze information on hazards and disasters that have impacted the county as well as document mitigation activities that have occurred during the past five years.

Due to time and duty constraints, not all the jurisdictions that were invited to participate in the MPC were able to attend meetings. However, all of the jurisdictions provided information to develop the document, submitted questionnaires, reviewed the plan and provided input. Interviews were conducted with stakeholders from the community and several planning meetings were conducted during the plan development.

The 2022 planning process began with a meeting held at the Washington County Courthouse on November 29, 2021. MRPC staff provided an overview of the hazard mitigation planning process and review of the existing hazard mitigation plan. The group reviewed and discussed hazard mitigation goals and what progress had been made on hazard mitigation action items over the past three years. The group made note of those action items that had been accomplished, those that were no longer applicable and added projects to the list. The second meeting was held on February 28, 2022. The MPC reviewed the revised list of goals and action items. The group then applied the STAPLEE method (Social, Technical, Administrative, Political, Legal, Economic; Environmental) and a cost benefit analysis to best determine priorities. A full description of the prioritization process is included in Chapter 4. The group agreed to review plan chapters as they were completed through email or postings on the MRPC website. The third meeting of the MPC was held on September 19, 2022. The MPC reviewed the participation requirements and status of participation of jurisdictions; reviewed and discussed draft chapters; reviewed plan maintenance and the adoption process.

The final list of prioritized action items were mailed out to all jurisdictions and entities that had been invited to participate on the MPC. Recipients were asked to review and provide feedback if they had concerns about how any of the projects were ranked. The draft plan was made

available on-line and MPC members were notified on where to find the document and asked to review and provide feedback.

All planning committee members were provided drafts of sections of the plan as they became available. Members of the planning committee reviewed the draft chapters and provided valuable input to MRPC staff. Additionally, through public committee meetings, press releases and draft plan posting on MRPC's website, ample opportunity was provided for public participation. An internet survey was provided for the public to provide input into the process. The results of that survey are included in the appendices. Jurisdictions in surrounding counties were also notified of where to view the revised plan and encouraged to provide input. Any comments, questions and discussions resulting from these activities were given strong consideration in the development of this plan.

Washington County further assisted in the planning process by issuing public notice of the planning meetings as well as scheduling meeting times at the County Courthouse in Potosi. County officials attended and participated in meetings.

The MPC contributed to the planning process by:

- Attending and participating in meetings;
- Collecting data for the plan;
- Making decisions on plan content;
- Reviewing drafts of the plan document;
- Developing a list of needs;
- Prioritizing needs and potential mitigation projects; and
- Assisting with public participation and plan adoption

The MPC did not formally meet on a regular basis as recommended in the plan. However, mitigation has become a regular topic of discussion among the majority of jurisdictions included in the plan. A number of hazard mitigation projects have been completed in the county and hazard mitigation concepts are being incorporated into other planning projects

Table 1.2 provides information on who actively participated in the planning process and who they represented:

Amy Bretz, Amber Forshee, Brenda Smith, Lee Ann Wallace, and Michael Silvy all participated indirectly by providing information, completing the jurisdictional questionnaire, participating in phone calls and email discussions and assisting with adoption of the plan.

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

Name	Title	Department	Jurisdiction/Agency/ Organization	Direct Participation	Indirect Participation
David Sansegraw	Presiding Commissioner	County Commission	Washington County	X	
Doug Short	Associate Commissioner	County Commission	Washington County	X	
Cody Brinley	Associate Commissioner	County Commission	Washington County	X	
Nick Branson	EMD	Emergency Management	Washington County	X	
Floyd Haworth	EMD	Emergency Management	Washington County	X	

Name	Title	Department	Jurisdiction/Agency/ Organization	Direct Participation	Indirect Participation
Matthew Hart		Ambulance District	Washington County		
Jeanette Allen	County Clerk	County Clerk's Office	Washington County	X	
Zach Jacobsen	Sheriff	Sheriff's Department	Washington County	X	
Shawnee Douglass	Director	Health Department	Washington County		X
Sheila Sappington	Accountant	Health Department	Washington County		X
Amy Bretz	City Clerk	Administration	City of Caledonia		X
Amber Forshee	City Clerk	Administration	City of Irondale		X
Amanda Barton	City Clerk	Administration	City of Irondale		X
Tom Degonia	Chairperson	Board of Trustees	City of Mineral Point	X	
Tina Hammers	City Clerk	Administration	City of Mineral Point	X	
Paula Williams	Manager	Water & Sewer	City of Mineral Point	X	
Brenda Smith	City Clerk	Administration	City of Potosi		X
Lee Ann Wallace	Superintendent	Administration	Kingston K-14 School District		X
Alex McCaul	Superintendent	Administration	Potosi R-III School District	X	
Lindell Conway	Superintendent	Administration	Richwoods R-VII School District	X	
Michael Silvy	Superintendent	Administration	Valley R-VI School District		X
T.R. Dudley	Community Development Specialist		Great Mines Health Center	X	
Rochelle Nickles		Volunteer Fire Department	City of Potosi	X	

The expertise of MPC members in the six mitigation categories (Preventive Measures, Property Protection, Natural Resource Protection, Emergency Services, Structural Flood Control Projects and Public Information) is outlined in Table 1.3 MPC Capability with Six Mitigation Categories.

**Table 1.3 MPC Capability with Six Mitigation Categories<sup>1(b)</sup>**

Community Department/Office	Preventive Measures	Structure and Infrastructure Projects		Natural Resource Protection	Public Information	Emergency Services
		Property Protection	Structural Flood Control Projects			
County Commission	✓	✓	✓	✓	✓	
County Clerk's Office	✓	✓	✓	✓	✓	
Sheriff's Department	✓	✓			✓	✓
County Emergency Management	✓				✓	✓
Washington County Ambulance District	✓				✓	✓
Washington County Health Department	✓			✓	✓	✓
City of Caledonia Administration	✓	✓	✓	✓	✓	
City of Irondale Administration	✓	✓	✓	✓	✓	
City of Mineral Point Administration	✓	✓	✓	✓	✓	
City of Mineral Point Water & Sewer	✓	✓	✓	✓	✓	
City of Potosi Administration	✓	✓	✓	✓	✓	
Kingston K-14 School District Administration	✓	✓	✓		✓	
Potosi R-III School District Administration	✓	✓	✓		✓	
Richwoods R-VII School District Administration	✓	✓	✓		✓	
Valley R-VI School District Administration	✓	✓	✓		✓	

## 1.4.1 Multi-Jurisdictional Participation

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

Washington County invited incorporated cities, school districts, utility companies, medical facilities, nursing facilities, county health department, and not-for-profits to participate in the hazard mitigation planning process. Press releases were sent to the media. Letters and/or emails were sent to each of the following:

- Washington County
- Village of Caledonia
- City of Irondale
- Town of Mineral Point
- City of Potosi
- Kingston K14 School District
- Potosi R-III School District
- Richwoods R-VII School District
- Valley R-VI School District
- Washington Co. Health Dept.
- Socket Internet Service
- Centurylink
- Crawford Electric Cooperative
- Ameren UE
- Washington Co. Memorial Hospital
- Great Mines Health Center
- Missouri State Emergency Management Agency
- Missouri Department of Transportation
- Missouri State Highway Patrol
- Missouri Department of Conservation
- American Red Cross
- United States Army Corps of Engineers
- United States Department of Agriculture
- United States Fish and Wildlife Service
- United States Federal Emergency Management Agency
- South Haven Residential
- Potosi Manor
- Georgian Gardens Rehab
- Hillside Living Center
- Independent Journal

A copy of the mailing list and invitation letters are included in Appendix B: Planning Process.

The Disaster Mitigation Act requires that each jurisdiction must participate in the planning process and formally adopt the plan. There were a number of criteria established for participation. In order to be considered participating in the planning process, jurisdictions needed to do at least one of the following as well as adopt the plan:

- Providing a representative to serve on the planning committee;
- Participating in at least one or more meetings of the planning committee;
- Providing data for plan development through surveys and/or interviews;
- Identify goals and mitigation actions for the plan;
- Prioritize mitigation actions/projects for the plan;
- Review and comment on the draft plan document;
- Informing the public, local officials and other interested parties about the planning process and providing opportunities for them to comment on the plan;
- Provide in-kind match documentation; and

- Formally adopt the plan prior to submittal of the final draft to SEMA and FEMA for final approval.

Not all jurisdictions were able to attend the MPC meetings. Most communities and school districts in Washington County are small and understaffed. It was not always feasible for representatives to travel to the meetings. However, all jurisdictions met at least one of the participation criteria. All jurisdictions were contacted by phone and asked to complete the data collection questionnaire. In some cases, staff assisted jurisdictions with completion of the questionnaire. All jurisdictions were also contacted via email and phone regarding completion of in-kind match forms and if there were any questions regarding the information on the data collection questionnaires. The jurisdictions that participated in the process, as well as their level of participation in the process are shown in Table 1.4. Documentation of meetings, including sign-in sheets are included in Appendix B: Planning Process.

**Table 1.4 Jurisdictional Participation in the Planning Process**

Jurisdiction	Meet- ing #1	Meet- ing #2	Meet- ing #3	Interviews	Data Collection Questionnaire/Call	Update/Develop/ Prioritize Mitigation Actions	Review/ Comment on Plan
Washington County	X	X	X	X	X	X	X
Village of Caledonia				X	X	X	
City of Irondale				X	X	X	
Town of Mineral Point	X	X		X	X	X	
City of Potosi			X	X	X	X	
Kingston K- 14				X	X	X	
Potosi R-III	X	X	X	X	X	X	X
Richwoods R-VII		X	X	X	X	X	
Valley R-VI			X	X	X	X	X

## 1.4.2 The Planning Steps

Washington County and MRPC worked together to develop the plan and based the planning process in FEMA's *Local Mitigation Planning Handbook (March 2013)*, the *Local Mitigation Plan Review Guide (October 1, 2011)*, and *Integrating Hazard Mitigation Into Local Planning: Case Studies and Tools for Community Officials (March 1, 2013)*. The planning process has included organizing the county's resources, assessing the risks to the county, developing the mitigation plan and implementing the plan and monitoring the progress of plan implementation.

The planning committee based their activities on the 10-step planning process adapted from FEMA's Community Rating System (CRS) and Flood Mitigation Assistance programs. By following the 10-step planning process, the plan met funding eligibility requirements of the Hazard Mitigation Grant Program, Building Resilient Infrastructure and Communities, Pre-Disaster Mitigation Program, Community Rating System and Flood Mitigation Assistance Program.

**Table 1.5 Washington County Planning Process**

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

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

The planning area was determined by the boundaries of Washington County. MRPC staff provided general information on the hazard mitigation plan review process at regular MRPC board meetings – providing both written and oral reports on the review process, schedules for the various plans; which ones had been funded; described match requirements; and asked mayors and commissioners to think about who should be included on the planning committees for each respective county.

The planning team was selected by contacting the leadership of each jurisdiction, explaining the process, and asking them to send appropriate representation to the planning meetings. In addition, they were asked to provide input on who they wanted to include on the planning committee. Stakeholders such as electric cooperatives and sewer districts were also contacted and invited. In addition, it was suggested that representatives of some of the local critical facilities be included on the planning committee, such as medical clinics and nursing homes. All meetings were also publicized to allow additional interested parties to attend and participate. Washington County Commission offered to host the meetings at the courthouse and the first meeting was held there on November 29, 2021. The second meeting was convened on February 28, 2022, and the third on September 19, 2022.

At the first meeting on November 29, 2021, MRPC staff made introductions and provided an overview of the Washington County Hazard Mitigation plan. The group reviewed and discussed the goals and objectives. A good deal of the meeting was spent sharing information on what progress had been made in five years and discussing current and future needs and adding new mitigation actions to the existing list. Staff offered to help those jurisdictions present with completion of their data collection surveys. The group started working on reviewing and prioritizing the action items – using both the STAPLEE method and analyzing the cost benefit.

At the second meeting on February 28, 2022, the group reviewed the existing list of plan goals and provided feedback on their revision. The group then reviewed the complete list of action items; determined which had been completed; which should be combined; which were no longer a high or medium priority; and determined if any needed to be added. The MCP then provided input on prioritizing each of the action items. Staff took those recommendations and developed a matrix of the action items with the STAPLEE and cost benefit scores. This matrix was emailed out to all of the individuals and organizations on the mailing list for the MPC with a request for feedback. All suggestions for changes were incorporated into the plan. MRPC staff shared the results of the public survey. It was decided that staff would share plan chapters with the MPC as they were completed.

At the third meeting on September 19, 2022, the group reviewed participation requirements and the status of all jurisdictions; reviewed and discussed those draft chapters that were completed; discussed plan maintenance and the adoption process.

Table 1.5 Schedule of MPC Meetings outlines the dates that meetings were held, and topics covered. Documentation of the planning process can be found in Appendix B: Planning Process.

**Table 1.6 Schedule of MPC Meetings**

Meeting	Topics	Date
Planning Meeting #1	Overview of hazard mitigation planning purpose and Washington County plan; grant programs linked to approved plan; participation requirements and public involvement; data collection questionnaires; discussion of hazards; critical facilities	November 29, 2021
Planning Meeting #2	Overview of hazard mitigation planning and Washington Co. HMP; discussion on the revision	February 28, 2022

Meeting	Topics	Date
	of plan goals, discussion of action items for the next 5 years; prioritization of action items; road and bridge projects; integration of other data, reports, studies, and plans	
Planning Meeting #3	Review of participation requirements and status of jurisdictions, review and discussion of draft chapters, plan maintenance and adoption process and next steps for the planning process and completion of the plan.	September 19, 2022

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

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

The MPC followed the same process for public involvement and input as suggested by SEMA and FEMA and as was followed during earlier planning processes. The first MPC meeting was held at the Washington County Courthouse. Public notices were placed at the courthouse, and press releases were done prior to the meeting to make the public aware. Meetings were also posted on the MRPC webpage. The public was notified each time the plan or sections of the plan were presented for review and discussion. A public survey was conducted, and the results shared with the MPC. A sample of the survey and the results of the survey are included in Appendix C: Public Survey. MPC members and public officials within the county as well as in surrounding counties were contacted, directed to the MRPC website ([www.meramecregion.org](http://www.meramecregion.org)) where a copy of the draft plan could be viewed or downloaded. The document was made available on the website on October 6, 2022. Hard copies of the final draft were placed at the Washington County Courthouse. A hard copy of the draft could be obtained directly from MRPC by request. Members of the local media were invited to attend planning meetings. Information was shared by these media outlets with the public on the planning process and where to find draft copies of the plan. Copies of public notices and press release are included in Appendix B. Results of the public survey are included in Appendix C: Public Survey.

No comments were received from the public other than what was found in the public survey. Which are included in the Appendices.

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

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

Every effort was made to encourage input from stakeholders whose goals and interests interface with hazard mitigation in Washington County including:

- Neighboring communities
- Local and regional agencies involved in hazard mitigation activities
- Agencies with the authority to regulate development
- Businesses
- Academia
- Other private and non-profit interests

Stakeholders involved in the hazard mitigation planning process included Great Mines Health Center. No federal stakeholders were involved during the planning process. Lists of the people from the jurisdictions and stakeholders who were invited to participate in the planning process follows.

#### **Jurisdictional Representatives Invited to Participate in the Planning Process**

<b>Name</b>	<b>Title</b>	<b>Department</b>	<b>Jurisdiction/Agency/Organization</b>
Dave Sansegraw	Presiding Commissioner	County	Washington County
Doug Short	Associate Commissioner	County	Washington County
Cody Brinley	Associate Commissioner	County	Washington County
Jeanette Allen	County Clerk	County	Washington County
Zach Jacobsen	Sherriff	Sherriff's Dept.	Washington County
Nicholas Branson	EMD	Emergency Management	Washington County
-	Supervisor	Highway Dept.	Washington County
Shawnee Douglas	Administrator	Health	Washington County Health Department
John Robison III	Chairperson	Admin.	City of Caledonia
Debra Bray	City Clerk	Admin.	City of Caledonia
Michael Green	Supervisor	Maintenance and Sewer	City of Caledonia
Chuck Hampton	Chief	Fire	Caledonia Fire Protection District
Jay Horton	Mayor	Admin.	City of Irondale
Amber Forshee	City Clerk	Admin.	City of Irondale
Marty O'Neial	Supervisor	Water/Street/Waste	City of Irondale
Ryan Hardy	Director	Emergency Management	City of Irondale
Ryan Hardy	Chief	Fire	Irondale Fire Protection District
Tom Degonia	Chairperson	Admin	City of Mineral Point

Name	Title	Department	Jurisdiction/Agency/Organization
Tina Hammers	City Clerk	Admin.	City of Mineral Point
Paula Williams	Manager	Water/Sewer	City of Mineral Point
-	Director	Emergency Management	City of Mineral Point
Joseph Blount	Mayor	Admin.	City of Potosi
Brenda Smith	City Clerk	Admin.	City of Potosi
Martin Lawson	Superintendent	Street	City of Potosi
Dave Douglas	Superintendent	Water/Sewer	City of Potosi
Sam Johnson	Superintendent	Natural Gas	City of Potosi
Doris Coffman	Director	Emergency Management	City of Potosi
Roger Lachance	Chief	Fire	Potosi Fire Protection District
Michael Gum	Chief	Police	Potosi Police Department
Bob Haworth	Chief	Fire	Belgrade Vol. Fire Department
David Hoffmann Jr.	Chief	Fire	Richwoods Fire Protection District
Lee Ann Wallace	Superintendent	Admin.	Kingston K-14 School District
Alex McCaul	Superintendent	Admin.	Potosi R-III School District
Lindell Conway	Superintendent	Admin.	Richwoods R-VII School District
Michael Silvy	Superintendent	Admin.	Valley R-VI School District

#### Stakeholder Invited to Participate in the Planning Process

Name	Title	Agency/Organization
Bryan Nicholson	-	Washington County Memorial Hospital
-	-	Ameren UE
-	-	Crawford Electric Cooperative
-	-	Socket Internet Services
-	-	CenturyLink
Ryan A Burckhardt	Captain	MO State Highway Patrol
-	-	MO Department of Transportation
Hank Voelker	Region C Coordinator	MO SEMA
-	-	MO Department of Conservation
Matt Shively	-	U.S. Army Corp of Engineers
Ken Sessa	-	U.S. FEMA Region VII
Karen Herrington	Field Supervisor	U.S. Fish and Wildlife Service
-	-	U.S. Department of Agriculture, NRCS
-	-	American Red Cross
Karen Veach	Administrator	South Haven Residential
Melissa Smith	Administrator	Potosi Manor
Suzanne Mayfield	Administrator	Georgian Gardens Rehab
Rhonda Huffman	Administrator	Hillside Living Center
-	-	Independent Journal

Jurisdictional representatives on the MPC were asked to share and solicit information from within and outside of their jurisdictions. A broad spectrum of entities other than the jurisdictions named in the plan, were invited to participate in the planning process.

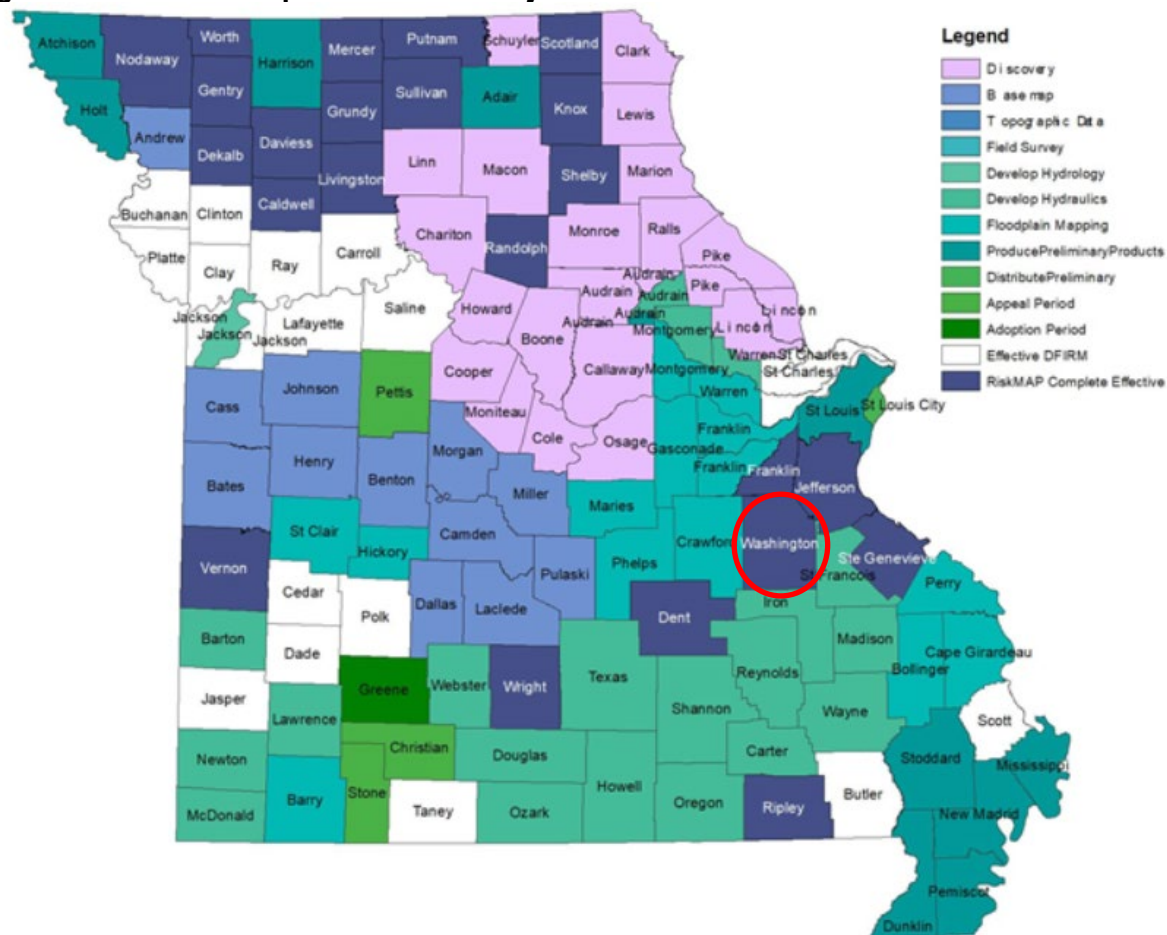
The questionnaire provided to every jurisdiction asked how mitigation actions were being incorporated into other planning documents. The county road and bridge department does a good job of incorporating mitigation projects into their regular maintenance program. Those projects have been incorporated into the plan document. Hazard mitigation goals and action items have also been incorporated, where applicable, in the Community Economic Development Strategy (CEDS).

### **Coordination with FEMA Risk MAP Project**

The Risk MAP project has been completed in Washington County. As of September 2022, updated flood risk data and effective maps have been approved and adopted by the jurisdictions. Risk MAP now provides mitigation planning support in a variety of ways including helping in the assessment of risks and identifying action items to reduce vulnerability. In addition, this project will provide tools to improve the understanding of risk by local officials and the general public.

**Figure 1.1** illustrates the current status of Missouri counties in regards to RiskMap projects.

**Figure 1.1. Map of RiskMAP Projects**



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

The MPC researched available plans, studies, reports and technical information during development of the Update. The intent was to identify existing data and information, shared objectives and past and ongoing activities that would add to the Update. The goal was to identify the existing capabilities and planning mechanisms to implement the mitigation strategy. Washington County is a rural area with the largest community's population at approximately 2,538. Not all of the participating communities have planning or zoning, subdivision regulations or other mechanisms for controlling the development of land. Some of the jurisdictions do have ordinances and planning documents. Following is a list of the documents that were reviewed:

- Local planning and zoning ordinances
- County EOP
- Crisis Plans (school districts)
- Comprehensive plans
- Economic development plans
- Capital improvement plans
- Regional Transportation Plan
- Floodplain management ordinances and flood Insurance Risk Maps (FIRMs)

In addition to information available from local jurisdictions, a number of data sources, reports, studies and plans were used in updating the plan. Every attempt was made to gather the best available data to develop the vulnerability assessment and identify assets in the county. The Missouri State Hazard Mitigation Plan (2018) was reviewed and referenced throughout the document. Other data sources included dam information from the Missouri Department of Natural Resources and National Inventory of Dams (NID); fire reports from state agencies; Wildland/Urban Interface and Intermix data from the SILVIS Lab – Department of Forest Ecology and Management – University of Wisconsin; the Community Economic Development Strategy (CEDS); capital improvement plans from the participating jurisdictions; historic weather data and damage estimates from the National Oceanic and Atmospheric Administration; the critical facilities inventory conducted by MRPC; and road and bridge department plans/budgets.

All documents were reviewed so that the MPC would have a broad foundation of data upon which to base the planning area's risk assessment. Information from these documents and data sources are incorporated into the plan as indicated throughout the document.

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

The MPC reviewed the hazards that affected Washington County at the first planning meeting on November 29, 2021 including discussions of any hazard events that occurred during the last twenty years and all of the hazards included in the Missouri Hazard Mitigation plan. A variety of sources were used to identify and profile hazards. These included U.S. Census data, GIS data, HAZUS, the Missouri Spatial Data Information Service (MSDIS), statewide datasets compiled by state and federal agencies, existing plans and reports, personal interviews with MPC members and the questionnaire completed by each jurisdiction. Every effort was made to use the most current and best data available. Additional information on the risk assessment and the conclusions drawn from the available data can be found in Chapter 3.

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

Assets for each jurisdiction were identified based on responses to the data collection questionnaire distributed to all jurisdictions, interviews with MPC members and the critical facilities inventory conducted by MRPC. Additional sources included U.S. Census, GIS data, MSDIS and HAZUS.

Losses were calculated using HAZUS and the Missouri State Hazard Mitigation plan data and the most recent U.S. census data available. Values reflected in the plan are on structures only and do not include land values.

Jurisdictions provided information on their regulatory, personnel, fiscal and technical abilities by completing the data collection questionnaire. The vulnerability assessment was completed using estimates from the 2018 State plan. For more information on planning area profiles and capabilities, please see Chapter 2.

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

The goals from the initial hazard mitigation plan were reviewed at the first planning meeting on November 29, 2021. At the second planning meeting on February 28, 2022 the MPC discussed

revisions of the original goals to remove redundancy and improve coverage. The revised goals are as follows:

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Goal 2:** Reduce the potential impact of natural disasters to [property, infrastructure, and the local economy.

**Goal 3:** Reduce the potential impact of natural disasters on the continuity of government and essential services.

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

Mitigation strategy and specific action items were discussed at the first and second MPC meetings. At the first MPC meeting the group reviewed the list in the existing plan and decided which actions could be eliminated; what could be combined; what needed to remain on the list; and what needed to be added. It was emphasized that any mitigation actions in the plan that were not likely to be accomplished, due to cost factors or that did not address the risks identified in the risk assessment, should be removed from the list.

Discussions also included mitigation activities that had been completed or were in process that had not been in the original plan document. Each jurisdiction and stakeholder group was asked to provide information about mitigation activities that were needed as well as those that had been accomplished over the past five years. Meeting facilitators offered to share ideas for mitigation projects from the FEMA publication *Mitigation Ideas: As Resource for Reducing Risk to Natural Hazards (January 2013)* to help stimulate ideas and discussion.

In order to prioritize action items, the MPC was asked to use the STAPLEE method as well as assign a cost benefit to each activity. This allowed the group to consider a broad range of issues in order to decide which actions should be considered high, moderate or low priority. The prioritization process used by the MPC is explained as follows:

STAPLEE stands for the following:

- **Social:** Will the action be acceptable to the community? Could it have an unfair effect on a particular segment of the population?
- **Technical:** is the action technically feasible? Are there secondary impacts? Does it offer a long-term solution?
- **Administrative:** Are there adequate staffing, funding and maintenance capabilities to implement the project?
- **Political:** Will there be adequate political and public support for the project?
- **Legal:** Does your jurisdiction have the legal authority to implement the action?
- **Economic:** is the action cost-beneficial? Is there funding available: Will the action contribute to the local economy?
- **Environmental:** Will there be negative environmental consequences from the action? Does it comply with environmental regulations? Is it consistent with community environmental goals?

Each question was scored based on a 0 to 3 point value system:

- 3 = Definitely YES
- 2 = Maybe YES
- 1 = Probably NO
- 0 = Definitely NO

For the Benefit/Cost Review portion of the prioritization process, these two aspects were scored as follows:

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

Note: For the Benefit/Cost Review, the benefit and cost of actions which used the word “encourage” were evaluated as if the action or strategy being encouraged was actually to be carried out.

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. 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

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 benefit portion of the prioritization process helped the MPC focus on long-term mitigation solutions that demonstrated the future cost savings that could be realized by completing mitigation projects that safeguard lives and protect property.

Finally, action items were reviewed to determine if they met the SMART criteria as provided by SEMA and FEMA: **S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**ime-bound.

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

The MPC reviewed the final list of action items and completed the prioritization process at the February 28, 2022 meeting. The final list was then mailed out to all jurisdictions and members of the MPC for review and approval as everyone was not able to attend the meeting. Staff was directed by the MPC to take the finalized list after allowing time for comments and draft an action plan.

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

When the first draft of the plan was completed, staff posted the document on the MRPC website and provided a hard copy to the county courthouse. All MPC members, jurisdictions and surrounding jurisdictions were notified on where to find a copy of the plan to review. If requested, additional hard copies of the plan document were provided. After allowing time for comments, a letter was mailed out to all jurisdictions asking them to formally adopt the plan and providing a sample adoption resolution. A deadline was provided in order to ensure receipt of adoption resolutions prior to submitting a final draft to FEMA for approval.

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

At all three planning meetings (November 29, 2021, February 28, 2022 and September 19, 2022) MRPC staff advised the MPC and participating jurisdictions of the importance of continuing to meet periodically to discuss implementation of the plan as well as monitoring and maintaining the plan into the future. Chapter 5 provides details on Washington County's strategy for implementation, evaluation and revising the plan.

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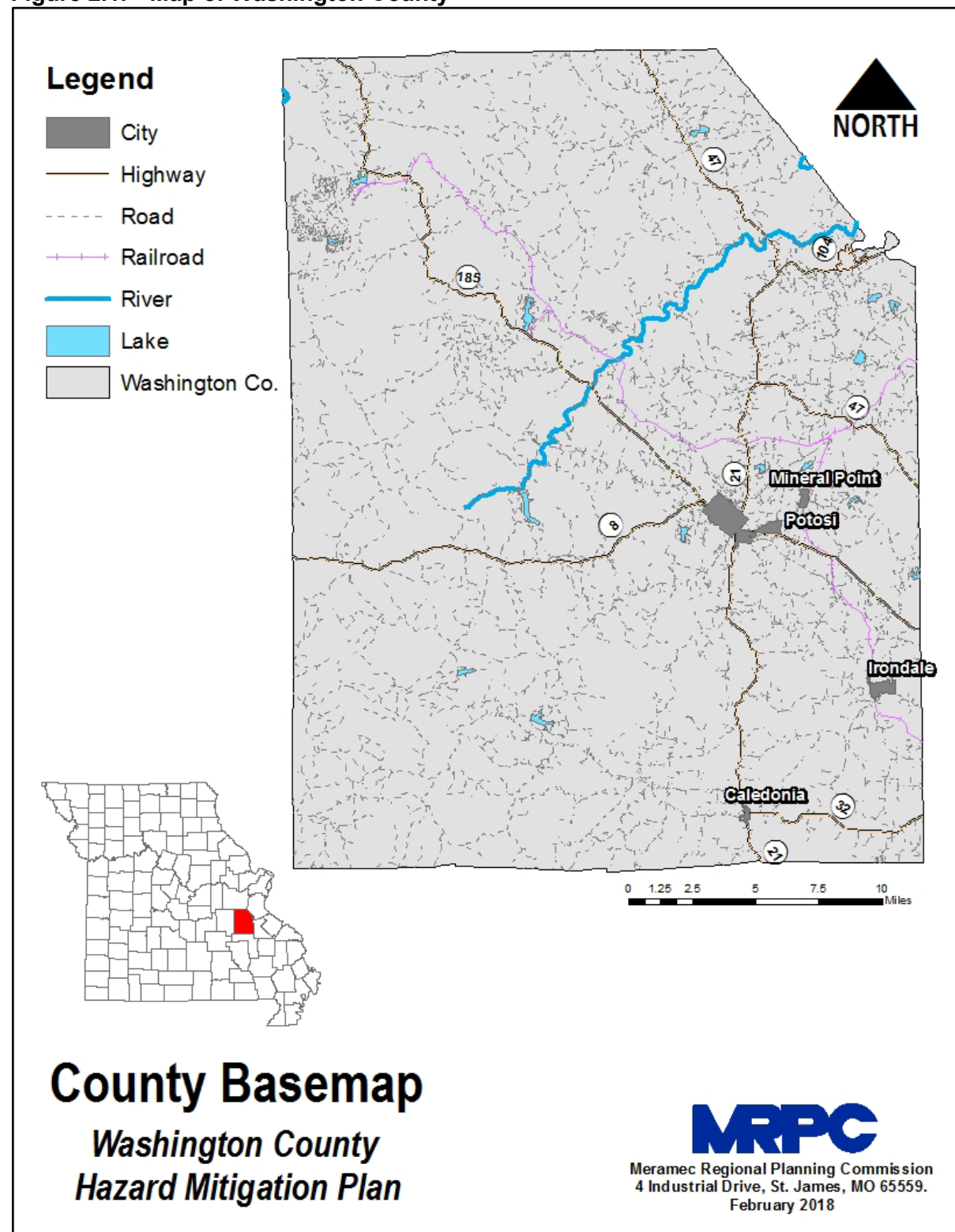
## 2 PLANNING AREA PROFILE AND CAPABILITIES

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## 2.1 Washington County Planning Area Profile

Figure 2.1. Map of Washington County



Washington County has a population of approximately 23,514 according to the most recent census data<sup>1</sup>. **Table 2.1** illustrates the percentage population growth since 2010 as compared to the statewide and national population growth. The median household income and percentage growth since 1999, as compared to statewide and national figures can be found in **Table 2.2**. Furthermore, median house value percentage growth for Washington County, Missouri, and the United States is provided in **Table 2.3**.

**Table 2.1. Percent Population Growth for County, State, and Nation 2010 - 2020**

Demographic Region	Total Population		Change Over Period	
	2010	2020	Change	Percent
Missouri	5,814,785	6,154,913	340,128	5.85
United States	300,758,215	331,449,281	30,691,066	10.2
Washington County	24,104	23,514	-590	-2.45

Source: U.S. Census Bureau, Census 2010 Summary File 1; U.S. Census Bureau, Census 2020 Redistricting Data

**Table 2.2. Median Household Income and Percentage Growth for County, State, and Nation 2010 - 2020**

Demographic Region	Median Household Income (USD)		Change Over Period	
	2010	2020	Change	Percent
United States	\$51,914	\$64,994	\$13,080	20.1
Missouri	\$46,262	\$57,290	\$20,972	19.2
Washington County	\$35,901	\$42,849	\$6,948	16.2

Source: U.S. Census Bureau, 2006-2010 and 2016-2020 5-Year American Community Survey

**Table 2.3. Median House Value Percentage Growth for County, State, and Nation 2010 - 2020**

Demographic Region	Median House Value (USD)		Change Over Period	
	2010	2020	Change	Percent
United States	\$188,400	\$229,800	\$41,400	18.02
Missouri	\$137,700	\$163,600	\$25,900	15.8
Washington County	\$82,400	\$97,700	\$15,300	15.7

Source: U.S. Census Bureau, 2006-2010 and 2016-2020 5-Year American Community Survey

## 2.1.1 Geography, Geology and Topography

Washington County has a total land area of 762 square miles with 2.6 square miles of total water area. Over 60 percent of the county is covered by forest land. Incorporated jurisdictions within the county include the Village of Caledonia, City of Irondale, Village of Mineral Point, and City of Potosi.

The county seat, Potosi, is located in the central portion of the county, approximately 116 miles southeast of the state capital of Jefferson City, approximately 177 miles northeast of Springfield, Mo., and approximately 69 miles south west of St. Louis, Mo. The county is bordered on the

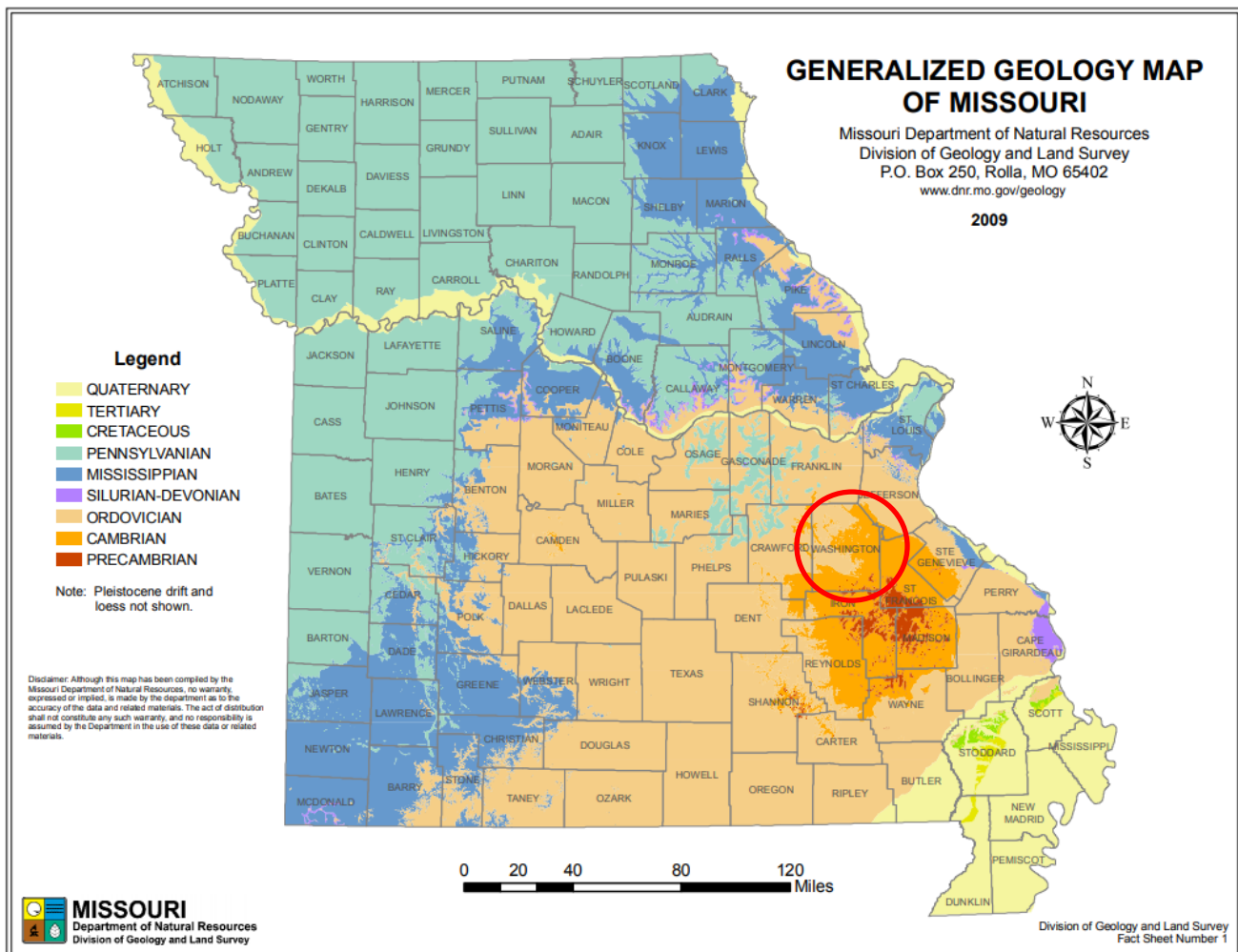
<sup>1</sup> U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates

north by Franklin County. On the east side the county is bordered by Jefferson and St. Francois Counties. To the south the county is bordered by Iron County. Crawford County shares a border with Washington to the west.

Located within the Ozark Mountains, Washington County is located in the Ozark Plateau – the largest outcrop area of Ordovician-age rocks in the United States<sup>2</sup>. This rock is 505 to 441 million years old and made up primarily of carbonates and thin shales with three distinctive sandstone layers: the Gunter at the base of the column, the red and white Roubidoux which is often used as a building stone and the St. Peter glass sand. This stone is the result of a time period when Missouri was covered by a shallow sea and the stone frequently produces aquatic fossils from that time period<sup>3</sup>. Portions of this formation contain rock that dissolves and fractures over time from rainwater, thus resulting in the karst features found throughout the Ozarks.

**Figure 2.2** depicts a generalized geologic map of Missouri and its counties.

**Figure 2.2. Generalized Geologic Map of Missouri**



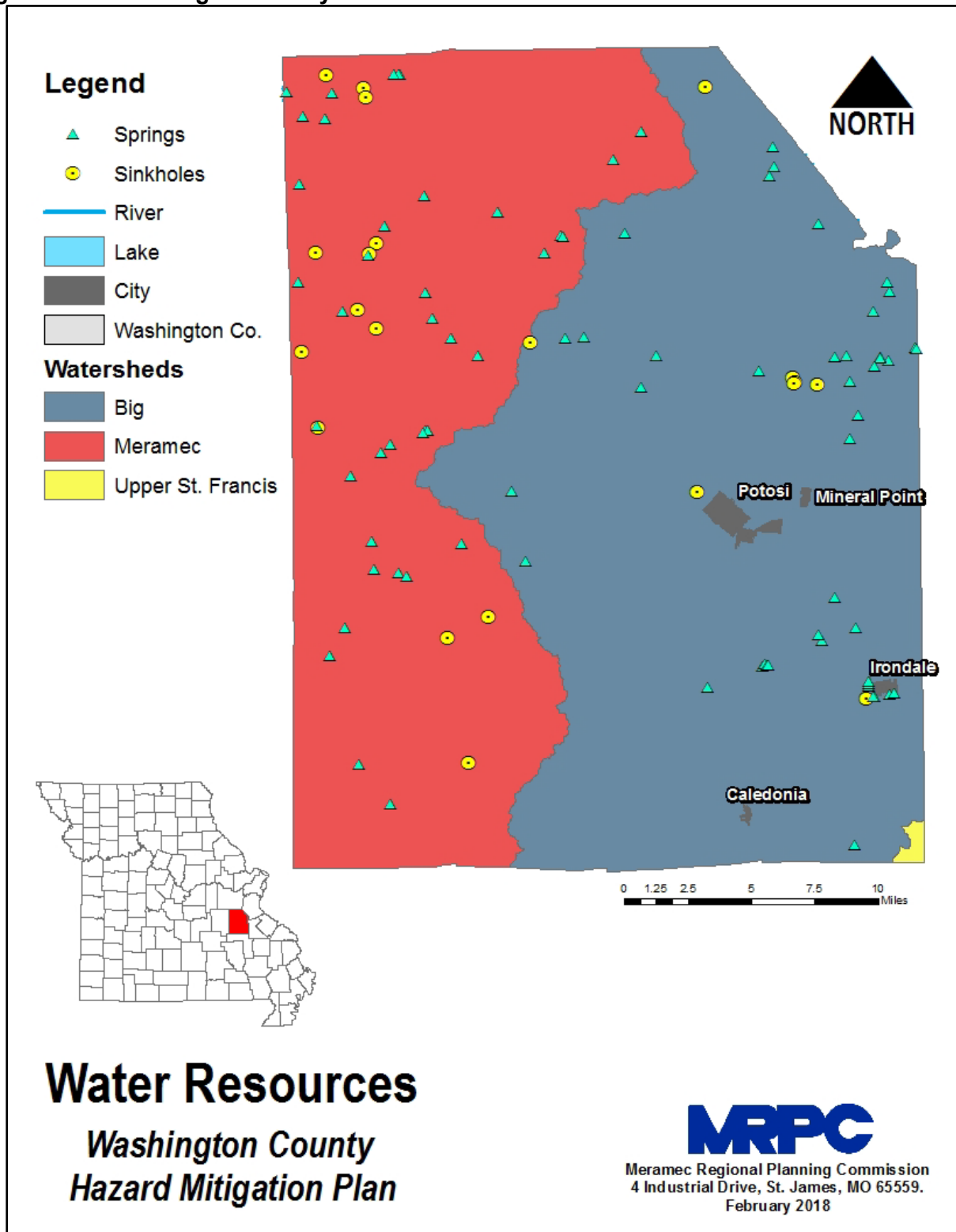
Source: <https://dnr.mo.gov/document-search/generalized-geologic-map-missouri-pub2514/pub2514> \*Red circle indicates Washington County

<sup>2</sup> <http://geology.about.com/library/bl/maps/blmissourimap.htm>

<sup>3</sup> <http://members.socket.net/~joschaper/ordo.html>

The topography of Washington County is divided by a line coincident with Highway 21. The topography west of Highway 21 is very hilly. The ridges in this area are sharp and the hills are steep sloping. East of Highway 21, the topography is gentle with broad valleys and rounded ridges. The maximum relief in the county is approximately 700 feet.

**Figure 2.3. Washington County Watershed/Water Resources**



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Two basic soil types are found in Washington County – The Ozark soils and Ozarks Dome soils. The Ozarks soils are located in an area of narrow, cherty limestone ridges that break sharply to steep side slopes of narrow valleys. Loess occurs in a thin mantle or is absent. Soils formed in the residuum from cherty limestone or dolomite range from deep to shallow and contain a high percentage of chert in most places. Some of the soils formed in a thin mantle of loess are on the ridges. Soils formed in loamy, sandy and cherty alluvium are in narrow bottom-land areas. These soils are found in the western part of Washington County. The Ozarks soils include the Lebanon-Goss-Bardley-Peridge, Needleeye-Viration-Wilderness, Gerald-Union-Goss, Lebanon-Hobson-Clarksville, Hobson-Coulstone-Clarksville, Captina-Clarksville-Hartville-Ashton-Cedargap-Nolin soil associations. The Hartville-Ashton-Cedargap-Nolin soils association is located along the Meramec River.

The Ozark Dome soils are located on mountainous slopes of rhyolite flows, granite domes and valley slopes on dolomite and sandstone formations. These soils are found in south-eastern Washington County. The Ozark Dome solid include Knobtop-Irondale-Selassus-Syenite and Peridge-Cantwell-Gasconade soil associations.

A majority of the general soil makeup in Washington County is Rueter-Sonsac-Useful association. Goss-Gravois, Cayneville-Gatewood-Aaron-Courtois, and Gravois-Goss associations are the other main soil types found in the county.

Washington County is located in three river basins: Big, Upper St. Francis, and Meramec. The Meramec River includes the following tributaries: Bourbeuse River, Dry Creek, Huzzah Creek, Courtois Creek, Hazel Creek, Big River and Mineral Fork. The watersheds located in the county can be seen in Error! Reference source not found..

The Big River Watershed is located within the northeastern quarter of the Ozark Highlands. The basin drains approximately 955 square miles of the Ozark Plateau in portions of six counties, including Washington. Main sub-basins range from 26 to 189 square miles, with the largest being Mineral Fork. The Big River, originating in Iron County, has eight, order five tributaries and flows north 138 miles until it reaches the Meramec River. The Big River's average gradient is 6.6 ft/mile, yet steepest near the St. Francois Mountains. Due to past lead and barite mining activity in the area, damage to some aquatic habitats and streams exist. Unsafe mine dams and poorly stored mine waste continue to degrade habitat or biota in about 110 miles of basin streams. The United States Army Corps of Engineers predicts catastrophic results from 27 high-hazard, unsafe dams during a moderate earthquake or major flood<sup>4</sup>.

The St. Francis Watershed is divided by the high-relief Ozark Plateau and the low-relief Mississippi Alluvial Plain. The watershed is separated into two subbasins, the upper and lower. The St. Francis River originates in Iron County and flows 225 miles to the Missouri/Arkansas border. The basin drains 1,839 square miles, 71 percent of the drainage area is in the upper subbasin. The upper subbasin's average gradient is 5 ft/mile. The St. Francis River basin ranked 13<sup>th</sup> in total recreational worth for Missouri. Lastly, streambank erosion is not a major issue in the upper subbasin due to heavily forested riparian corridors<sup>5</sup>.

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<sup>4</sup> <https://mdc.mo.gov/sites/default/files/watersheds/big.pdf>

<sup>5</sup> <https://mdc.mo.gov/sites/default/files/watersheds/StFrancisWatershed380.pdf>

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Seven miles northeast of the town of Salem in Southeastern Missouri, a spring-fed brook called the Watery Fork merges with a larger wet-weather branch and becomes the source of the Meramec River. For many millions of years, the Meramec has been carving its twisting, sometimes-tortuous 240-mile course into the solid rock of the Ozark Plateau, scouring its way through a deep, slowly widening valley, bordered by limestone bluffs and steep hills. It is joined along the way by innumerable springs, creeks, and four large tributaries, which transform the Meramec into a 100-yard to 200-yard-wide floodplain stream at its confluence with the Mississippi River eighteen miles below St. Louis.

Maramec Spring is the first of the four major contributors. It pours an average volume of 100 million gallons of cold clear water into the Meramec River per day, swelling the river to twice its size. It is interesting to note that the Dry Fork creek, which is about the same size as the Meramec River in that area, loses most of its volume underground to become a major contributor to Maramec Spring, and in a round-about way—a major contributor to the Upper Meramec. Over the next 30 miles, the inflows from many smaller branches turn the river into a prime stream. Then, from the right, the translucent waters of the second and largest of the headwater contributors, the Courtois-Huzzah creek, mingles with the Meramec, giving it the impression of a truly big river. Swirling on past Onondaga Cave (Leasburg), Meramec State Park (Sullivan), and the Meramec Caverns (Stanton)—all on the left—the Meramec receives the cloudy waters of the Bourbeuse River—its only major contributor from the west. As the darker waters flow on, the valley widens, and the river becomes a series of long, slow, wide pools, connected by short, fast, riffles. Around 25 miles below the Bourbeuse River confluence, the last major contributor, the Big River, flows into the Meramec from the right. Now, even wider and more sluggish, it enters the Mississippi floodplain, and wends its way another thirty miles before draining into the Mississippi. The name Meramec is of Algonquin Indian origin (probably the Fox tribe) and is widely thought to mean 'the good fish' or 'catfish', which were abundant in its waters. There is evidence that the river may get its name after a tribe of Indians called the Maroa, who once lived in Illinois across from the Meramec's mouth. Since the Algonquin syllable 'mec' or 'meg' stands for Small River or stream, the names Meramec or Merameg (the river has been called Merameg in the past) could be derived from the Algonquin Maroamec, which means 'Little River of the Maroas'. The name of the Mississippi is also of Algonquin origin, derived from their term mesisi-piya, meaning Big River. Also, the title of this state Missouri is of Indian origin, meaning People of the Big Canoe or He of the Big Canoe.

Even in geological time, the Meramec is a very old river. It does not drain its northeastern section of the Ozark Plateau with the reckless abandon of a mountain stream. Instead, it meanders through the landscape in a countless succession of bends, riffles, and placid slow stretches, each of which is another small step in the Meramec's 800-foot descent from the Ozark Plateau to the Mississippi River.

During the last 100 years, stream channels in the Ozarks have become wider and shallower and deep-water fish habitat has been lost. Historical data indicate that channel disturbances have resulted most directly from clearing of vegetation along stream channels, which decreases bank strength. Historical and stratigraphic data show that after 1830, Ozarks streams responded to land-use changes by depositing more gravel and less muddy sediment, compared to pre-settlement conditions. Because less muddy sediment is being deposited on flood plains, many stream banks now lack cohesive sediments, and therefore, no longer support steep banks. Land

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use statistics indicate that the present trend in the rural Ozarks is toward increased populations of cattle and increased grazing density; this trend has the potential to continue the historical stream-channel disturbance by increasing storm-water runoff and sediment supply.

Physiographic features, such as river basins and watersheds, play an important role in the development of any given area. Practical planning and engineering methods take advantage of the topography in planning and designing sewer and water facilities. The individual watersheds should form the basis for sewer and water districts, while several contiguous watersheds within the same drainage basin may be combined to form a sewer or water district.

## **2.1.2 Climate**

Snow occurs between November and April, both inclusive, but most of the snow falls in December, January and February. An average of about 14 inches of snow occurs annually in the Meramec Region. It is unusual for snow to stay on the ground for more than a week or two before it melts. Winter precipitation usually is in the form of rain, snow or both. Conditions sometimes borderline between rain and snow, and in these situations freezing drizzle or freezing rain occurs. Spring, summer and early fall precipitation comes largely in the form of showers or thunderstorms. Thunderstorms are most frequent from April to July. The average annual precipitation is 45.82 inches, which occurs on the average of less than 100 days per year. About half of these will be days with thunderstorms.

Because of its inland location, Missouri and Washington County are subject to frequent changes in temperature. The average annual temperature is 54.45°F. The average annual high temperature is 64.5°F with the average annual low at 44.4°F. The average high and low in January is 40°F and 21°F, respectively. In July the average high and low are 86°F and 67°F, respectively. A heat index of 120 degrees has been observed in the county.

While winters are cold and summers are hot, prolonged periods of very hot weather are unusual. Occasional periods of mild, above freezing temperatures are noted almost every winter. Conversely, during the peak of the summer season occasional periods of dry, cool weather break up stretches of hot, humid weather. About half of the days in July and August will have temperatures of 90°F or above, but it is not unusual for the temperature to drop into the 50s by the evening. In winter, there is an average of about 100 days with temperatures below 32°F. Temperatures below 0°F are infrequent with only about three days per year reaching this low temperature. The first frost occurs in mid-October, and the last frost occurs about mid-April.

## 2.1.3 Population/Demographics

**Table 2.4** provides population/demographic data for Washington County between 2000 and 2020 by jurisdiction. The unincorporated area of Washington County was determined by subtracting the populations of the incorporated areas from the overall county population.

**Table 2.4. Washington County Population 2010-2020 by Jurisdiction**

Jurisdiction	2000 Population	2010 Population	2020 Population	2010-2020 # Change	2010-2020 % Change
Unincorporated Washington County	19,724	20,696	20,246	-450	-2.23%
Caledonia	158	130	131	1	0.77%
Irondale	437	445	368	-77	-17.3%
Mineral Point	363	351	231	-120	-34.19%
Potosi	2,662	2,482	2,538	56	2.26%

Source: U.S. Census Bureau, Census 2000 Summary File 1; Census 2010 Summary File 1; Census 2020 Redistricting Data

**Table 2.5** provides information in regard to the percent of individuals under the age of 5, and over 65 for the county, State, and Nation. In addition, average household size is illustrated in **Table 2.6** including figures for Washington County, Missouri, and the U.S. In 2020 there were an estimated 10,719 households within the county<sup>6</sup>.

**Table 2.5. Percent of Individuals Under the Age of 5, and Over 65 for County, State, and Nation (2020)**

Location	% Under Age of 5	% Over Age of 65
Washington County	5.8	16.6
Missouri	6.1	16.9
United States	6.0	16.0

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates

**Table 2.6. 2020 Average Household Size for County, State, and Nation**

Location	Average Household Size
Washington County	2.56
Missouri	2.44
United States	2.60

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates

### Social Vulnerability Index (SoVI ®)

The University of South Carolina developed the Social Vulnerability Index to evaluate and rank the ability to respond to, cope with, recover from, and adapt to natural disasters. The index synthesizes 30 socioeconomic variables which are primarily derived from the United States Census Bureau.

<sup>6</sup> U.S. Census Bureau, 2020 Decennial Redistricting Data

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**Table 2.7** depicts the Social Vulnerability Index for Washington County along with its national percentile.

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**Table 2.7. Social Vulnerability Index (SoVI®)**

State	County	SoVI Score (10 - 14)	National Percentile (10 - 14)
Missouri	Washington County	0.150000006	52.8%

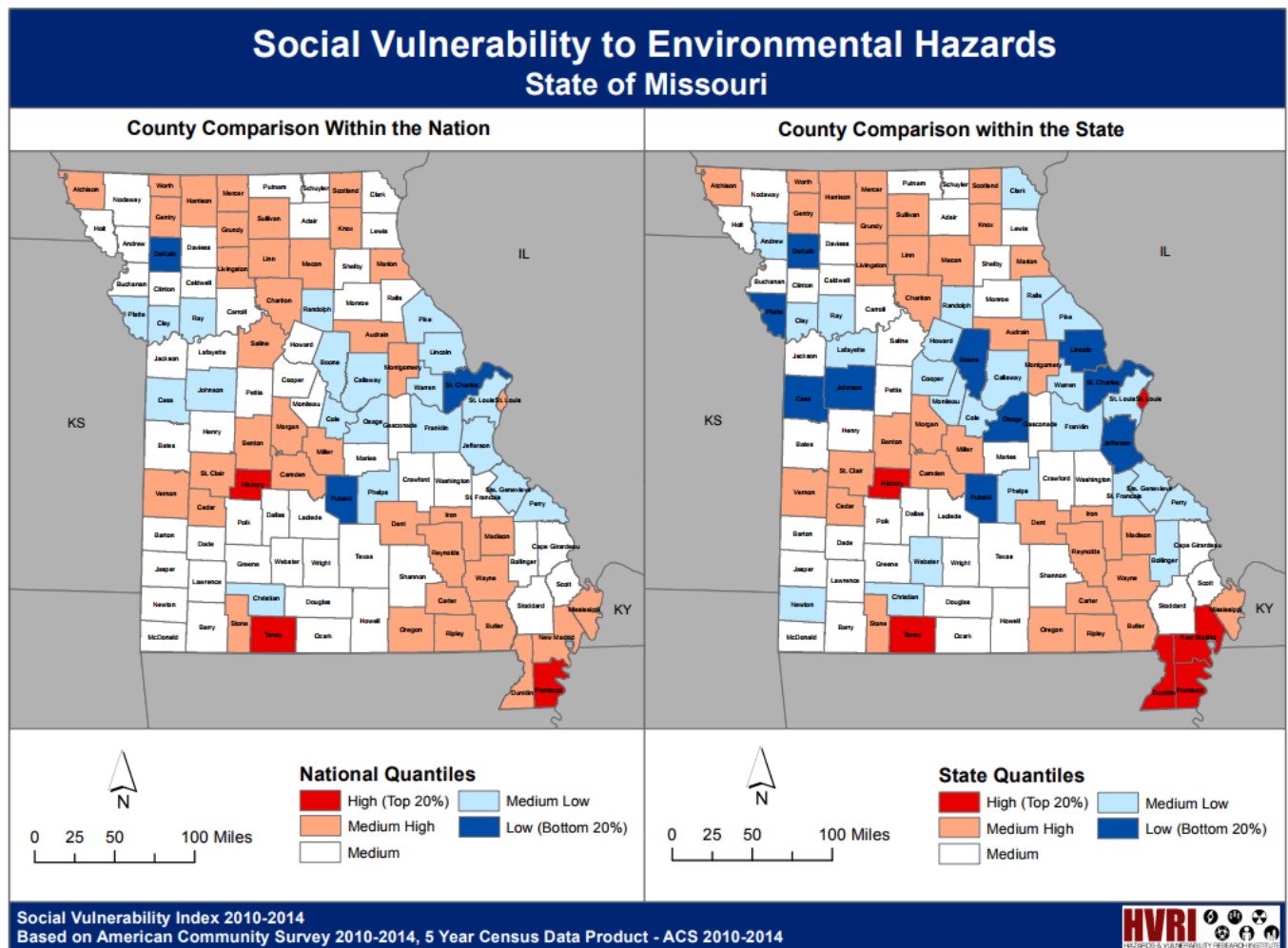
Source: <http://artsandsciences.sc.edu/geog/hvri/sovi-data>

The analysis of 30 socioeconomic variables includes the standardization of data, and reduction of variables into a condensed set of statistically optimized components; positive component loadings (+) are linked with amplified vulnerability, and negative component loadings (-) are linked with diminished vulnerability. Scores are represented as a numeric value, but have no inherent mathematical properties. To simplify the metrics of the SoVI® Score, a negative number illustrates a county's resiliency to hazard events, and a positive number illustrates a decrease in resiliency<sup>7</sup>. Washington County's SoVI® Score illustrates an amplified vulnerability to cope with natural disasters. Additionally, Washington County is ranked 52.8 percent nationally, for counties most vulnerable to environmental hazards. **Figure 2.4** depicts Missouri's SoVI® to environmental hazards between 2010 and 2014. Furthermore, **Figure 2.5** depicts the Nation's SoVI® to environmental hazards between 2010 and 2014.

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<sup>7</sup> <http://webra.cas.sc.edu/hvri/products/sovifaq.aspx>

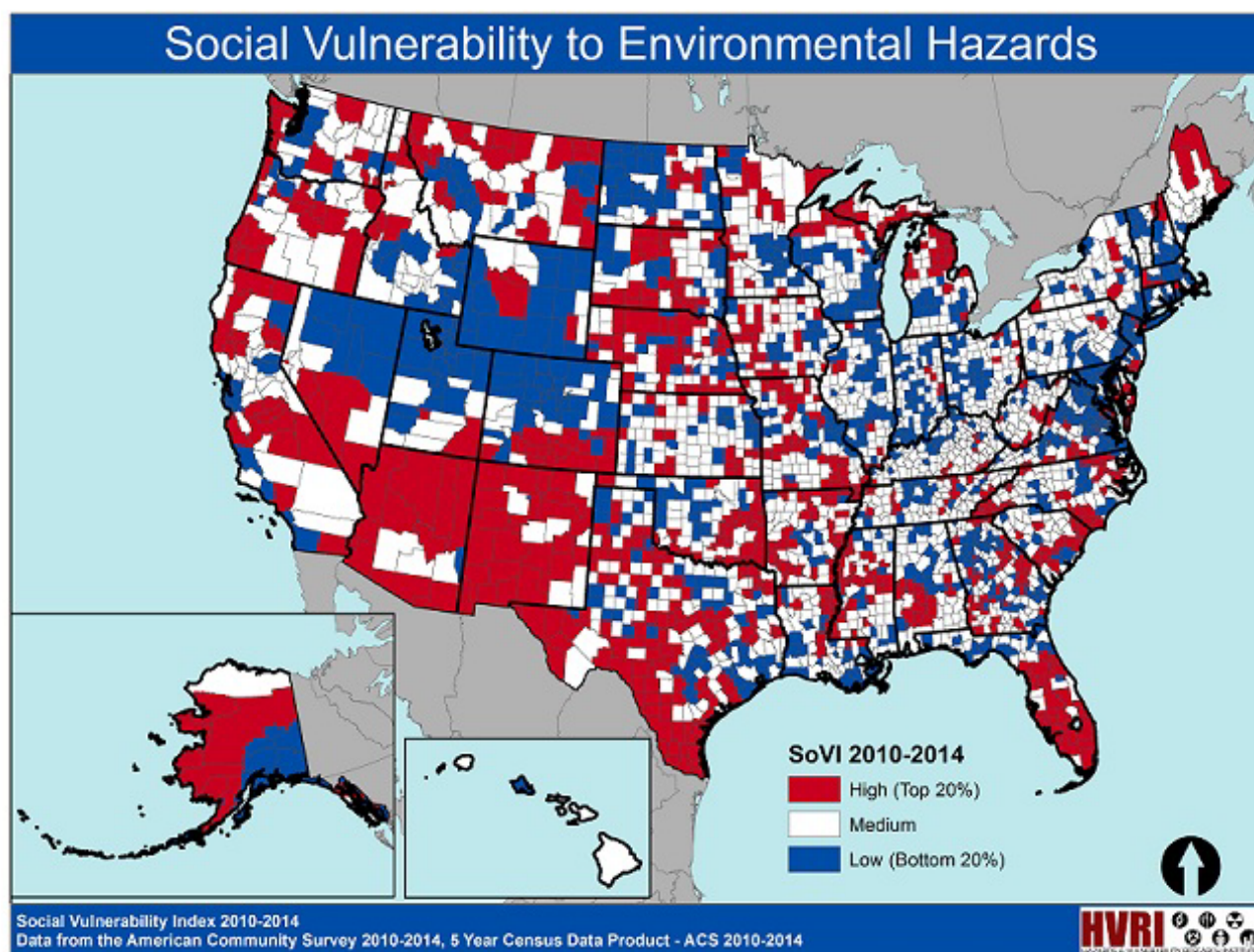
**Figure 2.4. 2010 – 2014 Missouri Social Vulnerability to Environmental Hazards (SoVI ®)**



Source: [http://artsandsciences.sc.edu/geog/hvri/sites/sc.edu.geog.hvri/files/attachments/MO\\_1014.pdf](http://artsandsciences.sc.edu/geog/hvri/sites/sc.edu.geog.hvri/files/attachments/MO_1014.pdf)



**Figure 2.5. 2010 – 2014 U.S. Social Vulnerability to Environmental Hazards (SoVI ®)**



Source: <http://artsandsciences.sc.edu/geog/hvri/sovi%C2%AE-0>

**Table 2.8** provides additional demographic and economic indicators for Washington County.

**Table 2.8. 2020 Unemployment, Poverty, Education, and Language Percentage Demographics, Washington County, Missouri**

Jurisdiction	% in Labor Force	% of Population Unemployed	% of Families Below the Poverty Level	High School Diploma ONLY, ages 25+ (%)	Bachelor's degree or higher, ages 25+ (%)	% of population language spoken at home other than English
Washington County	49.8	7.2	16.4	39.3	11.4	1.4
Caledonia	60.2	5.2	4.6	59.6	12.2	0
Irondale	54.2	13.0	42.5	27.4	5.0	1.0
Mineral Point	57.9	10.0	10.0	58.3	0.8	0

Jurisdiction	% in Labor Force	% of Population Unemployed	% of Families Below the Poverty Level	High School Diploma ONLY, ages 25+ (%)	Bachelor's degree or higher, ages 25+ (%)	% of population language spoken at home other than English
Potosi	47.5	5.9	18.4	36.7	16.6	1.9

Source: U.S. Census Bureau, 2016-2020 American Community Survey, 5-Year American Community Survey

## 2.1.4 History

It is not known when the first permanent settlement was made in the territory now included in Washington County. Historians agree that the first white men who explored this part of Missouri were Frenchmen. About 1760, Francis Breton discovered a mine near Potosi that bears his name, Mine-a-Breton. A mining camp was established near the present site of Potosi, and in 1765 families located there. Near the end of the century the Spanish government made concessions to individuals, and the first recorded permanent village, Mine-a-Breton was established. Early settlers were drawn to Washington County because of its abundant mineral resources. Lead, iron ore, zinc, barite, and silver have been mined in the county. The first metallic zinc made west of the Mississippi was smelted in Alex Anderson's furnace near Potosi. Iron ore and barite have been extensively mined until recently.

Washington County was organized on August 21, 1813, and was named after George Washington, the first president of the United States. The territory of which the county is composed was previously a part of Saint Genevieve County. Saint Genevieve County was one of the original five districts of which the Territory of Missouri had been composed at the time of its organization in 1812. As it was originally laid out, the county contained more territory than it does at the present time. In 1857 by subsequent acts of the Legislature, the county had been reduced in size to its present limits.

The commissioners appointed to select a county seat site designated the village of Mine a Breton as the temporary seat of justice for the county. On February 26, 1814, the permanent county seat was established on 40 acres of land donated by Moses Austin and 10 acres of land donated by John Rice Jones. The new town was briefly named St. George but was later renamed Potosi in honor of the Spanish silver mining town in Bolivia. Potosi and Mine a Breton remained separate villages until May 2, 1826, when they were incorporated under the single name of Potosi.

A large courthouse, suitable for a future state capital was planned for Potosi. In the Territorial convention, Potosi lost its bid for the site of the capital to Jefferson City. Although Potosi was not successful in becoming the capital of the new state, the State Supreme Court met twice a year in Potosi between 1837 and 1843.

In May 1861, the citizens of Potosi went on record in favor of armed neutrality in the Civil War and organized a home guard to maintain their neutrality. Later that month, Union troops overran the town and arrested several southern sympathizers. In August, Colonel White and a Confederate Calvary detachment invaded Potosi, but left shortly thereafter. In September 1864, General Shelby and his troops invaded the town, only to be met by a resistance force that had barricaded itself in the courthouse. The defenders were unsuccessful, and several of them were shot on the courthouse lawn following the engagement.

Caledonia is a portion of the Miles Gorforth Spanish Grant. The community was founded in the early 1800's by Alexander Craighead, a Scotsman, who named the village after his native Scotland in 1819. The first school in the area was built in 1804. A two-room school was built in Caledonia in the

1830s. The Bellevue Collegiate Institute was built by the St. Louis Conference of the Methodist Church South in 1864 closing around 1902. The building was used as a public school until 1952 when the structure was demolished. In 1936 the Caledonia High School was built also serving as an Elementary School.

Irondale is one of the oldest towns in the vicinity, established in 1807. Irondale was incorporated as a village in 1910. It is situated between some of the most beautiful hills of the Ozarks, northeast of Hughes Mountain. Grenia Springs, Thompson Spring, and the Big River. The abundance of iron ore made this a choice area for settlers. The Iron Furnace Company manufactured pig iron, and the Washington County Mining Company manufactured oxide zinc. Irondale also was the home of a soda bottling plant, saw and grist mill, brick factory, and dairy.

In 1864 during the Civil War, General Price's Army came to town, raided the stores, lived off the people and burned the railroad bridge over Big River north of town.

The town of Mineral Point is located west of Potosi on Highway O and was laid out in 1858 by William C. Inks. The town was incorporated as a village in 1905. It was originally located on the St. Louis Iron Mountain & Southern Railway which was later changed to a branch of the Missouri Pacific Railways. The oldest part of town is around the railroad tracks and still has a general store and the old Mineral Point Hotel which is no longer used.

## 2.1.5 Occupations

**Table 2.9** provides occupation statistics for the incorporated jurisdictions and incorporated county.

**Table 2.9. Occupation Statistics, Washington County, Missouri**

Place	% in Management, Business, Science, and Arts Occupations	% in Service Occupations	% in Sales and Office Occupations	% in Natural Resources, Construction, and Maintenance Occupations	% in Production, Transportation, and Material Moving Occupations
Washington County	26.9	20.1	18.9	13.9	20.4
Caledonia	31.5	2.2	20.7	30.4	15.2
Irondale	18.8	26.0	9.9	5.0	40.3
Mineral Point	12.6	24.4	31.1	9.6	22.2
Potosi	34.1	18.6	18.2	10.1	19.0

Source: U.S. Census, 2016-2020 American Community Survey, 5-year Estimates.

## 2.1.6 Agriculture

Due to the rural nature of the area, agriculture and timber are significant factors in the local economy. According to the 2012 Census of Agriculture, the number of farms in the County was 531 encompassing 123,960 total acres<sup>8</sup>. In addition, the average farm was 233 acres. According to the 2017 Census of Agriculture, Washington County had reduced to 502 farms encompassing 103,06 acres, with an average farm size of 207 acres<sup>9</sup>. Furthermore, there are only approximately 15 farms with 1,000 or more acres in the County. Due to the rugged nature of the region, row crop farming is

<sup>8</sup> 2012 Census of Agriculture, USDA, National Agriculture Statistics Service

<sup>9</sup> Source: 2012 Census of Agriculture – County Data, USDA, National Agriculture Statistics Service

for the most part limited to the river valleys. In 2017, 15,914 acres of cropland were harvested, with forage (hay, haylage, grass silage, and greenchop) being the top crop in the County. Moreover, 14,893 cattle and calves were raised<sup>10</sup>. The average sale per farm was \$19,858. Lastly, the total number of hired workers in the County was 156<sup>11</sup> individuals comprising 1.72%<sup>12</sup> of the total workforce.

The Ozarks region of Missouri is the focal point of several converging ranges of plant associations. Eastern hardwoods, southern pines and western prairies and the wildlife each supports, all reach the outward limits of their range in this area. As a result, various types of forest lands and animal habitats co-exist within a limited area. Several sawmills operate in the area and the large amount of National Forest Lands in the region also contribute to the importance of timber production and logging to the local economy.

## 2.1.7 FEMA Hazard Mitigation Assistance Grants in Planning Area

FEMA's Hazard Mitigation Assistance (HMA) grant program provides funding for mitigation activities which have the potential to reduce disaster losses and protect life and property from future disaster damages<sup>13</sup>. Previous FEMA HMA Grants issued in the planning area can be found in **Table 2.10**.

**Table 2.10. FEMA HMA Grants in County from 1993-2019**

Project Type	Sub applicant	Award Date	Project Total (\$)
206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	Washington County	09/23/2019	1,625,000
<b>Total</b>			1,625,000

Source: Missouri SEMA, <https://www.fema.gov/openfema-dataset-hazard-mitigation-grants-v1>

## 2.1.8 FEMA Public Assistance (PA) Grants in Planning Area

The purpose of the Public Assistance (PA) Grant Program is to support communities' recovery from major disasters by providing them with grant assistance for debris removal, life-saving emergency protective measures, and restoring public infrastructure. Local governments, states, tribes, territories and certain private nonprofit organizations are eligible to apply. Public Assistance is FEMA's largest grant program. **Table 2.11** below gives information about all Public Assistance Grant for the Planning area. It gives the Declaration number, project type and size, the applicant, and the project total. Total PA grants is \$2,770,653.30.

<sup>10</sup> 2012 Census of Agriculture, Missouri Farm Commodity Sales, USDA, National Agriculture Statistics Service

<sup>11</sup> [http://www.agcensus.usda.gov/Publications/2012/Full\\_Report/Volume\\_1\\_Chapter\\_2\\_County\\_Level/Missouri/st29\\_2\\_007\\_007.pdf](http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_2_County_Level/Missouri/st29_2_007_007.pdf)

<sup>12</sup> U.S. Census Bureau, 2019-2020 American Community Survey

<sup>13</sup> <https://www.fema.gov/media-library/assets/documents/103279>

**Table 2.11. FEMA PA Grants in Washington County from 2003-2017**

Disaster Declaration	Project Type	Project Size	Applicant	Project Total
1463	EMERGENCY PROTECTIVE MEASURES	Small	RICHWOODS VOLUNTEER FIRE DEPT	\$1,080.92
1463	DONATED RESOURCES	Small	RICHWOODS VOLUNTEER FIRE DEPT	\$360.31
1463	4.2 CULVERT REPLACEMENTS	Small	Washington County	\$10,424.00
1463	DEBRIS REMOVAL	Small	Washington County	\$10,085.07
1631	EMERGENCY PROTECTIVE MEASURES	Small	Washington County	\$9,704.47
1631	ROADS AND BRIDGES	Large	Washington County	\$166,494.81
1673	PUBLIC UTILITIES	Small	IRONDALE, CITY OF	\$1,000.00
1673	EMERGENCY PROTECTIVE MEASURES	Small	IRONDALE, CITY OF	\$3,690.75
1673	DEBRIS REMOVAL	Small	IRONDALE, CITY OF	\$4,730.27
1673	DEBRIS REMOVAL	Small	POTOSI, CITY OF	\$26,062.55
1673	PUBLIC UTILITIES	Small	POTOSI, CITY OF	\$2,750.00
1673	EMERGENCY PROTECTIVE MEASURES	Small	POTOSI, CITY OF	\$7,105.51
1673	DEBRIS REMOVAL	Small	Washington County	\$57,970.02
1673	EMERGENCY PROTECTIVE MEASURES	Small	Washington County	\$13,713.41
1673	EMERGENCY PROTECTIVE MEASURES	Small	Washington County	\$5,599.85
1673	DEBRIS REMOVAL: DISTRICT TWO	Small	Washington County	\$59,068.01
1673	EMERGENCY PROTECTIVE MEASURES: DISTRICT TWO	Small	Washington County	\$15,198.15
1673	EMERGENCY PROTECTIVE MEASURES	Small	IRONDALE FIRE PROTECTION DISTRICT	\$1,750.47
1673	DONATED RESOURCES	Small	IRONDALE FIRE PROTECTION DISTRICT	\$583.49
1749	CULVERT DAMAGE & ROAD SCOURING	Small	IRONDALE, CITY OF	\$1,906.85
1749	ROAD WASHOUT/CULVERT DAMAGE	Small	Washington County	\$51,696.31
1749	ROAD WASHOUT	Small	Washington County	\$24,997.49
1749	ROAD / CULVERT WASHOUT	Large	Washington County	\$188,666.03
1847	IRON01B / Emergency Protective Measures	Small	IRONDALE, CITY OF	\$1,032.50
1847	IRON01F / Lift Station	Small	IRONDALE, CITY OF	\$2,500.00
1847	WCO-02C / Roads - Dist 2	Large	Washington County	\$248,012.76
1847	WCO-01C / Roads - Dist 2	Small	Washington County	\$61,576.34
1847	WCO-03C / Roads - Dist 2 Slaughter House Rd, Brazil Rd,	Small	Washington County	\$36,267.58
1847	GWW01C / Hamilton Creek Low Water Crossing	Small	Washington County	\$43,677.25

1847	WCO-05C / Roads - Dist 2	Small	Washington County	\$52,487.86
1847	WCO-04C / Roads - Dist 2	Small	Washington County	\$39,794.16
1847	WCO-06C - Roads - Dist 2	Small	Washington County	\$23,647.24
1847	GW02C - Road washout and scouring Dist 1	Large	Washington County	\$129,617.86
1847	WCO-07C / Roads - Dist 2	Large	Washington County	\$70,952.95
1847	WCO-08C / Roads - Dist 2	Small	Washington County	\$47,351.20
1980	CCC-016 - Debris Removal	Small	POTOSI, CITY OF	\$5,490.70
1980	CCC-017 - Sewer Line and CMP Repairs	Small	POTOSI, CITY OF	\$1,879.63
1980	CCC-02 - Rock Roads	Small	Washington County	\$61,183.29
1980	CCC-01-Rock Roads	Small	Washington County	\$50,395.49
1980	CCC-03-Rock Roads	Small	Washington County	\$61,409.67
1980	CCC-04-Rock Roads	Small	Washington County	\$54,868.34
1980	CCC-05 - Rock Roads	Small	Washington County	\$25,840.91
1980	CCC-08 - Rock Roads	Small	Washington County	\$28,557.31
1980	CCC-07 - Rock Roads	Small	Washington County	\$44,036.59
1980	CCC-06 - Rock Roads	Small	Washington County	\$30,982.37
1980	CCC-010 - Culverts and Low Water Crossings	Small	Washington County	\$16,451.32
1980	CCC-009 - Culverts and Low Water Crossings	Small	Washington County	\$13,877.49
1980	CCC-014 - Debris Removal	Small	Washington County	\$8,777.34
1980	CCC-011-Tiff Water Crossing	Small	Washington County	\$61,259.02
1980	CCC-012-Culvert	Small	Washington County	\$2,397.36
3267	EMERGENCY PROTECTIVE MEASURES	Small	WASHINGTON COUNTY AMBULANCE	\$2,082.44
3267	EMERGENCY PROTECTIVE MEASURES	Small	BELGRADE VOLUNTEER FIRE DEPT	\$1,304.78
3267	EMERGENCY PROTECTIVE MEASURES	Small	POTOSI SCHOOL R-3 SCHOOL DISTRICT	\$5,672.77
3267	DEBRIS REMOVAL	Small	IRONDALE, CITY OF	\$8,982.75
3267	EMERGENCY PROTECTIVE MEASURES	Small	IRONDALE, CITY OF	\$5,604.41
3267	DONATED RESOURCES	Small	IRONDALE, CITY OF	\$4,862.38

3267	DEBRIS REMOVAL	Small	POTOSI, CITY OF	\$46,025.30
3267	EMERGENCY PROTECTIVE MEASURES	Small	POTOSI, CITY OF	\$7,952.96
3267	DEBRIS REMOVAL	Large	Washington County	\$170,801.67
3267	EMERGENCY PROTECTIVE MEASURES	Small	Washington County	\$13,929.22
3267	EMERGENCY PROTECTIVE MEASURES	Small	CALEDONIA FIRE PROTECTION DISTRICT	\$1,561.65
3267	EMERGENCY PROTECTIVE MEASURES	Small	POTOSI FIRE PROTECTION DISTRICT	\$5,438.49
4238	WCO002C Road Damage	Small	Washington County	\$11,258.77
4238	WCO003C Road Washout - District 2	Small	Washington County	\$54,113.00
4238	WCO004C Bridge Approaches- District 2	Small	Washington County	\$6,472.28
4238	WCO006C Roads-District 2	Small	Washington County	\$15,597.52
4238	WCO007C Roads	Small	Washington County	\$77,010.71
4238	WCO001A - PAAP Debris Removal	Small	Washington County	\$7,762.16
4238	WCO005C - Culverts	Small	Washington County	\$28,580.36
4238	WCO008C Robison Road Bridge	Small	Washington County	\$15,208.93
4250	221JB1C - Washington County District 1	Small	Washington County	\$28,575.36
4250	221JB2C - Washington County District 2	Small	Washington County	\$84,773.39
4250	221JB3A - Debris Removal	Small	Washington County	\$4,458.83
4317	CP01981 - Washington County District 1 Culverts	Small	Washington County	\$9,194.80
4317	ST01247 - Washington County District 1 Roads	Large	Washington County	\$67,067.91
4317	ST01266 - Washington County District 2 Culverts/Low Wat	Small	Washington County	\$91,000.54
4317	ST01248 - Washington County District 2 Roads	Large	Washington County	\$106,396.65
			<b>TOTAL</b>	<b>\$2,770,653.30</b>

Source: Federal Emergency Management Agency, 06/09/2022

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## 2.2 Jurisdictional Profiles and Mitigation Capabilities

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

### 2.2.1 Unincorporated Washington County

#### Overview

The jurisdiction of Washington County includes all unincorporated areas within the county boundaries. Washington County is governed by a three-member County Commission. The Commission is composed of a presiding commissioner, representing all of the county's population who is elected for a four-year term. Two associate commissioners representing roughly half the county's population each, are elected for four-year terms. The commission meets on Monday of each week. Other elected county officials include the County Clerk, Assessor, Collector, Circuit Clerk, Treasurer, Prosecuting Attorney, Sheriff, Recorder of Deeds, County Surveyor, Public Administrator, Associate Circuit Judge, and Coroner.

Washington County operates as a third-class county. The county government has the authority to administer county structures, infrastructures, and finances as well as floodplain regulations. Third class counties do not have building regulations. Other county officials include the Emergency Management Director, Floodplain Administrator, 911 Director, Health Dept. Administrator, and Road and Bridge Supervisor.

#### Technical and Fiscal Resources

Washington County operates as a third-class county. The county government has the authority to administer county structures, infrastructures, and finances as well as floodplain regulations. Third class counties do not have building regulations. Washington County has staff resources emergency management and transportation. The county has a 9-1-1 central dispatch center with enhanced 9-1-1 capabilities.

There are six fire departments located in the county. Those departments include Belgrade Volunteer Fire Dept., Caledonia Fire Protection District, Irondale Community Volunteer Fire Department, Potosi Fire Protection District, Richwoods Fire Protection District, and Sullivan Fire Protection District. The county is served by the Washington Co. Sheriff's Office. The county has a 911 Central Dispatch Center located at 12252 N State Highway 21, Cadet, Missouri. The county is served by the Washington County Ambulance District. The Washington County Memorial Hospital is located within the county. There are four warning sirens within the county. Additionally, the county operates Nixle, a mass notification system. The county owns one fixed and five portable generators.

Fiscal tools or resources that the county could potentially use to help fund mitigation activities include Community Development Block Grants and capital improvements project funding.

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## Existing Plans and Policies

The county has a County Emergency Operations Plan, County Recovery Plan, Economic Development Plan, Regional Transportation Plan, Flood Mitigation Assistance Plan, Critical Facilities Plan, and Floodplain Ordinance.

## Other Mitigation Activities

The Office of Emergency Management, local fire departments, Washington County Ambulance District, and the Washington County Health Department have conducted public education campaigns to raise awareness and increase preparedness among the county's population. Those programs have included Ready-In-3 emergency preparedness, fire safety, storm preparedness, weather radio education, dissemination of SEMA brochures, and other health/safety trainings. Bicycle and car seat safety education is provided by the Coalition for Roadway Safety.

Since the last plan update the county has increased the number of generators. The Pine Tree Lake Homeowners Association received a USDA Forest Service grant for fire mitigation activities. The county is applying to build a FEMA tornado safe room in the industrial park.

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**Table 2.12. Demographic and Structure Risk Parameters For Unincorporated Washington County**

Jurisdiction	Total Population	People With a Disability	Non-English Speaking Populations	People Below Poverty Level	Population Under 5 Yrs.	Population 65 Yrs. and Over	Residences Built Prior to 1939	Mobile Homes
Unincorporated Washington County	21,098	5,076	311	3,867	1,146	3,495	588	2,629

Source: U.S. Census Bureau, 2016-2020 5-Years American Community Survey

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**Table 2.13. Unincorporated Washington County Mitigation Capabilities**

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
<b>Comprehensive Plan</b>	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	n/a
County Emergency Operations Plan	Yes
Local Recovery Plan	n/a
County Recovery Plan	Yes
City Mitigation Plan	n/a
County Mitigation Plan	Yes - 2017
Debris Management Plan	No
<b>Economic Development Plan</b>	Yes – Regional CEDS 2018
Transportation Plan	Yes – Regional 2021
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
<b>Watershed Plan</b>	No
Firewise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
<b>Policies/Ordinance</b>	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes – 2/10/2020
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
<b>Program</b>	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	No
FireWise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	Unkown
Economic Development Program	MRPC
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (City)	n/a
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Evacuation Route Map	Yes
Critical Facilities Inventory	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
<b>Staff/Department</b>	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No

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

Source: Data Collection Questionnaire, 2022

## 2.2.2 Village of Caledonia

### Overview

Caledonia is located in the southeast portion of Washington County. Caledonia is located where Highways 21 and 32 meet. Caledonia is incorporated as a village with five trustees and a chairperson making decisions regarding city issues. Village personnel include a Secretary/Clerk, Office Manager, and Maintenance/Sewer/Water Supt. The city population from the 2020 5-year ACS data is 190, in 2010 it was 130, which shows a significant population growth of 46 percent.

### Technical and Fiscal Resources

Caledonia is a participating community in the National Flood Insurance Program. Law enforcement in the community is provided by the Washington Co. Sheriff's Office. The Washington County Ambulance District provides ambulance service for the village and surrounding area. The city is served by the Caledonia Fire Protection District. The village has one warning siren; activated by 911. The village owns and operates two generators. The village has a Floodplain Administrator.

Fiscal tools or resources that the city could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements project funding, levy taxes for specific purposes, fees for water, sewer, gas, and electric services, impact fees for new development, debt through general obligation bonds, and debt through special tax bonds.

### Other Mitigation Activities

Since the last plan update the city has added another generator.

Public education programs are provided regionally by the Office of Emergency Management, local fire departments, and the Washington County Health Department. Bicycle and car seat safety education is provided regionally by the Coalition for Roadway Safety.

Over 45 percent of housing units in Caledonia were built prior to 1939, this is the highest percentage of pre-1939 homes in the county. A greater percent of pre-1939 homes increase the village's risk to damages from several hazards. The village also has the highest percentage of population over 65 in the county at over 21 percent, which increases the risk of injury and death during a hazard event.

**Table 2.14** below shows the demographic and structure statistics, and **Table 2.15** describes the mitigation capabilities of the city.

**Table 2.14. Demographic and Structure Risk Parameters For Caledonia**

Jurisdiction	Total Population	With a disability	Non-English Speaking Populations	People Below Poverty Level	Population Under 5 Yrs.	Population 65 Yrs. and Over	Residences Built Prior to 1939	Mobile Homes
Caledonia	190	32	0	30	7	41	41	18

Source: U.S. Census Bureau, 2016-2020 5-Years American Community Survey

**Table 2.15. Village of Caledonia Mitigation Capabilities**

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
<b>Comprehensive Plan</b>	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	No
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes – 2017
Debris Management Plan	No
<b>Economic Development Plan</b>	Yes – Regional CEDS 2018
Transportation Plan	Yes – Regional 2021
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
<b>Watershed Plan</b>	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
<b>Policies/Ordinance</b>	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes – 4/20/2020
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	No
Historic Preservation Ordinance	Yes
Landscape Ordinance	No
<b>Program</b>	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	9
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
<b>Staff/Department</b>	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
Emergency Management Director	No

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes – regional MLEPD
County Emergency Management Commission	n/a
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	Yes - Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
<b>Non-Governmental Organizations (NGOs)</b>	
American Red Cross	No
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2022

## 2.2.3 City of Irondale

### Overview

Irondale is one of the larger towns in Washington County and is located nine miles southeast of Mineral Point in Concord Township. Irondale is incorporated as a fourth-class city with a four member board of aldermen and a mayor. City personnel include a City Clerk, Attorney, Water Superintendent, and two water/sewer/street personnel. The city population from the 2020 5-year ACS data is 575, in 2010 it was 445, which shows a population increase of over 29 percent.

### Technical and Fiscal Resources

Irondale is a participating community in the National Flood Insurance Program. Law enforcement in the community is provided by the Washington County Sheriff's Department. The Washington

County Ambulance District provides ambulance service for the village and surrounding area. The city is served by the Irondale Community Volunteer Fire Department. The city does not have a warning siren. The city possesses one portable generator. The city has a Floodplain Administrator.

Fiscal tools or resources that the city could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements project funding, levy taxes for specific purposes, fees for water, sewer, gas, and electric services, impact fees for new development, debt through general obligation bonds, and debt through special tax bonds.

### Other Mitigation Activities

The city is planning the construction of a Recreation Center that also serves as a disaster center at the site of the old recreation center in the next five years.

Public education programs are provided regionally by the Office of Emergency Management, local fire departments, and the Washington County Health Department. Bicycle and car seat safety education is provided regionally by the Coalition for Roadway Safety.

Irondale has the highest percentage of population under the age of 5 and below the poverty line at 3.7% and 39.8% respectively, which increases the risk of injury and death during hazard events.

**Table 2.16** below shows the demographic and structure statistics, and **Table 2.17** describes the mitigation capabilities of the city.

**Table 2.16. Demographic and Structure Risk Parameters For Irondale**

Jurisdiction	Total Population	With a disability	Non-English Speaking Populations	People Below Poverty Level	Population Under 5 Yrs.	Population 65 Yrs. and Over	Residences Built Prior to 1939	Mobile Homes
Irondale	575	75	5	229	50	37	35	38

Source: U.S. Census Bureau, 2016-2020 5-Years American Community Survey

**Table 2.17. City of Irondale Mitigation Capabilities**

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
<b>Comprehensive Plan</b>	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	N/A
Local Recovery Plan	No
County Recovery Plan	N/A
City Mitigation Plan	No
County Mitigation Plan	Yes – 2017
Debris Management Plan	No
<b>Economic Development Plan</b>	Yes – Regional CEDS 2018
Transportation Plan	Yes – Regional 2021

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
<b>Watershed Plan</b>	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
<b>Policies/Ordinance</b>	
Zoning Ordinance	Yes
Building Code	No
Floodplain Ordinance	Yes – 01/16/2020
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
<b>Program</b>	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
Hazard Awareness Program	No
National Flood Insurance Program	Yes
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	05/5X
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
<b>Staff/Department</b>	
Building Code Official	No
Building Inspector	Yes – Contracted as Needed
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes – MLEPD
County Emergency Management Commission	n/a
Sanitation Department	Yes – Contract with Republic Services
Transportation Department	No
Economic Development Department	No
Housing Department	Yes - Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
<b>Non-Governmental Organizations (NGOs)</b>	
American Red Cross	No
Salvation Army	No
Veterans Groups	No
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.)	Yes – Masonic Lodge
<b>Local Funding Availability</b>	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	N/A
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2022

## 2.2.4 Village of Mineral Point

### Overview

The town of Mineral Point is located east of Potosi in the east central portion of Washington County. Mineral Point was incorporated as a village in 1905. A four-member board of trustees and a chairperson make decisions regarding village issues. The village employs a Clerk/Treasurer and Water/Sewer Manager. The city population from the 2020 5-year ACS data is 384, in 2010 it was 351, which shows a population increase of over nine percent.

### Technical and Fiscal Resources

Mineral Point is a participating community in the National Flood Insurance Program. Law enforcement in the community is provided by the Washington Co. Sheriff's Office. The Washington

County Ambulance District provides ambulance service for the village and surrounding area. The village is served by the Potosi Fire Protection District. The village does not have an outdoor warning siren. The village owns and operates two generators. Mineral Point has a Floodplain Administrator.

Fiscal tools or resources that the city could potentially use to help fund mitigation activities include Community Development Block Grants, fees for water, sewer, gas, and electric services, debt through general obligation bonds, and debt through special tax bonds.

### Other Mitigation Activities

Since the last plan update the village has added a generator.

Public education programs are provided regionally by the Office of Emergency Management, local fire departments, and the Washington County Health Department. Bicycle and car seat safety education is provided regionally by the Coalition for Roadway Safety.

Mineral Point has the highest percent of population with a disability (31.3 percent) and a large percent of vulnerable populations increases the risk of injury or death due to hazards.

**Table 2.18** below shows the demographic and structure statistics, and **Table 2.19** describes the mitigation capabilities of the city.

**Table 2.18. Demographic and Structure Risk Parameters For Mineral Point**

Jurisdiction	Total Population	With a Disability	Non-English Speaking Populations	People Below Poverty Level	Population Under 5 Yrs.	Population 65 Yrs. and Over	Residences Built Prior to 1939	Mobile Homes
Mineral Point	384	120	0	85	26	81	20	40

Source: U.S. Census Bureau, 2016-2020 5-Years American Community Survey

**Table 2.19. Village of Mineral Point Mitigation Capabilities**

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
<b>Comprehensive Plan</b>	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	n/a
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes - 2017
Debris Management Plan	Yes
<b>Economic Development Plan</b>	Yes – Regional CEDS 2018
Transportation Plan	Yes – regional 2021
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
<b>Watershed Plan</b>	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
<b>Policies/Ordinance</b>	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes – January 1993
Subdivision Ordinance	No
Tree Trimming Ordinance	No
Nuisance Ordinance	No
Storm Water Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	No
Historic Preservation Ordinance	No
Landscape Ordinance	No
<b>Program</b>	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	No
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
<b>Staff/Department</b>	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
Emergency Management Director	Yes

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes - MLEPD
County Emergency Management Commission	N/A
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	Yes - Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
<b>Non-Governmental Organizations (NGOs)</b>	
American Red Cross	No
Salvation Army	Yes
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	No
Authority to levy taxes for a specific purpose	No
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	Yes
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2022

## 2.2.5 City of Potosi

### Overview

Potosi is centrally located where highways 185, 8 and 21 meet, and serves as the seat of Washington County. Potosi is a fourth-class city with a four-member board of aldermen and a mayor. The city employs a Clerk, Collector, Attorney, Prosecutor, Police Chief, Fire Chief, Street Superintendent, Water/Sewer Superintendent, Natural Gas Supt., Building Inspector/Code Officer, Municipal Judge, Court Clerk, EMD, and Finance Director. The city population from the 2020 5-year ACS data is 2,572, in 2010 it was 2,482, which shows a population growth of over three percent.

### Technical and Fiscal Resources

Potosi is a participating community in the National Flood Insurance Program. Law enforcement in the community is provided by the Potosi Police Department. The Washington County Ambulance District provides ambulance service for the city and surrounding area. The city is served by the Potosi Fire Protection District. The city has four outdoor warning sirens; activated by 911 and the police department. The city possesses two generators. Potosi has a Floodplain Administrator and Emergency Management Director.

Fiscal tools or resources that the city could potentially use to help fund mitigation activities include Community Development Block Grants, Capital Improvements project funding, levy taxes for specific purposes, fees for water, sewer, gas, and electric services, and debt through general obligation bonds.

### Other Mitigation Activities

Since the last plan update the city has doubled their outdoor warning sirens to four.

Public education programs are provided regionally by the Office of Emergency Management, local fire departments, and the Washington County Health Department. Bicycle and car seat safety education is provided regionally by the Coalition for Roadway Safety.

The City of Potosi has the highest percentage of non-English speaking population at 1.9 percent. Vulnerable populations increase the risk of injury or death due to hazards.

**Table 2.20** below shows the demographic and structure statistics, and **Table 2.21** describes the mitigation capabilities of the city.

**Table 2.20. Demographic and Structure Risk Parameters For Potosi**

Jurisdiction	Total Population	With a Disability	Non-English Speaking Populations	People Below Poverty Level	Population Under 5 Yrs.	Population 65 Yrs. and Over	Residences Built Prior to 1939	Mobile Homes
Potosi	2,572	753	51	590	218	465	147	5

Source: U.S. Census Bureau, 2016-2020 5-Years American Community Survey

**Table 2.21. City of Potosi Mitigation Capabilities**

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
<b>Comprehensive Plan</b>	Yes – 2004
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	Yes – March 2004
County Emergency Operations Plan	N/A
Local Recovery Plan	No
County Recovery Plan	N/A
City Mitigation Plan	No
County Mitigation Plan	Yes – 2017

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
Debris Management Plan	No
<b>Economic Development Plan</b>	Yes – Regional CEDS 2018
Transportation Plan	Yes – Regional 2021
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
<b>Watershed Plan</b>	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
<b>Policies/Ordinance</b>	
Zoning Ordinance	Yes
Building Code	Yes, Chapter 26, June 2007
Floodplain Ordinance	Yes – 04/06/2020
Subdivision Ordinance	Yes
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	No
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	No
<b>Program</b>	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
Hazard Awareness Program	No
National Flood Insurance Program	Yes
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	Yes
Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	No
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	Yes
Tree Trimming Program	Yes
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
<b>Studies/Reports/Maps</b>	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2017) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	Yes
<b>Staff/Department</b>	
Building Code Official	No
Building Inspector	Yes – Part-time

<b>Capabilities</b>	<b>Status Including Date of Document or Policy</b>
Mapping Specialist (GIS)	No
Engineer	Yes
Development Planner	No
Public Works Official	Yes
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	Yes
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes – MLEPD
County Emergency Management Commission	N/A
Sanitation Department	Contracted
Transportation Department	No
Economic Development Department	Yes
Housing Department	Yes – Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
<b>Non-Governmental Organizations (NGOs)</b>	
American Red Cross	Yes
Salvation Army	Yes
Veterans Groups	Yes
Environmental Organization	Yes
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
<b>Local Funding Availability</b>	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	No
Ability to incur debt through general obligation bonds	Yes
Ability to incur debt through special tax bonds	No
Ability to incur debt through private activities	No
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2022

**Table 2.22** summarizes the mitigation capabilities of Washington County and its jurisdictions.

**Table 2.22. Mitigation Capabilities Summary Table**

<b>CAPABILITIES</b>	<b>Unincorporated Washington County</b>	<b>Caledonia</b>	<b>Irondale</b>	<b>Mineral Point</b>	<b>Potosi</b>
<b>Planning Capabilities</b>					
Comprehensive Plan	No	No	No	No	Yes – 2004

<b>CAPABILITIES</b>	<b>Unincorporated Washington County</b>	<b>Caledonia</b>	<b>Irondale</b>	<b>Mineral Point</b>	<b>Potosi</b>
Builder's Plan	No	No	No	No	No
Capital Improvement Plan	No	No	No	No	No
City Emergency Operations Plan	n/a	No	No	No	Yes – March 2004
County Emergency Operations Plan	No	N/A	N/A	N/A	N/A
Local Recovery Plan	Yes	No	No	No	No
County Recovery Plan	Yes	N/A	N/A	N/A	N/A
City Mitigation Plan	n/a	No	No	No	No
County Mitigation Plan	Yes – 2017	Yes – 2017	Yes – 2017	Yes – 2017	Yes – 2017
Debris Management Plan	No	No	No	No	No
Economic Development Plan	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018
Transportation Plan	Yes – Regional 2021	Yes – Regional 2021	Yes – Regional 2021	Yes – Regional 2021	Yes – Regional 2021
Land-use Plan	No	No	No	No	No
Flood Mitigation Assistance (FMA) Plan	No	No	No	No	No
Watershed Plan	No	No	No	No	No
Firewise or other fire mitigation plan	No	No	No	No	No
Critical Facilities Plan (Mitigation/ Response/ Recovery)	No	No	No	No	No
<b>Policies/Ordinances</b>					
Zoning Ordinance	No	No	Yes	No	Yes
Building Code	No	No	No	No	Yes-Chapter 27, June 2007
Floodplain Ordinance	Yes – 2/10/2020	Yes – 4/20/2020	Yes – 01/16/2020	Yes – January 1993	Yes – 04/06/2020

<b>CAPABILITIES</b>	<b>Unincorporated Washington County</b>	<b>Caledonia</b>	<b>Irondale</b>	<b>Mineral Point</b>	<b>Potosi</b>
Subdivision Ordinance	No	No	No	No	Yes
Tree Trimming Ordinance	No	No	No	No	No
Nuisance Ordinance	No	Yes	Yes	No	Yes
Storm Water Ordinance	No	No	No	No	Yes
Drainage Ordinance	No	No	No	No	No
Site Plan Review Requirements	No	No	No	No	Yes
Historic Preservation Ordinance	No	Yes	No	No	No
Landscape Ordinance	No	No	No	No	No
<b>Program</b>					
Zoning/Land Use Restrictions	No	No	Yes	No	Yes
Codes Building Site/Design	No	No	Yes	No	Yes
Hazard Awareness Program	No	No	No	No	No
National Flood Insurance Program	Yes	Yes	Yes	Yes	Yes
NFIP Community Rating System (CRS) Participating Community	No	No	No	No	No
National Weather Service (NWS) Storm Ready	No	No	No	No	Yes
Firewise Community Certification	No	No	No	No	No
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No
ISO Fire Rating	No	9	05/5X	No	No

CAPABILITIES	Unincorporated Washington County	Caledonia	Irondale	Mineral Point	Potosi
Economic Development Program	Yes	No	No	No	No
Land Use Program	No	No	No	No	No
Public Education/Awareness	No	No	No	No	No
Property Acquisition	No	No	No	No	No
Planning/Zoning Boards	No	No	No	No	Yes
Stream Maintenance Program	No	No	No	No	Yes
Tree Trimming Program	No	No	No	No	Yes
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	No
Mutual Aid Agreements	Yes	Yes	Yes	Yes	Yes
Studies/Reports/Maps					
Hazard Analysis/Risk Assessment (City)	N/A	No	No	No	No
Hazard Analysis/Risk Assessment (County)	Yes – 2017, 2021	Yes – 2017, 2021	Yes – 2017, 2021	Yes – 2017, 2021	Yes – 2017, 2021
Evacuation Route Map	Yes	No	No	No	No
Critical Facilities Inventory	Yes – 2017, 2021	Yes – 2017, 2021	Yes – 2017, 2021	Yes – 2017, 2021	Yes – 2017, 2021
Vulnerable Population Inventory	No	No	No	No	No
Land Use Map	No	No	No	No	Yes
Staff/Department					
Building Code Official	No	No	No	No	No
Building Inspector	No	No	Yes	No	Yes

<b>CAPABILITIES</b>	<b>Unincorporated Washington County</b>	<b>Caledonia</b>	<b>Irondale</b>	<b>Mineral Point</b>	<b>Potosi</b>
Mapping Specialist (GIS)	No	No	No	No	No
Engineer	No	No	No	No	Yes
Development Planner	No	No	No	No	No
Public Works Official	No	Yes	Yes	Yes	Yes
Emergency Management Director	Yes	No	Yes	Yes	Yes
NFIP Floodplain Administrator	Yes	Yes	Yes	Yes	Yes
Bomb and/or Arson Squad	No	No	No	No	No
Emergency Response Team	No	No	No	No	Yes
Hazardous Materials Expert	No	No	No	No	No
Local Emergency Planning Committee	Yes - MLEPD	Yes - MLEPD	Yes - MLEPD	Yes - MLEPD	Yes - MLEPD
County Emergency Management Commission	No	N/A	N/A	N/A	N/A
Sanitation Department	No	No	Yes	No	Contracted
Transportation Department	Yes	No	No	No	No
Economic Development Department	Yes	No	No	No	Yes
Housing Department	Yes – Phelps Co. PHA	Yes – Phelps Co. PHA	Yes – Phelps Co. PHA	Yes – Phelps Co. PHA	Yes – Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC	Yes - MRPC	Yes - MRPC	Yes - MRPC	Yes - MRPC
Historic Preservation	No	No	No	No	No
<b>Non-Governmental Organizations (NGOs)</b>					
American Red Cross	No	No	No	No	Yes
Salvation Army	Yes	No	No	Yes	Yes
Veterans Groups	Yes	Yes	No	Yes	Yes

<b>CAPABILITIES</b>	<b>Unincorporated Washington County</b>	<b>Caledonia</b>	<b>Irondale</b>	<b>Mineral Point</b>	<b>Potosi</b>
Environmental Organization	No	No	No	No	Yes
Homeowner Associations	Yes	No	No	No	No
Neighborhood Associations	No	No	No	No	No
Chamber of Commerce	Yes	Yes	No	Yes	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes	Yes	Yes – Masonic Lodge	Yes	Yes
<b>Financial Resources</b>					
Ability to apply for Community Development Block Grants	Yes	Yes	Yes	Yes	Yes
Ability to fund projects through Capital Improvements funding	Yes	Yes	Yes	No	Yes
Authority to levy taxes for a specific purpose	No	Yes	Yes	No	Yes
Fees for water, sewer, gas, or electric services	No	Yes	Yes	Yes	Yes
Impact fees for new development	No	Yes	Yes	No	No
Ability to incur debt through general obligation bonds	No	Yes	Yes	Yes	Yes
Ability to incur debt through special tax bonds	No	Yes	Yes	Yes	No
Ability to incur debt through private activities	No	No	No	No	No

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CAPABILITIES	Unincorporated Washington County	Caledonia	Irondale	Mineral Point	Potosi
Ability to withhold spending in hazard prone areas	No	No	No	No	No

Source: Data Collection Questionnaires, 2022

## **2.2.6 Public School District Profiles and Mitigation Capabilities**

The following school districts are participating jurisdictions in this plan: Kingston K-14 School District, Potosi R-III School District, Richwoods R-VII School District, and Valley R-VI School District. As public institutions responsible for the care and education of the county's children, these school districts share an interest with Washington County in public safety and hazard mitigation planning. **Figure 2.6** provides the boundaries of the school districts participating in this planning process.

### **Technical and Fiscal Resources**

All school districts have NOAA all hazard radios on site to provide early warning of hazard events. In addition, each school district has fire alarms and intercom systems or Blackboard Connect capable of providing specific instructions in the event of an emergency.

### **Existing Plans and Policies**

All four school districts have an emergency management plan and weapons policy.

### **Other Mitigation Activities**

All schools participating in the plan conduct regular fire, earthquake, tornado drills, and lock-down security training at varying frequencies from quarterly to twice an academic year. Kingston K-14 and Potosi R-III each have a designated safe area for tornados that meets FEMA standards at their elementary buildings.

### **New Construction**

Kingston K-14 will be constructing a new high school gymnasium, fine arts classrooms, and updating existing cafeteria and classrooms.

Potosi R-III School District just completed a FEMA standard tornado shelter at the elementary school and is applying for an additional shelter for the high school and junior high school buildings.

Richwoods R-VII School District does not anticipate a new building or major renovation project in the near future.

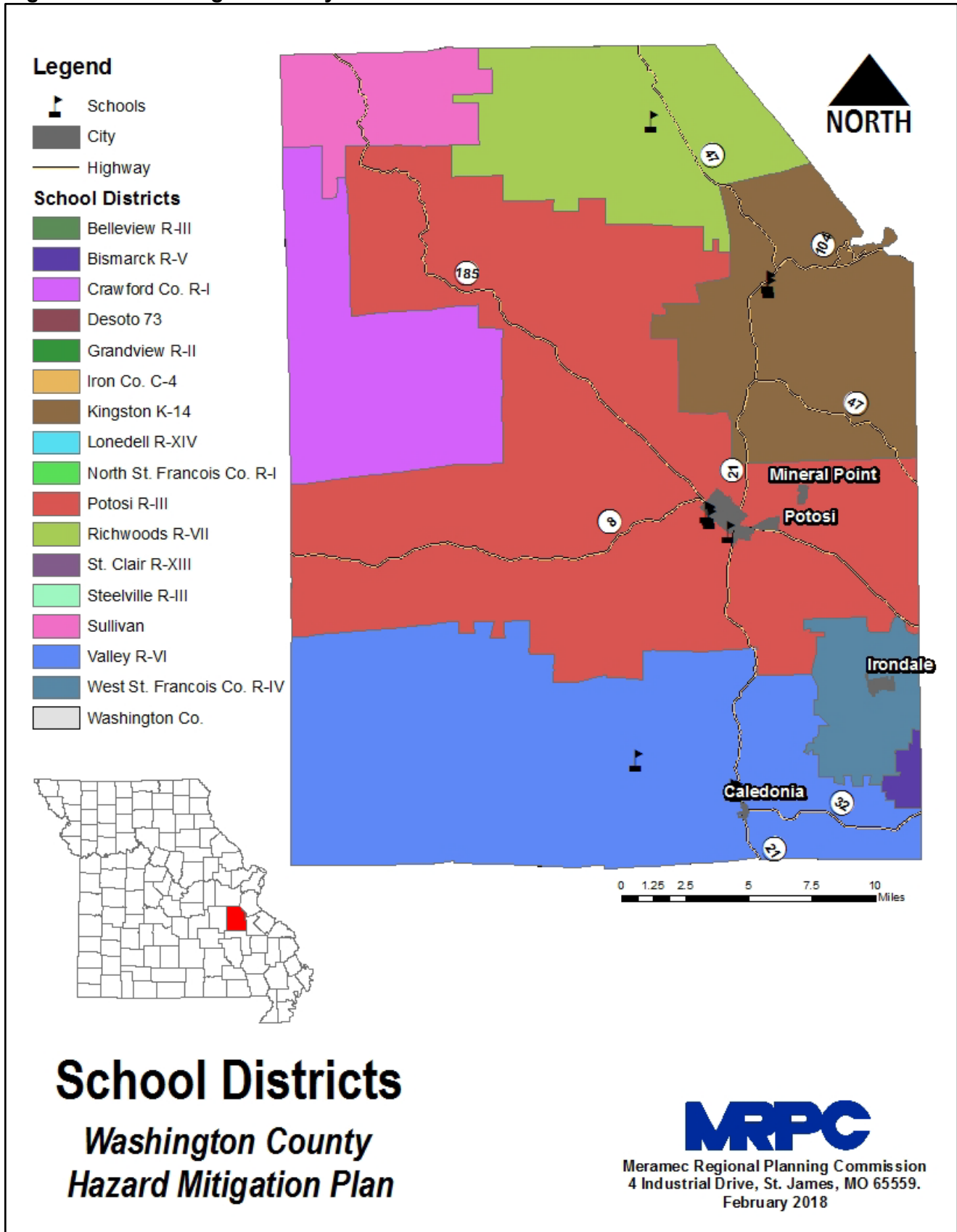
Since the last Hazard Mitigation Plan the Valley R-VI school district completed construction of updating roofing, replacement of HVAC units, reconstruction of high school entrance with waiting area and window, marked all exterior and interior doors, acquired house on new property and converted into preschool building. The district does not anticipate new building or major renovation project in the near future.

**Table 2.23. School District Buildings and Enrollment Data, 2020**

District Name	Building Name	Enrollment
Kingston K-14		
	Kingston Elementary	178
	Kingston Primary	232
	Kingston Middle	200
	Kingston High	263
Potosi R-III		
	Potosi Elementary	624
	Trojan Intermediate	404
	John Evans Middle	362
	Potosi High	656
Richwoods R-VII		
	Richwoods Elementary	149
Valley R-VI		
	Valley High	196
	Caledonia Elementary	219

Source: <https://dese.mo.gov/directory>

**Figure 2.6. Washington County School Districts**



**Table 2.24. Summary of Mitigation Capabilities for School Districts**

<b>Capability</b>	<b>Kingston K-14</b>	<b>Potosi R-III</b>	<b>Richwoods R-VII</b>	<b>Valley R-VI</b>
<b>Planning Elements</b>				
Master Plan/Date	Yes – 2017	Yes – 2018	No	No
Capital Improvement	Yes – In Progress	No	Yes – 01/14/2016	Yes – 10/14/21
School Emergency Plan/Date	Yes – 2017	Yes – August 2021	Yes – 12/17/2020	Yes – 2021
Weapons Policy/Date	Yes – 11/19/2015	Yes – 01/16/2001	Yes – 12/17/2020	Yes – July 2014
<b>Personnel Resources</b>				
Full-Time Building Official (Principal)	Yes	Yes	Yes	Yes
Emergency Manager	Yes	Yes	Yes	Yes
Grant Writer	No	Yes	No	No
Public Information Officer	Yes	Yes	No	Yes
<b>Financial Resources</b>				
Capital Improvements Project Funding	Yes	Yes	Yes	Yes
Local Funds	Yes	Yes	Yes	Yes
General Obligation	Yes	Yes	No	No
Special Tax Bonds	Yes	No	No	No
Private Activities/Donations	No	Yes	Yes	No
State and Federal Funds/Grants	Yes	Yes	Yes	Yes
<b>Other</b>				
Privately or Self-Insured?	MUSIC	MUSIC	MUSIC	MUSIC
Fire Evacuation Training	Biannual	Biannual	Quarterly	Biannual
Tornado Sheltering Exercises	Biannual	Biannual	Quarterly	Biannual
Public Address/Emergency Alert System	Blackboard Connect and Intercom System	Intercom System	Intercom System	Blackboard Connect
NOAA Weather Radios	Yes	Yes	Yes	Yes

<b>Capability</b>	<b>Kingston K-14</b>	<b>Potosi R-III</b>	<b>Richwoods R-VII</b>	<b>Valley R-VI</b>
Lock-Down Security Training	Biannual	Biannual	Biannual	Biannual
Mitigation Programs	No	No	No	No
Tornado Shelter/Safe-room	No	Yes – FEMA Tornado Shelter in Elementary	No	Not FEMA Certified
Campus Police	District Paid Resource Officer	2 School Resource Officers	School Resource Officer	School Resource Officer

Source: Data Collection Questionnaires, 2022

There are no colleges/universities located in the planning area.

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## 3 RISK ASSESSMENT

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

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

This chapter is divided into four main parts:

- **Section 3.1 Hazard Identification** identifies the hazards that threaten the planning area and provides a factual basis for elimination of hazards from further consideration.
- **Section 3.2 Assets at Risk** provides the planning area's total exposure to natural hazards, considering critical facilities and other community assets at risk.
- **Section 3.3 Future Land Use and Development** discusses areas of planned future development
- **Section 3.4 Hazard Profiles and Vulnerability Analysis** provides more detailed information about the hazards impacting the planning area. For each hazard, there are three sections: 1) Hazard Profile provides a general description and discusses the threat to the planning area, the geographic location at risk, potential severity/magnitude/extent, previous occurrences of hazard events, probability of future occurrence, risk summary by jurisdiction, impact of future development on the risk; 2) Vulnerability Assessment further defines and quantifies populations, buildings, critical facilities, and other community/school or special district assets at risk to natural hazards; and 3) Problem Statement briefly summarizes the problem and develops possible solutions.

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## 3.1 Hazard Identification

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

The primary phase in the development of a hazard mitigation plan is to identify specific hazards which may impact the planning area. To initiate this process, the Hazard Mitigation Planning Committee (HMPC) reviewed a list of natural hazards provided by the Federal Emergency Management Agency (FEMA). From that list, the HMPC selected pertinent natural hazards of concern that have the potential to impact Washington County. These selected natural hazards are further profiled and analyzed in this plan.

### 3.1.1 Review of Existing Mitigation Plans

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Within the State of Missouri, local hazard mitigation plans customarily include only natural hazards, as only natural hazards are required by federal regulations. Nevertheless, there is an opportunity to include man made or technical hazards within the plan. However, it was decided that only natural hazards were appropriate for the purpose of this plan. Based on past history and future probability, the Hazard Mitigation Planning Committee (HMPC) determined that the following potential hazards would be included in the Washington County Hazard Mitigation Plan:

- Dam Failure
- Drought
- Earthquake
- Extreme Temperatures
- Fires
- Flooding (Riverine and Flash)
- Land Subsidence/Sinkholes
- Severe Thunderstorms Including High Winds, Hail, and Lightning
- Tornado
- Severe Winter Weather

Hazards not occurring in the planning area or considered insignificant were eliminated from this plan. **Table 3.1** outlines the hazards eliminated from the plan and the reasons for doing so. Additionally, some hazards were combined in the Washington County Plan to match the hazards listed in the Missouri State Hazard Mitigation Plan.

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**Table 3.1. Table 3.1 Hazards Not Profiled in the Plan**

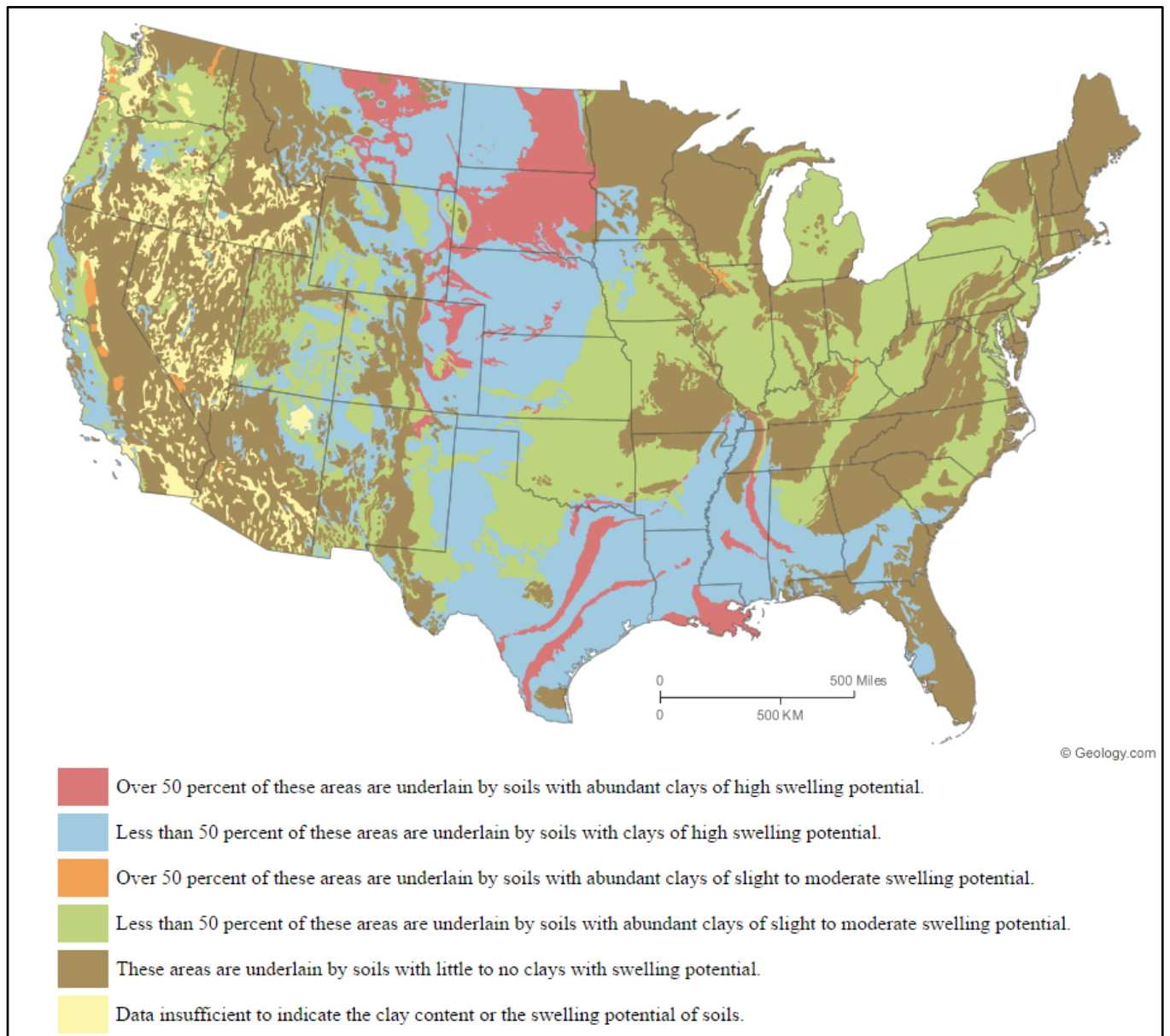
Hazard	Reason for Omission
Avalanche	No mountains in the planning area.
Coastal Erosion	Planning area is located in the Midwest, not on any coast.
Coastal Storm	Planning area is located in the Midwest, not on any coast.

<b>Hazard</b>	<b>Reason for Omission</b>
<b>Debris Flow</b>	There are no mountainous areas in the planning area where this type of event occurs.
<b>Expansive Soils</b>	No expansive soils exist within the planning area. According to the USGS National Geologic Map Database <sup>1</sup> , the planning area is underlain by soils with little to no clays with swelling potential ( <b>Figure 3.1</b> ).
<b>Hurricane</b>	Planning area is located in the Midwest, not on any coast.
<b>Levee Failure</b>	According to the US Army Corps of Engineers' National Levee Database <sup>2</sup> , and local officials, there are no levees located in the planning area. However, low-head agricultural levees could be present. Unfortunately, no data could be found indicating damages in the event of failure.
<b>Volcano</b>	There are no volcanic areas in the county.

<sup>1</sup> [http://ngmdb.usgs.gov/Prodesc/proddesc\\_10014.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_10014.htm)

<sup>2</sup> <http://nld.usace.army.mil/egis/f?p=471:1:0::NO>

**Figure 3.1. Swelling clays map of the conterminous United States**



Source: [http://ngmdb.usgs.gov/Prodesc/proddesc\\_10014.htm](http://ngmdb.usgs.gov/Prodesc/proddesc_10014.htm)

### 3.1.2 Review Disaster Declaration History

In order to assess risk, it was logical to review the disaster declaration history for the State of Missouri and specifically for Washington County. Federal and State disaster declarations are granted when the severity and magnitude of a hazard event surpasses the ability of local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. If the disaster is so severe that both the local and state governments' capacities are exceeded; a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

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

There are three agencies through which a federal disaster declaration can be issued – FEMA, the U.S. Department of Agriculture (USDA) and/or the Small Business Administration. A federally declared disaster generally includes long-term federal recovery programs. The type of declaration is determined by the type of damage sustained during a disaster and what types of institutions or industries are affected.

A declaration issued by USDA indicates that the affected area has suffered at least a 30 percent loss in one or more crops or livestock industries. This type of declaration provides those farmers affected with access to low-interest loans and other programs to assist with disaster recovery and mitigation.

Missouri has been especially hard hit by natural disasters in the recent past. The state has had 72 federally declared disasters since 1953. Of those, 35 have occurred since 2002. Most of these disasters have been weather related – severe wind and rainstorms, tornadoes, flooding, hail, ice storms and winter storms. **Table 3.2** lists the federal disaster declarations for Washington County from 2001 through 2020.

**Table 3.2. FEMA Disaster Declarations that included Washington County, Missouri, 2001-2020**

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)
DR-1412	Missouri Severe Storms & Tornadoes	Incident Period: April 24, 2002- June 10, 2002 Declaration Date: May 06, 2002	PA
DR-1463	Missouri Severe Storms, Tornadoes, and Flooding	Incident Period: May 04, 2003- May 30, 2003 Declaration Date: May 06, 2003	IA, PA
EM-3232	Missouri Hurricane Katrina Evacuation	Incident Period: August 29, 2005-October 01, 2005 Declaration Date: September 10, 2005	PA

<b>Disaster Number</b>	<b>Description</b>	<b>Declaration Date Incident Period</b>	<b>Individual Assistance (IA) Public Assistance (PA)</b>
EM-3267	Missouri Severe Storms	Incident Period: July 19, 2006- July 21, 2006 Declaration Date: July 21, 2006	PA
DR-1631	Missouri Severe Storms, Tornadoes, and Flooding	Incident Period: March 08, 2006-March 13, 2006 Declaration Date: March 16, 2006	PA
DR-1673	Missouri Severe Winter Storms	Incident Period: November 30, 2006-December 02, 2006 Declaration Date: December 29, 2006	PA
EM-3281	Missouri Severe Winter Storms	Incident Period: December 08, 2007-December 15, 2007 Declaration Date: December 12, 2007	PA
DR-1749	Missouri Severe Storms & Flooding	Incident Period: March 17, 2008-May 09, 2008 Declaration Date: March 19, 2008	IA, PA
DR-1847	Missouri Severe Storms, Tornadoes, and Flooding	Incident Period: May 08, 2009- May 16, 2009 Declaration Date: June 19, 2009	IA, PA
EM-3303	Missouri Severe Winter Storms	Incident Period: January 26, 2009-January 28, 2009 Declaration Date: January 30, 2009	PA
DR-1980	Missouri Severe Storms, Tornadoes, and Flooding	Incident Period: April 19, 2011- June 06, 2011 Declaration Date: May 09, 2011	PA
EM-3317	Missouri Severe Winter Storm	Incident Period: January 31, 2011-February 05, 2011 Declaration Date: February 03, 2011	PA
DR-4238	Missouri Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Incident Period: May 15, 2015- July 27, 2015 Declaration Date: August 07, 2015	PA
EM-3374	Missouri Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Incident Period: December 22, 2015-January 09, 2016 Declaration Date: January 02, 2016	PA
DR-4250	Missouri Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Incident Period: December 23, 2015-January 09, 2016 Declaration Date: January 21, 2016	PA

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)
DR-4317	Missouri Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Incident Period: April 28, 2017- May 11, 2017 Declaration Date: June 02, 2017	PA
EM-3482	Missouri COVID-19	Declaration Date: March 13, 2020 Incident Period: January 20, 2020, and continuing	PA
DR-4490	Missouri COVID-19 Pandemic	Declaration Date: March 26, 2020 Incident Period: January 20, 2020, and continuing	IA, PA

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

### 3.1.3 Research Additional Sources

List of the additional sources of data on locations and past impacts of hazards in the planning area:

- Missouri Hazard Mitigation Plans (2013, 2018)
- Federal Emergency Management Agency (FEMA)
- Missouri Department of Natural Resources (MDNR)
- National Drought Mitigation Center Drought Reporter
- US Department of Agriculture's (USDA) Risk Management Agency Crop Insurance Statistics
- National Agricultural Statistics Service (Agriculture production/losses)
- Data Collection Questionnaires completed by each jurisdiction
- State of Missouri GIS data
- Environmental Protection Agency
- Flood Insurance Administration
- Hazards US (HAZUS)
- Missouri Department of Transportation
- Missouri Division of Fire Marshal Safety
- Missouri Public Service Commission
- National Fire Incident Reporting System (NFIRS)
- National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI);
- Pipeline and Hazardous Materials Safety Administration
- County and local Comprehensive Plans to the extent available
- County Emergency Management
- County Flood Insurance Rate Map, FEMA
- Flood Insurance Study, FEMA

- 
- SILVIS Lab, Department of Forest Ecology and Management, University of Wisconsin
  - U.S. Army Corps of Engineers
  - U.S. Department of Transportation
  - United States Geological Survey (USGS)
  - Various articles and publications available on the internet (sources are cited in the body of the Plan)

Remarkably, the only centralized source of data for many of the weather-related hazards is the National Oceanic and Atmospheric Administration's (NOAA) National Centers for Environmental Information (NCEI). Although it is usually the best and most current source, there are limitations to the data which should be noted. The NCEI documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in the NCEI may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS. Those using information from NCEI should be cautious as the NWS does not guarantee the accuracy or validity of the information.

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

The database currently contains data from January 1950 to March 2014, as entered by the NWS. Due to changes in the data collection and processing procedures over time, there are unique periods of record available depending on the event type. The following timelines show the different time spans for each period of unique data collection and processing procedures.

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

Injuries and deaths caused by a storm event are reported on an area-wide basis. When reviewing a table resulting from an NCEI search by county, the death or injury listed in connection with that county search did not necessarily occur in that county.

### 3.1.4 Hazards Identified

**Table 3.3** lists the hazards that significantly impact each jurisdiction within the planning area and were chosen for further analysis in alphabetical order. "X" indicates the jurisdiction is impacted by the hazard, and a "-" indicates the hazard is not applicable to that jurisdiction. As Washington County is predominately rural, limited variations occur across the county. However, jurisdictions with a high percentage of housing comprised of mobile homes, for example, could be more at risk to damages from a tornado.

**Table 3.3. Hazards Identified for Each Jurisdiction**

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Temperatures	Flooding (River and Flash)	Land Subsidence/Sinkholes	Thunderstorms/High Winds/ Lightning/Hail	Severe Winter Weather	Tornado	Wildfires
Washington County	x	x	x	x	x	x	x	x	x	x
Caledonia	x	x	x	x	x	x	x	x	x	x
Irondale	x	x	x	x	x	x	x	x	x	x
Mineral Point	x	x	x	x	x	x	x	x	x	x
Potosi	x	x	x	x	x	x	x	x	x	x
School Districts										
Kingston K-14	x	x	x	x	x	x	x	x	x	x
Potosi R-III	x	x	x	x	x	x	x	x	x	x
Richwoods R-VII	x	x	x	x	x	x	x	x	x	x
Valley R-VI	x	x	x	x	x	x	x	x	x	x

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### 3.1.5 Multi-Jurisdictional Risk Assessment

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For this multi-jurisdictional hazard mitigation plan, each hazard is profiled in which the risks are assessed on a planning area wide basis. Some hazards, such as dam failure, vary in risk across the county. If variations exist within the planning area, discussion is included in each profile. Washington County is uniform across the county in terms of climate, topography, and building construction characteristics. Weather-related hazards will impact the entire county in much the same fashion, as do topographical/geological related hazards such as earthquake. Sinkholes appear throughout the county and are localized in their effects. The focal area of urbanization includes the cities and villages of Caledonia, Irondale, Mineral Point, and Potosi. Urbanized areas have more assets at a greater density, and therefore have greater vulnerability to weather-related hazards. Rural areas include agricultural assets (livestock/crops) that are also vulnerable to damages. Differences among jurisdictions for each hazard will be discussed in greater detail in the vulnerability section of each hazard.

## 3.2 Assets at Risk

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This section assesses the planning area's population, structures, critical facilities, infrastructure, and other important assets that may be at risk to hazards.

### 3.2.1 Total Exposure of Population and Structures

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#### Unincorporated County and Incorporated Cities

In the following three tables, population data is based on 2020 Census Bureau data. Building counts values are based on parcel data provided by the 2018 Missouri State Hazard Mitigation Plan, which can be found at the following website, [https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf).

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**Table 3.4. Maximum Population and Building Exposure by Jurisdiction**

Jurisdiction	2020 Population	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Unincorporated Washington County	20,246	14,690	\$921,201,000	\$482,800,000	\$1,404,001,000
Caledonia	131	106	\$9,968,000	\$6,571,000	\$16,539,000
Irondale	368	194	\$20,681,000	\$11,552,000	\$32,413,000
Mineral Point	231	128	\$13,780,000	\$7,108,000	\$20,888,000
Potosi	2,538	1,163	\$130,847,000	\$47,673,000	\$207,381,000
<b>Total</b>	<b>23,514</b>	<b>16,288</b>	<b>\$1,097,306,000</b>	<b>\$584,999,000</b>	<b>\$1,682,304,000</b>

Sources: U.S. Census Bureau Decennial Redistricting Data, 2018 Missouri State Hazard Mitigation Plan

**Table 3.5. Building Value/Exposure by Usage Type**

Jurisdiction	Agriculture	Commercial	Education	Government	Industrial	Residential	Total
Washington County	\$3,390	\$79,525	\$16,142	\$7,309	\$25,644	\$1,271,990	\$1,404,001
Caledonia	\$8	\$6,101	\$0	\$261	\$0	\$10,169	\$16,539
Irondale	\$1	\$3,704	\$0	\$783	\$0	\$27,926	\$32,413
Mineral Point	\$0	\$872	\$0	\$0	\$0	\$20,016	\$20,888
Potosi	\$3	\$51,419	\$7,122	\$3,394	\$2,426	\$143,018	\$207,381
<b>Total</b>	<b>\$3,402</b>	<b>\$142,056</b>	<b>\$23,264</b>	<b>\$11,747</b>	<b>\$28,070</b>	<b>\$1,473,765</b>	<b>\$1,682,304</b>

Source: FEMA HAZUS, Missouri State Hazard Mitigation Plan

\* All values in 1,000s of dollars.

**Table 3.6. Building Counts by Usage Type**

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Other	Total
Washington County	7,880	365	74	6,309	62	14,690
Caledonia	63	28	0	14	1	106
Irondale	173	17	0	1	3	194
Mineral Point	124	4	0	0	0	128
Potosi	6	236	7	6	28	1,163
<b>Total</b>	<b>9,130</b>	<b>652</b>	<b>81</b>	<b>6331</b>	<b>94</b>	<b>16,288</b>

Source: 2018 MO State Hazard Mitigation Plan

**Table 3.7** below, provides additional information for school districts, including the number of buildings, building values (building exposure) and contents value (contents exposure). These numbers will represent the total enrollment and building count for the public-school districts regardless of the county in which they are located.

**Table 3.7. Population and Building Exposure by Jurisdiction-Public School Districts**

Public School District	Enrollment	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Kingston K-14	873	4	26,271,848	3,892,679	30,164,527
Potosi R-III	2,046	4	78,315,194	13,061,787	91,376,981
Richwoods R-VII	149	1	5,957,754	1,288,404	7,246,157
Valley R-VI	415	2	16,664,587	5,670,153	22,334,740

Source: [https://apps.dese.mo.gov/MCDS/Reports/SSRS\\_Print.aspx?ReportId=152b1d45-e617-4184-acf3-82b9287ae2b4](https://apps.dese.mo.gov/MCDS/Reports/SSRS_Print.aspx?ReportId=152b1d45-e617-4184-acf3-82b9287ae2b4) ; 2022 Data Collection Questionnaire

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### 3.2.2 Critical and Essential Facilities and Infrastructure

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

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

The table below (**Table 3.8**) provides information for critical facilities in the planning area. Specific information includes a Hazus ID if applicable, jurisdiction, building name/owner, and address. Facilities addressed include emergency, fire department, law enforcement, medical, and schools.

**Table 3.8. Washington County Critical Facilities by Type and Jurisdiction**

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
<b>Emergency Facilities</b>						
	Washington Co.	Emergency Management Director	23117 State Highway P	Belgrade	MO	63622
	Washington Co.	Washington Co. E-911	12252 N State Highway 21	Cadet	MO	63630
<b>Fire Department Facilities</b>						
MO000138	Belgrade	Belgrade Volunteer Fire Dept.	14126 State Hwy C	Belgrade	MO	63622
MO000715	Caledonia	Caledonia Fire Protection Dist.	155 Webster Road	Caledonia	MO	63631
	Irondale	Irondale Community Vol. Fire Dept.	107 West Pine St.	Irondale	MO	63648
MO000517	Potosi	Potosi Fire Prot. Dist., No. 1	313 East Jefferson St.	Potosi	MO	63664
	Potosi	Potosi Fire Prot. Dist., No. 2	10441 State Hwy AA	Potosi	MO	63664
	Potosi	Potosi Fire Prot. Dist., No. 3	10047 Tiff Road	Cadet	MO	63630
	Potosi	Potosi Fire Prot. Dist., No. 4	19076 North State Hwy 21	Cadet	MO	63630
	Potosi	Potosi Fire Prot. Dist., No. 5	10051 Jeff City Road	Potosi	MO	63664
MO000137	Richwoods	Richwoods Fire Prot. Dist.	10015 Turtle Road	Richwoods	MO	63071
	Sullivan	Sullivan Fire Protection District, Station 2	11890 Mine Road	Sullivan	MO	63080
<b>Law Enforcement Facilities</b>						
	Potosi	Potosi Police Department	1 Police Plaza	Potosi	MO	63664
	Washington Co.	Washington County Sheriff's Department	116 West High Street	Potosi	MO	63664
<b>Medical Facilities</b>						
MO000099	Potosi	Washington Co. Memorial Hospital	300 Health Way	Potosi	MO	63664
	Washington Co.	Washington Co. Health Dept.	520 Purcell Drive	Potosi	MO	63664
<b>School Facilities</b>						
	Cadet	Kingston Primary	10047 Diamond Road	Cadet	MO	63630
MO001824	Cadet	Kingston Elem.	10047 Diamond Road	Cadet	MO	63630
MO001825	Cadet	Kingston Middle	10047 Diamond Road	Cadet	MO	63630
MO001120	Cadet	Kingston High	10047 Diamond Road	Cadet	MO	63630
MO000822	Potosi	Potosi Elem.	205 State Hwy P	Potosi	MO	63664
MO000825	Potosi	Trojan Intermediate	367 Intermediate Drive	Potosi	MO	63664
MO000823	Potosi	John A. Evans Middle	303 S Lead St.	Potosi	MO	63664
MO000824	Potosi	Potosi High	1 Trojan Drive	Potosi	MO	63664

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
MO000173	Potosi	Citadel School	400 S Mine	Potosi	MO	63664
MO001177	Richwoods	Richwoods Elem.	10788 State Hwy A	Richwoods	MO	63071
MO001827	Caledonia	Caledonia Elem.	1 Viking Drive	Caledonia	MO	63631
MO001828	Caledonia	Valley High	1 Viking Drive	Caledonia	MO	63631
<b>Childcare Facilities</b>						
	Mineral Point	East Missouri Action Agency, Inc	512 State St.	Mineral Point	MO	63660
	Potosi	Happy Days Preschool	10079 Simmental LN	Potosi	MO	63664
	Potosi	Kids Zone	402 N. Missouri	Potosi	MO	63664
	Potosi	Little Learners Academy	10965 Hwy. 185	Potosi	MO	63664
	Caledonia	Martin, Kimberly	10350 Webster Rd.	Caledonia	MO	63631
	Potosi	Mim's Just Like Home, LLC	10405 State Hwy P	Potosi	MO	63664
	Potosi	Randall, Sandra Kay	303 College St.	Potosi	MO	63664
	Potosi	Tammy's Tiny Tots	606 Raymond	Potosi	MO	63664
	Potosi	Wilson, Dena Mae	10271 Outer Rd.	Potosi	MO	63664
<b>Nursing Homes</b>						
	Potosi	Georgian Gardens Center for Rehab and Healthcare	1 Georgian Gardens Dr.	Potosi	MO	63664
	Mineral Point	Hillside Living Center	10109 Restoration Circle	Mineral Point	MO	63660
	Potosi	Potosi Manor	307 S. Hwy. 21	Potosi	MO	63664
	Mineral Point	South Haven Residential Care Center, LLC	10462 Airport Road	Mineral Point	MO	63664

Source: 2020 Data Collection Questionnaires, Missouri DHSS

<https://healthapps.dhss.mo.gov/childcaresearch/>, <https://healthapps.dhss.mo.gov/showmeltc/default.aspx>

**Table 3.9** includes a summary of the inventory of critical and essential facilities and infrastructure in the planning area. The list was compiled from the 2020 Data Collection Questionnaire, the Meramec Regional Hazardous Materials Emergency Response Plan and the National Bridge Inventory.

**Table 3.9. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction**

	Airport Facility	Bus Facility	Childcare Facility	Communications Tower	Electric Power Facility	Emergency Operations	Fire Service	Government	Housing	Shelters	State & Non-State Structures (Bridge)	Hospital/Health Care	Military	Pipeline/Pump Station	Nursing Homes	Police Station	Potable Water Facility	Rail	Sanitary Pump Stations	School Facilities	Stormwater Pump Stations	Tier II Chemical Facility	Wastewater Facility	Total
Unincorporated Washington County	0	0	0	-	-	1	2	28	2	0	143	0	0	-	0	1	-	1	2	4	0	16	0	200
Caledonia	1	0	1	-	-	0	1	1	-	0	0	0	0	-	0	0	-	0	5	2	-	2	-	13
Irondale	0	0	0	-	-	0	1	3	205	0	2	0	0	-	0	0	-	1	10	0	1	1	-	224
Mineral Point	1	0	1	-	1	0	0	0	-	0	2	0	0	-	2	0	-	2	-	0	-	6	-	15
Potosi	1	0	7	-	1	0	1	13	2	0	9	3	0	1	2	1	-	0	0	4	0	15	2	62
<b>Totals</b>	3	0	9	-	2	1	5	45	209	0	156	3	0	1	4	2	-	4	17	10	1	40	2	514

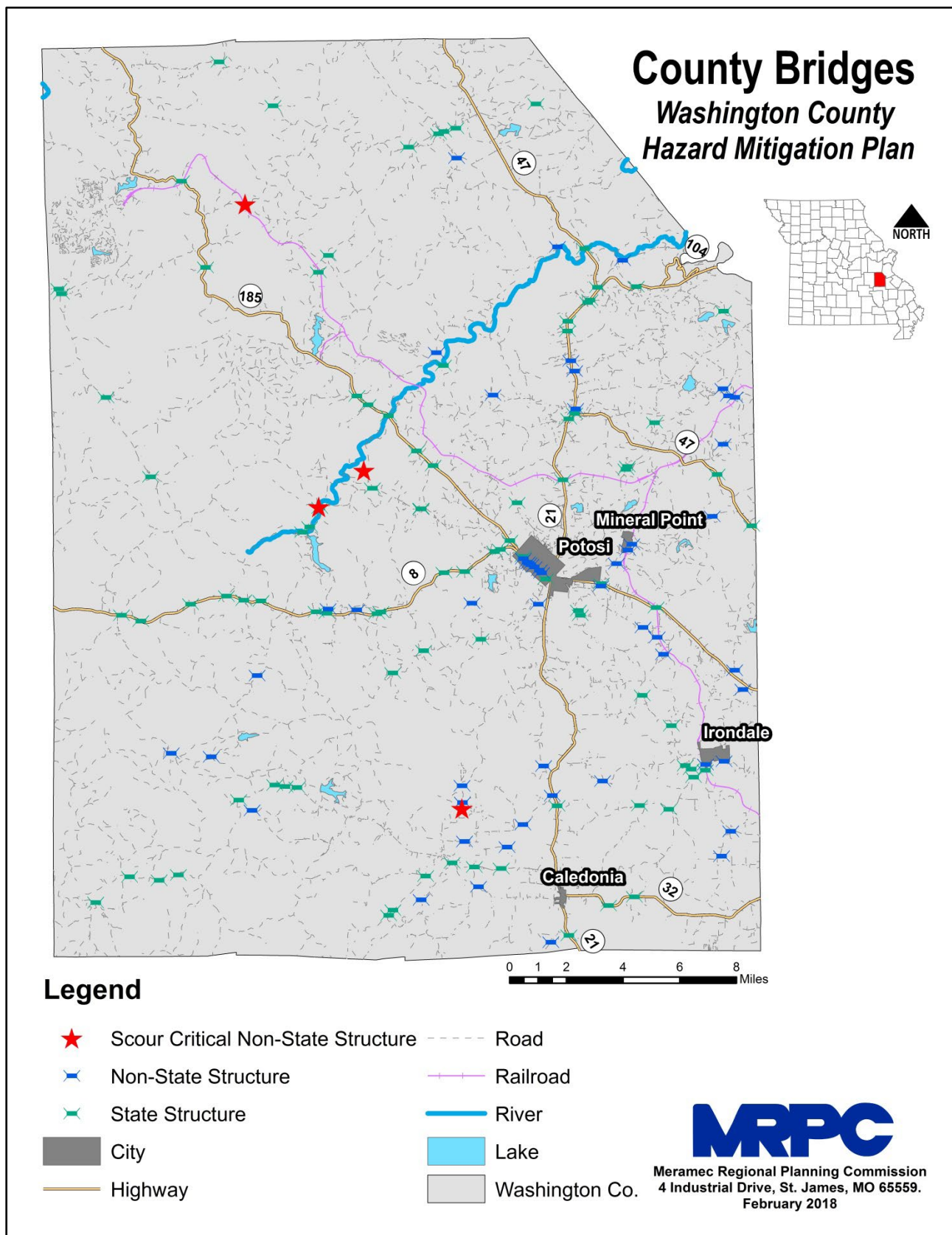
Source: 2022 Data Collection Questionnaires, National Bridge Inventory, 2021 MREPC Hazardous Materials Emergency Response Plan

According to the National Bridge Inventory there are a total of 156 bridges in Washington County<sup>3</sup>. **Figure 3.2** shows the locations of State regulated bridges and non-State bridges in the planning area. Scour critical bridges were also examined. Scour critical refers to one of the database elements in the National Bridge Inventory. This element is quantified using a “scour index”, which is a number indicating the vulnerability of a bridge to scour during a flood. Bridges with a scour index between 1 and 3 are considered “scour critical”, or a bridge with a foundation determined to be unstable for the observed or evaluated scour condition. There are four scour critical bridge within Washington County. The Goose Creek Rd. bridge spanning the Indian Creek, the Floyd Tower Rd. bridge over Fourche Renault creek, the Delbridge Rd. bridge over Clear Creek, and the Fourche Renault Rd bridge over the Little Fourche A Renault all have scour index ratings of 3<sup>4</sup>.

<sup>3</sup> <http://www.fhwa.dot.gov/bridge/nbi/no10/county.cfm>

<sup>4</sup> <https://infobridge.fhwa.dot.gov/Data/BridgeDetail/21918012#!/#OverviewTab>

Figure 3.2. Washington County Bridges



Source: MSDIS, MoDOT, MRPC

### 3.2.3 Other Assets

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

- These types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- Knowing about these resources in advance allows for consideration immediately following a hazard event, which is when the potential for damages is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- The presence of natural resources can reduce the impacts of future natural hazards, such as wetlands and riparian habitats which help absorb floodwaters.
- Losses to economic assets like these (e.g., major employers or primary economic sectors) could have severe impacts on a community and its ability to recover from disaster.

Threatened and Endangered Species: **Table 3.10** depicts Federally Threatened, Endangered, Proposed and Candidate Species in the county.

**Table 3.10. Threatened and Endangered Species in Washington County**

Common Name	Scientific Name	Status
<b>Amphibians</b>		
Eastern Hellbender	<i>Cryptobranchus alleganiensis</i>	Endangered (S)(Proposed F)
<b>Clams</b>		
Scaleshell Mussel	<i>Leptodea leptodon</i>	Endangered (F)
Snuffbox Mussel	<i>Epioblasma triquetra</i>	Endangered (F)
Spectaclecase	<i>Cumberlandia monodonta</i>	Endangered (F)
Sheepnose Mussel	<i>Plethobasus cyphus</i>	Endangered (F)
<b>Crustaceans</b>		
Big Creek Crayfish	<i>Faxonius peruncus</i>	Threatened (Proposed F)
St. Francis River Crayfish	<i>Faxonius quadruncus</i>	Threatened (Proposed F)
<b>Fishes</b>		
Mountain Madtom	<i>Noturus eleutherus</i>	Endangered (S)
Taillight Shiner	<i>Notropus maculatus</i>	Endangered (S)
<b>Birds</b>		
Northern Harrier	<i>Circus cyaneus</i>	Endangered (S)
<b>Flowering Plants</b>		
Mead's Milkweed	<i>Asclepias meadii</i>	Endangered (S)
Eastern prairie fringed orchid	<i>Plantanthera leucophaea</i>	Endangered (S)
<b>Mammal</b>		
Gray bat	<i>Myotis grisescens</i>	Endangered (F) (S)
Indiana bat	<i>Myotis sodalis</i>	Endangered (F) (S)
Northern long-eared bat	<i>Myotis septentrionalis</i>	Threatened (F)

Eastern spotted skunk	<i>Spilogale putorius</i>	Endangered (S)
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Note: S = State, F = Federal

Source: U.S. Fish and Wildlife Service, <https://ecos.fws.gov/ecp/>;

MDC, <https://nature.mdc.mo.gov/status/endangered>

**Natural Resources:** The Missouri Department of Conservation (MDC) provides a database of lands owned, leased, or managed for public use. **Table 3.11** provides the names and locations of parks and conservation areas in Washington County.

**Table 3.11. Conservation Areas in Washington County**

Area Name	Address	City
Bismark Conservation Area	From Caledonia, take Highway 32 east 10 miles, then right onto County Road 533, then left onto County Road 532, then right onto Bismark Lake Road.	Caledonia
Bootleg Access	From Potosi, take Highway 21 south 10 miles to Big River.	Potosi
Buford Mountain Conservation Area	From Caledonia, take Highway 21 south for 13 miles, turn left onto Highway U.	Caledonia
Hughes Mountain NA	From Potosi, take Highway 21 south 11 miles, then Route M east 5 miles to parking lot on south side of road 200 yards east of Cedar Creek Road (CR 541).	Potosi
Kingston Access	From the main entrance of Washington State Park, take Highway 21 west 3 miles, then Dugout Road north 2 miles to the area.	-
Little Indian Creek CA	North entrance: From Highway 30, take Route K south across the Meramec River, then Old Route K left 0.50 mile, then Little Indian Creek Road 3 miles to the area sign. South entrance to new shooting range: From I-44, take Highway 185 south 7 miles, then Route A east 6 miles to the area sign.	-

MO DNR (Washington State Park Access)	The Washington State Park Access (MO DNR) is north off of Highway 21 between De Soto and Old Mines. The access is located on the west side of the Big River.	-
Pea Ridge CA	Pea Ridge Conservation Area consists of several tracts and is marked with a sign on Highway 185 between Sullivan and Potosi.	Potosi
Potosi (Roger Bilderback Lake)	In Potosi City Park, located along Route P.	Potosi

Source: [https://nature.mdc.mo.gov/discover-nature/find/places?area\\_name=&counties=All&location%5Bdistance%5D=50&location%5Borigin%5D=](https://nature.mdc.mo.gov/discover-nature/find/places?area_name=&counties=All&location%5Bdistance%5D=50&location%5Borigin%5D=)

**Table 3.12** provides information pertaining to community owned/operated parks within Washington County.

**Table 3.12. Community Owned Parks in Washington County**

Park Name	Address	City
Townsend St. City Park	Townsend St., Caledonia, MO	Caledonia
Irondale City Park	Ash St., Irondale, MO 63648	Irondale
Bilderback Park	Clara Ave, Potosi, MO 63664	Potosi
Cresswell Park	South Lead St., Potosi, MO 63664	Potosi
Heritage Park	S Mine St. Potosi, MO 63664	Potosi
Howell Park	Stone St., Potosi, MO 63664	Potosi
Potosi City Park	Park Dr., Potosi, MO 63664	Potosi
Thurman Park	E Jefferson St., Potosi, MO 63664	Potosi

Source: Google Search

**Historic Resources:** The National Register of Historic Places is the official list of registered cultural resources worthy of preservation. It was authorized under the National Historic Preservation Act of 1966 as part of a national program. The purpose of the program is to coordinate and support public and private efforts to identify, evaluate, and protect our historic and archeological resources. The National Register is administered by the National Park Service under the Secretary of the Interior. Properties listed in the National Register include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. **Table 3.13** provides information in regards to properties on the National Register of Historic Places in Washington County.

**Table 3.13. Washington County Properties on the National Register of Historic Places**

Property	Address	City	Date Listed
Caledonia Historic District	roughly bounded by Patrick, College, and Alexander Sts., and MO 21 on Main St., Caledonia	Caledonia	10/27/86
Cresswell Petroglyph Archaeological Site	address restricted	-	2/12/71
Cresswell, George, Furnance	MO F, Potosi vicinity	Potosi	5/23/88

Land Archaeological Site	address restricted	-	5/05/72
Lost Creek Pictograph Archaeological Site	address restricted	-	1/25/71
Palmer Historic Mining District	address restricted	-	11/29/10
Queen, Harrison, House	Hwy C, 1.3 mi. W of MO 21, Caledonia vicinity	Caledonia	6/27/02
Susan Cave	address restricted	-	7/08/89
Washington County Courthouse	102 N. Missouri St., Potosi	Potosi	10/25/11
Washington State Park CCC Historic District	Potosi vicinity	Potosi	3/04/85
Washington State Park Petroglyph Archaeological Site	Fertile vicinity	-	4/03/70

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

**Economic Resources:** **Table 3.14** provides major non-government employers in the planning area. There are approximately 350 employer establishments within the county, employing on average 11 individuals each<sup>5</sup>.

**Table 3.14. Major Non-Government Employers in Washington County**

Employer Name	Product or Service	Employees
Potosi Correctional Center	Corrections	250-499
Washington Co. Memorial Hospital	Hospital	250-499
Red Wing Shoe Store	Retail	100-249
Purcell Tire Co.	Tire	100-499
Pyramid Homemaker Service	Services	100-249
Walmart Supercenter	Retail	100-249
YMCA Trout Lodge	Youth Organizations & Centers	250-499

Source: <https://meric.mo.gov/industry/business-locator>, 2022 Data Collection Questionnaires

Agriculture plays an important role in Washington County. However, the Agribusiness Employment Location Quotient for the county is 0.70; meaning that there is a relatively low share of agribusiness employment to its share of total national employment<sup>6</sup>. In addition, there were 86 individuals working in the agriculture industry, comprising 0.87% of the total workforce in 2020<sup>7</sup>. Furthermore, the market value of products sold in 2017 was \$21,818,000 million; 88% from livestock sales and 12% from crop sales<sup>8</sup>.

<sup>5</sup> <https://www.census.gov/quickfacts/fact/table/washingtoncountymissouri,dentcountymissouri,crawfordcountymissouri/HSG650219>

<sup>6</sup> [Missouri Economic Research Information Center](https://www.missouri.gov/economic-research)

<sup>7</sup> <https://data.census.gov/table?text=S2405&q=05000000US29221&tid=ACSSST5Y2020.S2405>

<sup>8</sup> [https://www.nass.usda.gov/Quick\\_Stats/CDQT/chapter/2/table/1/state/MO/county/065/year/2017](https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/1/state/MO/county/065/year/2017)

### 3.3 Future Land Use and Development

Table 3.15 provides population growth statistics for Washington County.

**Table 3.15. Washington County Population Growth, 2010-2020**

Jurisdiction	2010 Population	2020 Population	2010-2020 # Change	2010-2020 % Change
<b>Unincorporated Washington County</b>	20,696	20,246	-450	-2.17%
<b>Caledonia</b>	130	131	1	0.77%
<b>Irondale</b>	445	368	-77	-17.30%
<b>Mineral Point</b>	351	231	-120	-34.19%
<b>Potosi</b>	2,482	2,538	56	2.26%

Source: U.S. Bureau of the Census 2020 Decennial Redistricting Data, Census 2010 Summary File 1

Typically, population growth or decline is generally accompanied by an increase or decrease in the number of housing units. Table 3.16 provides the change in numbers of housing units in the planning area from 2010-2019.

**Table 3.16. Change in Housing Units, 2010-2020**

Jurisdiction	Housing Units 2010	Housing Units 2020	2010-2020 # Change	2010-2020 % change
<b>Unincorporated Washington</b>	9,388	9,193	-195	-2.08%
<b>Caledonia</b>	76	74	-2	-2.63%
<b>Irondale</b>	192	160	-32	-16.67%
<b>Mineral Point</b>	131	99	-32	-24.43%
<b>Potosi</b>	1,230	1,193	-37	-3.01%

Source: U.S. Census Bureau 2020 Decennial Redistricting Data, U.S. Bureau of the Census, Census 2010 Summary File 1

Jurisdictions reported anticipated future developments within the next five years (2021-2026). The cities of Potosi, Mineral Point, and Caledonia did not anticipate any major future developments within the next five years nor did the Richwoods R-VII school district.

Washington County reported the recent development of two residential sub-division just outside the city limit of Potosi, increasing growth in the area industrial park, and preparations to construct a new park and amphitheater to be located in Potosi.

The city of Irondale is demolishing their recreation center to construct a new recreation center that will double as a community disaster shelter.

Valley R-VI recently completed several projects to include roof repairs and HVAC system improvements. They are designed the high school entryway to include interior locking doors a waiting area, and a window into the office. They also labelled all interior and exterior doors to improve communication with first responders during emergency situations. Finally, a new property was acquired

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and converted into a pre-school facility. There are no current plans for future construction at this time. The district does not have any FEMA certified tornado safe rooms.

Potosi R-III School District just completed the construction of certified tornado safe room at the elementary and would like to construct another in the next five years to service the Jr. High and High Schools.

Kingston K14 School district plans to construct a new gymnasium and fine arts classrooms at the high school as well as updating the existing cafeteria and some other classrooms. The district has one certified tornado safe room servicing the elementary school. They would like to build a second to serve the Jr. high and high schools.

New development can impact a jurisdiction's vulnerability to natural hazards. As the number of buildings, critical facilities, and assets increase, vulnerability increases as well. For example, real estate development can increase storm water runoff, which often increases localized flooding. However, some development such as infrastructure improvements can help reduce vulnerability risks. Unfortunately, quantitative data is not available to further examine each jurisdictions new development and its correlation to natural hazard vulnerabilities.

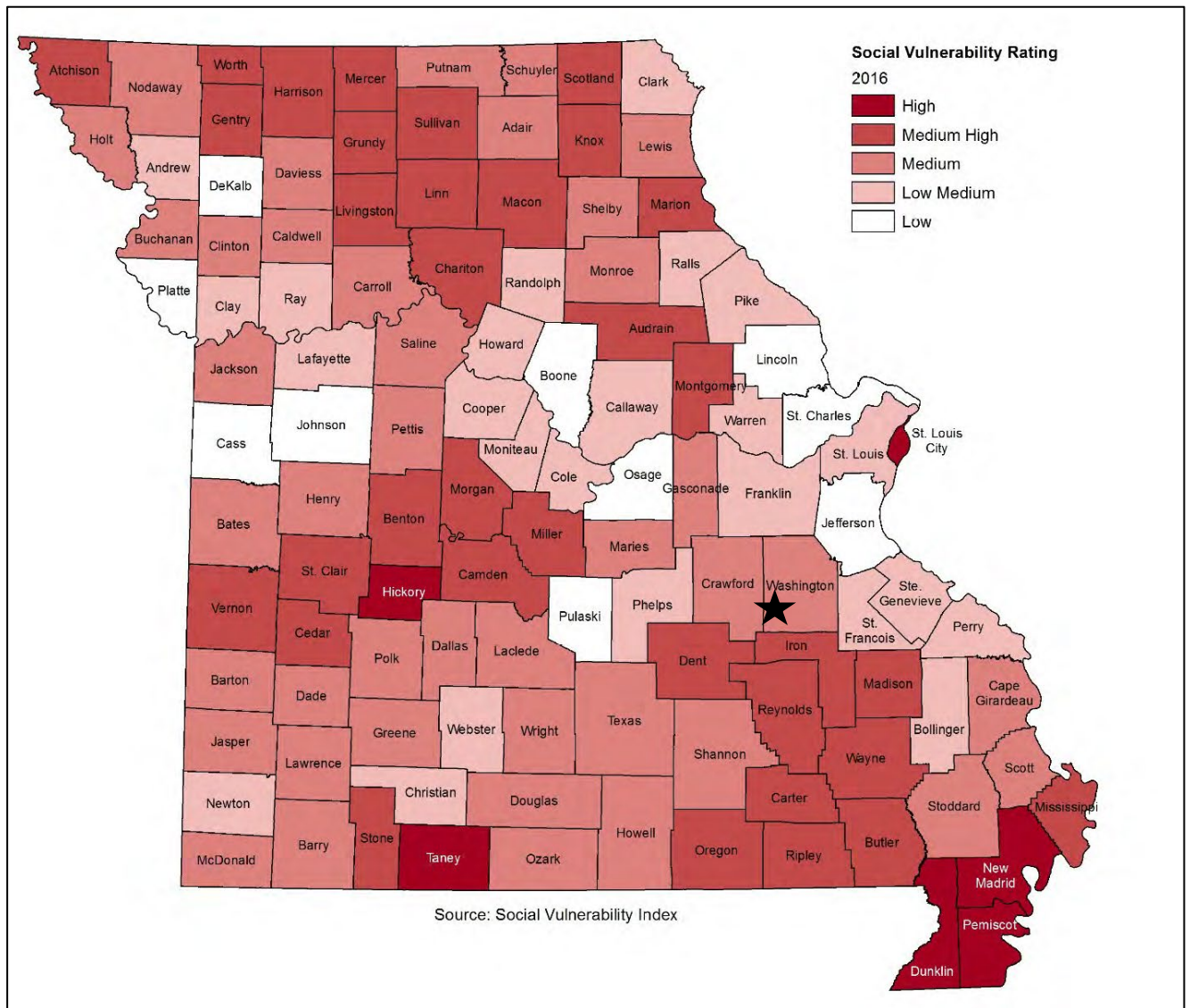
### **Socioeconomic Profile**

The Missouri State Hazard Mitigation Plan provides ratings for social vulnerability for each of the counties in the state based on 42 socioeconomic and built environment variables that research suggests contribute to a community's ability to prepare for, respond to and recover from hazards. Based on that data, Washington County has a "medium" social vulnerability rating (**Figure 3.3**). Furthermore, business incentives are available in the County including Missouri Works, a program for qualified job creators which enables the retention of withholding tax or tax credits that can be transferrable, refundable and/or saleable; BUILD, a financial incentive for the location or expansion of large business projects; sales tax exemptions exist for qualified manufacturers; and industrial infrastructure grants are available up to \$2 million or \$20,000 per job created<sup>9</sup>.

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<sup>9</sup> <https://ded.mo.gov/programs/business/missouri-works>

**Figure 3.3. Social Vulnerability Rating for Washington County**



Source: 2018 Missouri State Hazard Mitigation Plan

\*Black star indicates Washington County

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## 3.4 Hazard Profiles, Vulnerability, and Problem Statements

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Each hazard that has been determined to be a potential risk to Washington County is profiled individually in this section of the plan document. The profile will consist of a general hazard description, location, severity/magnitude/extent, previous events, future probability, a discussion of risk variations between jurisdictions, and how anticipated development could impact risk. At the end of each hazard profile will be a vulnerability assessment, followed by a summary problem statement.

### **Hazard Profiles**

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

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

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

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

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

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

**Probability of Future Occurrence:** The frequency of recorded past events is used to estimate the likelihood of future occurrences. Probability was determined by dividing the number of recorded events by the number of years and multiplying by 100. This gives the percent chance of the event happening in any given year. For events occurring more than once annually, the probability will be reported 100% in any given year, with a statement of the average number of events annually. For hazards such as drought that may have gradual onset and extended duration, probability can be based on the number of months in drought in a given time-period and expressed as the probability for any given month to be in drought.

The discussion on the probability of future occurrence should also consider changing future conditions, including the effects of long-term changes in weather patterns and climate on the identified hazards. NOAA has a new tool that can provide useful information for this purpose.

- NOAA Climate Explorer, <http://toolkit.climate.gov/climate-explorer2/>

## **Vulnerability Assessments**

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

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

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

**Requirement §201.6(c)(2)(ii)(C): The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.**

**Requirement §201.6(c)(2)(ii): (As of October 1, 2008) The risk assessment must also address National Flood Insurance Program (NFIP) insured structures that have been repetitively damaged in floods.**

Following the hazard profile for each hazard will be the vulnerability assessment. The vulnerability assessment further defines and quantifies populations, buildings, critical facilities, and other community assets at risk to damages from natural hazards. The vulnerability assessments will be based on the best available county-level data, which is in the Missouri Hazard Mitigation Plan (2018). With the 2018 Hazard Mitigation Plan Update, SEMA is pleased to provide online access to the risk assessment data and associated mapping for the 114 counties in the State. Through the web-based Missouri Hazard Mitigation Viewer, local planners or other interested parties can obtain all State Plan datasets. This effort removes from local mitigation planners a barrier to performing all the needed local risk assessments by providing the data developed during the 2018 State Plan Update. The Missouri Hazard Mitigation viewer can be found at this link: <http://bit.ly/MoHazardMitigationPlanViewer2018>.

The county-level assessments in the State Plan were also based on the following additional sources:

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

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

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

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

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**Vulnerability Overview:** This section will include a brief review of the vulnerability of each hazard.

**Potential Losses to Existing Development:** This section will describe the potential impacts of each hazard – the consequences of the effect of the hazard on the jurisdiction and its assets (including types and numbers, of buildings, critical facilities, etc.).

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

**Previous and Future Development:** This section will include information on how changes in development have impacted the community's vulnerability to this hazard. Describe how any changes in development that occurred in known hazard prone areas since the previous plan have increased or decreased the community's vulnerability. Describe any anticipated future development in the county, and how that would impact hazard risk in the planning area.

### **Problem Statements**

Each hazard analysis must conclude with a brief summary of the problems created by the hazard in the planning area, and possible ways to resolve those problems. Additionally, variations in risk between geographic areas will be included.

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### 3.4.1 Dam Failure

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.3, Page 3.148  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- Missouri Department of Natural Resources, Dam and Reservoir Safety, <https://dnr.mo.gov/land-geology/dam-reservoir-safety>
- Stanford University's National Performance of Dams Program; <http://npdp.stanford.edu/>
- National Inventory of Dams, <https://nid.usace.army.mil/#/>
- National Resources Conservation Service <http://www.nrcs.usda.gov>
- DamSafetyAction.org, <http://www.damsafetyaction.org/MO/>
- Missouri Spatial Data Information Service, <http://msdis.missouri.edu>
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0jqF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Total number of Missouri NID dams by County
  - Total number of High, Significant, and Low Hazard dams by County
  - Total number of State Regulated dams by County
  - Total number of Class 1, Class 2, and Class 3 dams by County
  - Total number of structures impacted by USACE dams by County
  - Total number of structures impacted by State dams by County
  - Total value of structures impacted by USACE dams by County
  - Total value of structures impacted by State dams by County
  - Total population impacted by USACE dams by County
  - Total population impacted by State dams by County

### **Hazard Profile**

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

A dam is defined as a barrier constructed across a watercourse for the purpose of storage, control, or diversion of water. Dams are typically constructed of earth, rock, concrete, or mine tailings. Dam failure is the uncontrolled release of impounded water resulting in downstream flooding, affecting both life and property. Dam failure can be caused by any of the following:

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

Information regarding dam classification systems under both the Missouri Department of Natural Resources (MDNR) and the National Inventory of Dams (NID), which differ, are provided in **Table 3.17** and **Table 3.18**, respectively.

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**Table 3.17. MDNR Dam Hazard Classification Definitions**

Hazard Class	Definition
Class I	Contains 10 or more permanent dwellings or any public building
Class II	Contains 1 to 9 permanent dwellings or 1 or more campgrounds with permanent water, sewer, and electrical services or 1 or more industrial buildings
Class III	Everything else

Source: Missouri Department of Natural Resources, Missouri Geological Survey Rolla Office

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**Table 3.18. NID Dam Hazard Classification Definitions**

Hazard Class	Definition
Low Hazard	A dam located in an area where failure could damage only farm or other uninhabited buildings, agricultural or undeveloped land including hiking trails, or traffic on low volume roads that meet the requirements for low hazard dams.
Significant Hazard	A dam located in an area where failure could endanger a few lives, damage an isolated home, damage traffic on moderate volume roads that meet certain requirements, damage low-volume railroad tracks, interrupt the use or service of a utility serving a small number of customers, or inundate recreation facilities, including campground areas intermittently used for sleeping and serving a relatively small number of persons.
High Hazard	A dam located in an area where failure could result in any of the following: extensive loss of life, damage to more than one home, damage to industrial or commercial facilities, interruption of a public utility serving a large number of customers, damage to traffic on high-volume roads that meet the requirements for hazard class C dams or a high-volume railroad line, inundation of a frequently used recreation facility serving a relatively large number of persons, or two or more individual hazards described for significant hazard dams.

Source: National Inventory of Dams

## ***Geographic Location***

### **Dams in Planning Area**

According to the National Inventory of Dams there are 118 recorded dams in Washington County; including 85 high hazard dams; two significant hazard dams; and 31 low hazard dams. The Missouri Department of Natural Resources also tracks dams in the state and has identified forty Class 1 dams, forty-six Class 2 dams, and thirty five Class 3 dams. **Table 3.19** provides the name of the dam, DNR hazard class and NID hazard class for each of the identified dams in Washington County. There are fifty-seven state-regulated dams and two local government dams in Washington County. There is one federally owned dam, however it is owned by the USDA Forest Service. None of the dams are owned or operated by the United States Army Corps of Engineers (USACE). County dams are privately or commercially owned. **Table 3.20** provides the names, locations, and other pertinent information for all NID High Hazard Dams in the planning area.

**Table 3.19. Washington County Dams Hazard Risk**

<b>Name of Dam</b>	<b>DNR Hazard Class</b>	<b>NID Hazard Class</b>
ARNAULT BRANCH MINE DAM	2	High
ARTESIAN LAKE DAM	2	High
ASHLEY BRANCH DAM	2	High
ASSAF LAKE DAM	3	Low
BAHA TRAIL LAKE DAM	2	High
BELGRADE DAM	2	High
BELL-SETTLE LAKE DAM	1	High
BIG FOUR MINE DAM	1	High
BLACK TAILINGS DAM	1	High
BLACKWELL MINE DAM	1	High
BLUE HERON DAM	2	High
BOTTOM DIGGINS DAM	2	High
BRESSIE LAKE(TOO SMALL)	3	Low
BUST LAKE DAM (BREACHED)	3	Low
CADET MINE TAILINGS DAM	2	High
CADET NO. 1 DAM	2	High
CADET NO. 2 DAM	2	High
CADET NO. 3 DAM	2	High
CARTER LAKE DAM	3	Low
CASEY LAKE DAM (MO30695)	2	High
CASEY LAKE DAM (MO31005)	1	High
CATES LAKE DAM	3	Low
CLICK LAKE DAM	3	Low
CRYSTAL LAKE DAM	2	High
DAVIS LAKE DAM	2	High
DEL LAGO LAKE DAM	3	Low
DEL VISTA LAKE DAM	3	Low
DESOTO MINE PIT & PLANT A DAM	2	High
DESOTO PIT & PLANT B DAM	2	High
DESSIEUX LAKE DAM	1	High
DITCH CREEK DAM	2	High
DORLAC LAKE DAM	2	High
DRESSER #1 DAM	1	High
DRESSER IND. OLD #1	1	High

<b>Name of Dam</b>	<b>DNR Hazard Class</b>	<b>NID Hazard Class</b>
DRESSER MINERALS #7 DAM NORTH(DRY)	2	High
DRESSER MINERALS #7 DAM SOUTH (DRY)	2	High
DRESSER MINERALS DAM SEC 24 (DRY)	3	Low
DRESSER MINERALS NO 7 DAM (DRY)	3	Low
DRESSER NO.4 DAM	1	High
EMERALD LAKE DAM	2	High
ESHBAUGH-MARTIN DAM	2	High
FLOYD LAKE DAM	1	High
FLYING "S" BAR RANCH DAM	1	High
FOREST LAKE DAM	1	High
FOUR WINDS WAY DAM	2	High
GIBSON MEMORIAL DAM	2	High
GUDAITIS LAKE DAM	1	High
GUN CLUB LAKE DAM	2	High
HAHN LAKE DAM/(DRY)	2	High
HEIMOS LAKE DAM	1	High
HEMATITE LAKE DAM (BREACHED)	3	Low
HENPECK HOLLOW DAM	1	High
HILL VIEW LAKE DAM SOUTH	3	Low
HILLVIEW LAKE DAM	3	Low
HOFFMAN LAKE DAM	2	High
HOPKINS LAKE DAM	3	Low
HOWELL MINE DAM	2	High
INDIAN CREEK MINE DAM - UPPER	1	High
INDIAN CREEK MINE DAM- LOWER	1	High
JOHNS DAM	3	Low
JONES LAKE DAM	3	Low
KEUSS DAM	2	High
KEYES BRANCH MINE DAM	1	High
KING ARTHUR'S DAM	2	High
KINGSTON NO. 1 DAM	2	High
KIRKPATRICK LAKE DAM	2	High
LAC SHAYNE DAM	2	High
LAKE 2 DAM	3	Low
LAKE APACHE DAM	2	High

Name of Dam	DNR Hazard Class	NID Hazard Class
LAKE CHEROKEE DAM	1	High
LAKE MELISSA DAM	3	Low
LAKEVIEW DAM	1	High
LITTLE INDIAN CREEK DAM	1	High
LOWER DRESSER NO. 4 DAM	1	High
LUTTRELL LAKE DAM LOWER	3	Significant
LUTTRELL LAKE UPPER DAM	3	Significant
MINERAL POINT #1	1	High
MINERAL POINT #2	1	High
MINNETONKA LAKE DAM	2	High
MONONAME 267	3	Low
MONONAME 551	3	Low
MONONAME 558	3	Low
MONONAME 563	3	Low
MONONAME 582	3	Low
MONONAME 588	3	Low
MONONAME 862	3	Low
MONONAME 875	2	High
MOOSEHORN LAKE DAM	3	Low
NATIONAL LEAD INDUSTRIES DAM	1	High
OLD MINES TAILINGS DAM	1	High
OLD WOLF DAM	1	High
PALMER MINE DAM	1	High
PAROLE MINE DAM	1	High
PEA RIDGE TAILINGS DAM	1	High
PINE TREE LAKE EAST DAM	1	High
PINE TREE LAKE WEST DAM	1	High
PINSON GRAVEL COMPANY DAM	2	High
PIONEER ROD&GUN CLUB DAM	3	Low
PODORSKI LAKE DAM	2	High
POTOSI LAKE DAM	1	High
POWDER SPRING LAKE DAM	1	High
RACOLA TAILINGS DAM	2	High
RICHWOODS MINE B DAM	1	High
RIEFFER LAKE DAM	3	Low
ROGUE CREEK UPPER DAM (IMCOMPLETED)	2	High
RUSSEL ELSEY DAM	1	High
SAMPSON LAKE DAM	3	Low

<b>Name of Dam</b>	<b>DNR Hazard Class</b>	<b>NID Hazard Class</b>
SAYERSBROOK DAM	2	High
SCHNELLE LAKE DAM	2	High
SETTLE MINE DAM #2	2	High
SOMETHING GREEN A DAM	1	High
SOMETHING GREEN B DAM	1	High
SPRING GLEN LAKE DAM	2	High
SPRING LAKE DAM (MO30725)	1	High
SPRING LAKE DAM (MO31838)	3	Low
SUN MINE DAM	2	High
SUNNEN DAM	2	High
THE PLACE LAKE DAM	1	High
TIMBERLANE DAM (FEDERAL)	3	Low
WING LAKE DAM	3	Low
WOODLAND LAKE	3	Low

Source: Missouri Department of Natural Resources, Dam and Reservoir Safety Program; National Inventory of Dams

**Table 3.20. NID High Hazard Class Dams in the Washington County Planning Area**

Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (Mi.) *
ARNAULT BRANCH MINE DAM	MO30716	High	46	582	TRIB-ARNAULT CREEK	OLD MINES	3
ARTESIAN LAKE DAM	MO30470	High	26	195	TR-LITTLE INDIAN CREEK	RICHWOODS	3
ASHLEY BRANCH DAM	MO31857	High	58	1,970	ASHLEY BRANCH CREEK	BOURBON	14
BAHA TRAIL LAKE DAM	MO31306	High	30	433	TR-DRY BR-INDIAN CREEK	SULLIVAN	6
BELGRADE DAM	MO30696	High	55	281	TR-FURNACE CREEK	LEADWOOD	17
BELL-SETTLE LAKE DAM	MO30480	High	33	230	TR-MINE A BRETON CREEK	POTOSI	2
BIG FOUR MINE DAM	MO30729	High	73	1,980	TRIB-CALICO CREEK	FLETCHER	2
BLACK TAILINGS DAM	MO31154	High	70	22	MILL CREEK-OFFSTREAM	MINERAL POINT	0
BLACKWELL MINE DAM	MO30709	High	85	2,100	TRIB MADDEN CREEK	POTOSI	1
BLUE HERON DAM	MO30478	High	51	2,176	POND CREEK	TIFF	7
BOTTOM DIGGINS DAM	MO30750	High	41	300	TR-MILL CREEK	TIFF	3
CADET MINE TAILINGS DAM	MO30715	High	97	103	TR-MILL CREEK	TIFF	3
CADET NO. 1 DAM	MO30704	High	53	264	MILLCREEK TRIB OFFSTREAM	BLACKWELL	7
CADET NO. 2 DAM	MO30707	High	77	33	TR-MILL CREEK	TIFF	4
CADET NO. 3 DAM	MO31830	High	74	765	SHIBBOLETH BRANCH	CADET	4
CASEY LAKE DAM	MO31005	High	57	120	TR-OLD MINES CREEK	MORSE MILL	26
CASEY LAKE DAM	MO30695	High	36	117	TR-CLEAR CREEK	LEADWOOD	20
CRYSTAL LAKE DAM	MO31837	High	65	1,770	HARRIS BRANCH	ANTHONIES MILL	10
DAVIS LAKE DAM	MO31000	High	30	48	TR-TYREY CREEK	MORSE MILL	21
DESOTO MINE PIT & PLANT A DAM	MO30468	High	78	3,700	TRIB-DITCH CREEK	RICHWOODS	2

Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (Mi.) *
DESOTO PIT & PLANT B DAM	MO30469	High	54	248	DITCH CREEK	RICHWOODS	2
DESSIEUX LAKE DAM	MO30994	High	28	470	TR BATES CREEK	BATES CREEK CAMP	2
DITCH CREEK DAM	MO30726	High	60	1,500	TR-DITCH CREEK	MORSE MILL	16
DORLAC LAKE DAM	MO30731	High	45	758	TR-MINERAL FORK-BIG RIVER	OLD MINES	6
DRESSER #1 DAM	MO31117	High	30	1,295	RUBENEAU BRANCH - OFFSTREAM	MINERAL POINT	0
DRESSER IND. OLD #1	MO30753	High	45	1,300	RUBENEAU BRANCH-OFFSTREAM	MINERAL POINT	0
DRESSER MINERALS #7 DAM NORTH(DRY)	MO31145	High	15	305	TR-CADET CREEK	CADET	0
DRESSER MINERALS #7 DAM SOUTH (DRY)	MO31147	High	34.6	80	TR-MILL CREEK	BLACKWELL	0
DRESSER NO.4 DAM	MO30474	High	105	4,325	TR-MILL CREEK	TIFF	2
EMERALD LAKE DAM	MO31836	High	46	405	TR HARRIS BRANCH	SULLIVAN	16
ESHBROUGH-MARTIN DAM	MO30711	High	115	81	TR BIG RIVER	MORSE MILL	26
FLOYD LAKE DAM	MO30744	High	21	90	TR-OLD MINES CREEK	OLD MINES	2
FLYING "S" BAR RANCH DAM	MO31124	High	62	127	TR MILL CREEK	TIFF	1
FOREST LAKE DAM	MO30101	High	50	409	SWAN CREEK	LATTY	2
FOUR WINDS WAY DAM	MO30722	High	31	199	TR-MINERAL FORK-BIG RIVER	APTUE	1
GIBSON MEMORIAL DAM	MO32036	High	45	184	ASHLEY BRANCH	SHRILEY	0
GUDAITIS LAKE DAM	MO30702	High	25	158	TR-CLEAR CREEK	IRONDALE	12
GUN CLUB LAKE DAM	MO30476	High	85	1,400	TR-MINE A BRETON CREEK	CRUISE	11

Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (Mi.) *
HAHN LAKE DAM/(DRY)	MO31122	High	30	241	TR-SALT MINES CREEK	MORSE MILL	25
HEIMOS LAKE DAM	MO30999	High	37	37	TRIB-LITTLE INDIAN CREEK	RICHWOODS	1
HENPECK HOLLOW DAM	MO31256	High	24	141	TR-COURTOIS CREEK	BERRYMAN	4
HOFFMAN LAKE DAM	MO31484	High	25	134	TR-LITTLE INDIAN CREEK	RICHWOODS	0
HOWELL MINE DAM	MO30700	High	58	1,460	ISHMAEL BR HAZEL CREEK	SHIRLEY	9
INDIAN CREEK MINE DAM - UPPER	MO31036	High	56	791	GOOSE CREEK	SULLIVAN	13
INDIAN CREEK MINE DAM- LOWER	MO30717	High	84	875	GOOSE CREEK	RICHWOODS	5
KEUSS DAM	MO40120	High	45	378	TURKEY CREEK	-	0
KEYES BRANCH MINE DAM	MO30386	High	77	1,192	TRIBUTARY KEYES BRANCH CREEK	TIFF	0
KING ARTHUR'S DAM	MO31825	High	80	2,000	POND CREEK	MINERAL POINT	6
KINGSTON NO. 1 DAM	MO30728	High	85	1,700	TR-MINERAL FK-BIG RIVER	BLISS	2
LAC SHAYNE DAM	MO31835	High	72	2,475	POND CREEK	TERRE DU LAC	6
LAKE APACHE DAM	MO30703	High	41	142	TR DRY CREEK	IRONDALE	1
LAKE CHEROKEE DAM	MO30751	High	27	72	TR DRY CREEK	IRONDALE	1
LAKEVIEW DAM	MO30688	High	68	1,750	TR BATES CREEK	FLETCHER	23
LITTLE INDIAN CREEK DAM	MO30718	High	58	1,280	TR-LITTLE INDIAN CREEK	RICHWOODS	1
LOWER DRESSER NO. 4 DAM	MO31123	High	31	116	TRIBUTAR TO MILL CREEK	TIFF	2
MINERAL POINT #1	MO30705	High	72	2,200	TR-MILL CREEK	BLACKWELL	9
MINERAL POINT #2	MO31158	High	95	1,191	TRIB-MILL CREEK	MINERAL POINT	1
MINNETONKA LAKE DAM	MO30727	High	74	2,500	TRIB-DITCH CREEK	RICHWOODS	1
MONONAME 875	MO31006	High	20	235	SYCAMORE CREEK	BLISS	0

Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (Mi.) *
NATIONAL LEAD INDUSTRIES DAM	MO30708	High	99	363	TR-MILL CREEK	BLACKWELL	2
OLD MINES TAILINGS DAM	MO30706	High	61	286	MUD TOWN CREEK	RACOLA	1
OLD WOLF DAM	MO31118	High	48	182	TR CADET CREEK	TIFF	4
PALMER MINE DAM	MO30482	High	76	1,460	TR HAZEL CREEK	SHIRLEY	9
PAROLE MINE DAM	MO30483	High	64	1,000	SPRINGTOWN BRANCH	PAROLE	9
PEA RIDGE TAILINGS DAM	MO30473	High	150	4,100	TR-MARYS CREEK	MORSE MILL	-
PINE TREE LAKE EAST DAM	MO30992	High	33	159	TRIB-FOURCHEARENAULT CREEK	POTOSI	0
PINE TREE LAKE WEST DAM	MO30995	High	28	120	TRIB-FOURCHE A RENAULT CREEK	POTOSI	0
PINSON GRAVEL COMPANY DAM	MO31155	High	79	875	TR-OLD MINES CR	CRUISE MILL	0
PODORSKI LAKE DAM	MO30697	High	26	83	TR-CLEAR CREEK	LEADWOOD	19
POTOSI LAKE DAM	MO30477	High	33	438	TRIB-BIG RIVER	LEADWOOD	10
POWDER SPRING LAKE DAM	MO30749	High	28	195	BUST BRANCH O MILL CREEK	TIFF	2
RACOLA TAILINGS DAM	MO30475	High	78	29	OLD MINES CREEK	RACOLA	1
RICHWOODS MINE B DAM	MO31404	High	48	1,000	TR-DITCH CREEK	RICHWOODS	0
ROGUE CREEK UPPER DAM (IMCOMPLETED )	MO31849	High	17	109	ROGUE CREEK	POTOSI	3
RUSSEL ELSEY DAM	MO30102	High	21	224	NORTH FORK FOURCHE A RENAULT	POTOSI	0
SAYERSBROOK DAM	MO30112	High	67	1,080	ASHLY BRANCH	APTUS	6
SCHNELLE LAKE DAM	MO31329	High	25	134	TR-BIG RIVER	BELGRADE	4

Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (Mi.) *
SETTLE MINE DAM #2	MO30479	High	68	300	TR-MINE A BRETON CREEK	POTOSI	2
SOMETHING GREEN A DAM	MO30720	High	27	347	ROUGE CREEK	POTOSI	8
SOMETHING GREEN B DAM	MO30719	High	22	118	ROUGE CREEK	POTOSI	9
SPRING GLEN LAKE DAM	MO30698	High	33	194	GOOSE CREEK	LEADWOOD	17
SPRING LAKE DAM	MO30725	High	27	92	TRIB-LITTLE INDIAN CREEK	RICHWOODS	2
SUN MINE DAM	MO30710	High	73	2,100	MADDIN CREEK	POTOSI	11
SUNNEN DAM	MO30111	High	51	5,000	FOURCHE A RENAULT	APTUS	7
THE PLACE LAKE DAM	MO30996	High	16	94	TR-MINE A BRETON CREEK	POTOSI	2

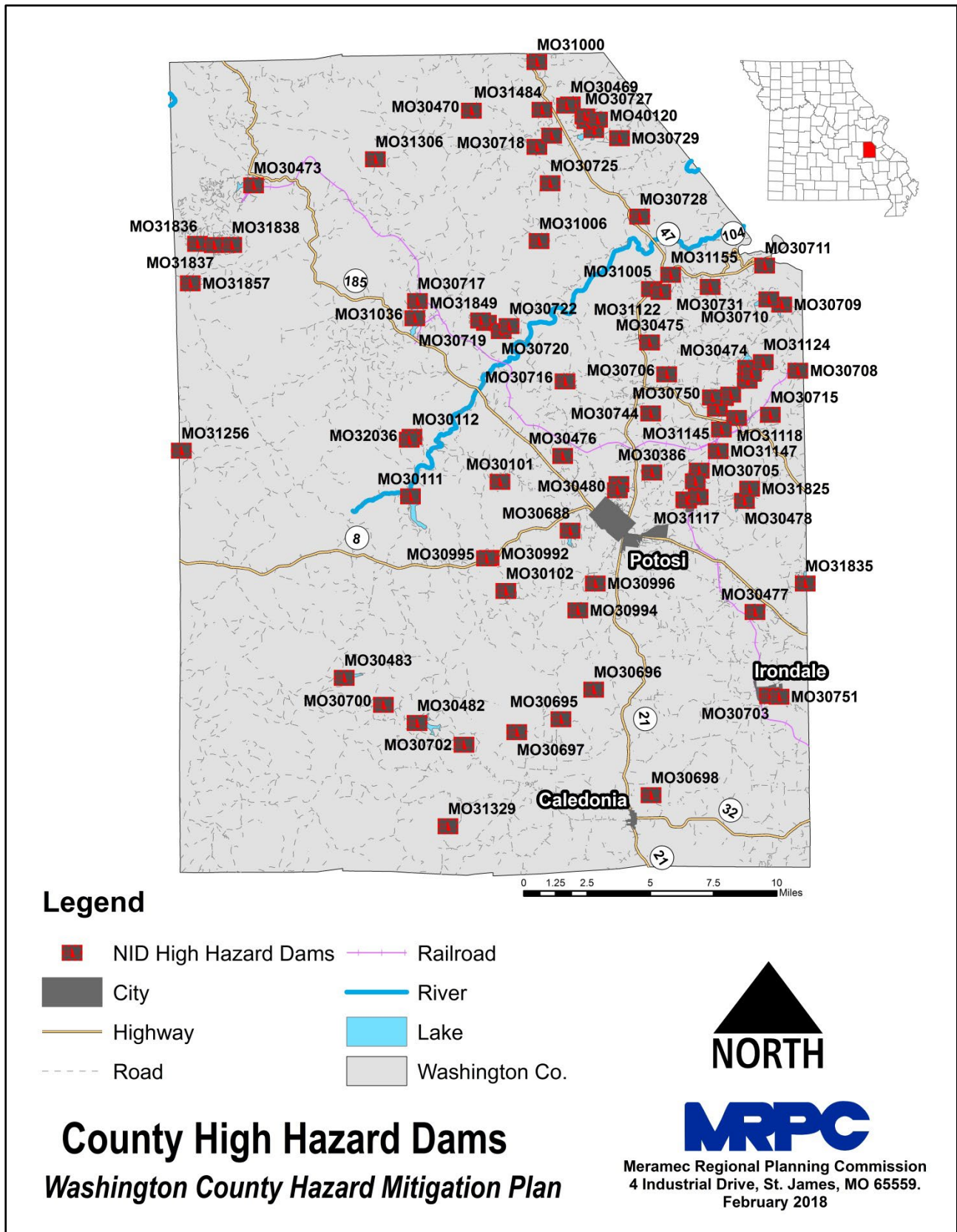
Sources: National Inventory of Dams, [http://nid.usace.army.mil/cm\\_apex/f?p=838:12](http://nid.usace.army.mil/cm_apex/f?p=838:12)

**Figure 3.4** depicts locations of NID high hazard dams located in the planning area. If a dam failure were to occur in Washington County, depending upon dam and location, the severity would range between negligible to life threatening. Road infrastructure, residential structures, commercial buildings, and public buildings are all vulnerable to losses. There is one area of assembly in dam inundation zones within the county. Kingston K-14 Schools are located between two tailings dams, MO31122 and MO31005. The distance from the dams to school assets are less than 385 yards.

Ten dam inundation maps were available from the Missouri Department of Natural Resources. These Regulated Dams include Ashley Branch Dam, Crystal Lake Dam, Emerald Lake Dam, Forest Lake Dam, Gibson Memorial Dam, Keuss Dam, Lac Shayne Dam, Lake Apache Dam, Sayersbrook Dam, and Sunnen Dam (**Figure 3.5** through **Figure 3.14**). No other dam inundation maps were available for the remaining NID High Hazard Dams in the county.

The Missouri Department of Natural Resources requires certain dams over 35 feet tall to be permitted and submit an emergency action plan. Emergency action plans are on record for an additional forty mine tailing dams that include Mineral Point #1 Dam, Old Mines Dam, Mineral Point #2 Dam, Keys Branch Dam, Desoto A Dam, Desoto B Dam, Pea Ridge Tailings Dam, Racola Tailings Dam, Blue Heron Dam, Settle Mine #2 Dam, Palmer Mine Dam, Parole Mine Dam, Lake View Dam, Casey Dam, Belgrade Dam, Howell Mine Dam, Cadet #2 Dam, National Lead Industries Dam, Blackwell Mine Dam, Sun Mine Dam, Eshbaugh-Martin Dam, Cadet Mine Tailings Dam, Indian Creek Lower Dam, Little Indian Creek Dam, Ditch Creek Dam, Minnetonka Dam, Kinston No. 1 Dam, Big Four Mines Dam, Dorlac Dam, Bottom Diggins Dam, Dresser Old #1 Dam, Casey Dam, Old Wolf Dam, Flying S Ranch Dam, Black Tailings Dam, Pinson Grave Dam, Richwoods Mine B Dam, King Arthur's Dam, Cadet No. 3 Dam, and Heimos Dam. These emergency action plans are available from the department upon request.

**Figure 3.4. NID High Hazard Dam Locations in Washington County**



Source: MSDIS, MRPC

Figure 3.5. Ashley Branch Dam Inundation Zone

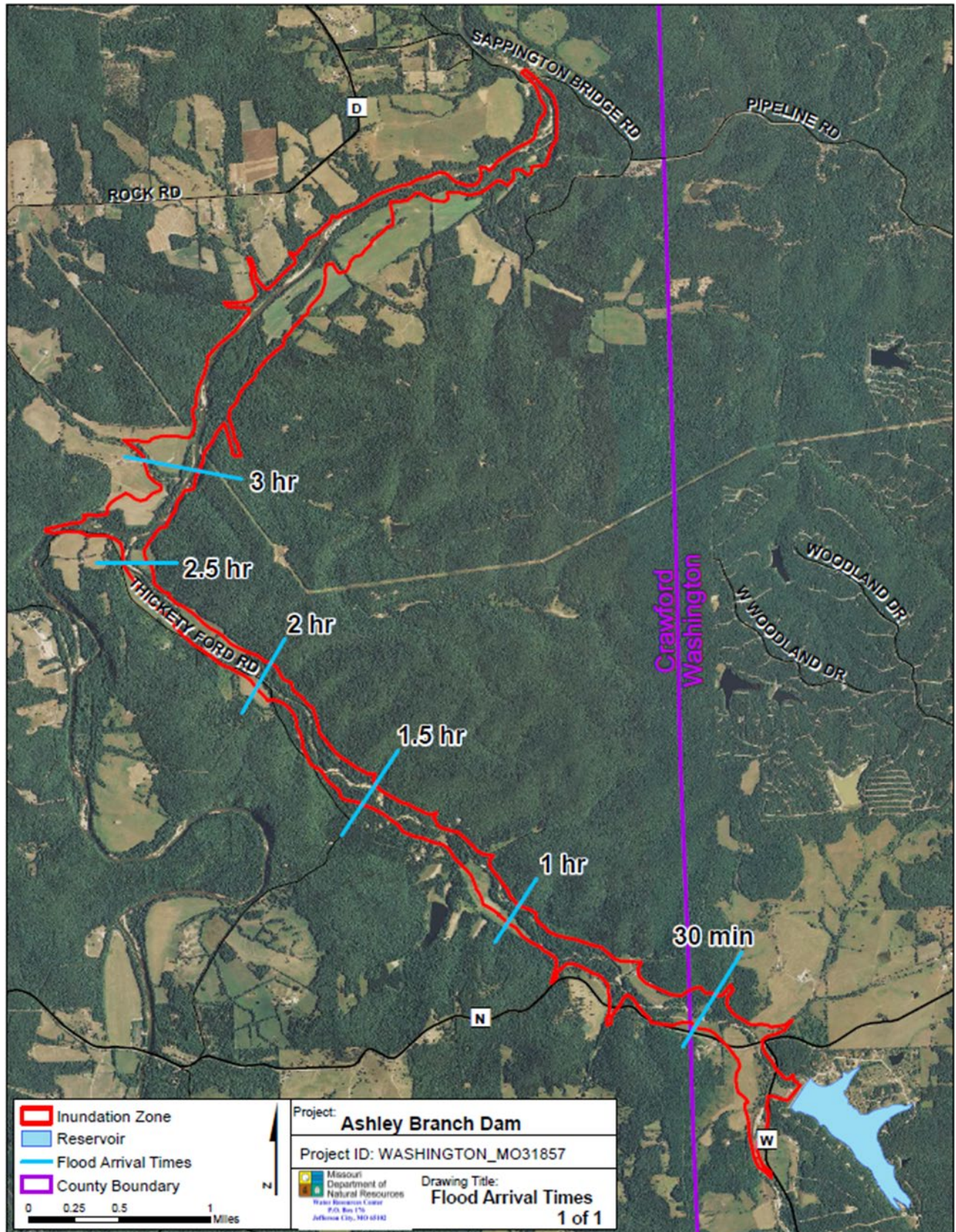


Figure 3.6. Crystal Lake Dam Inundation Zone

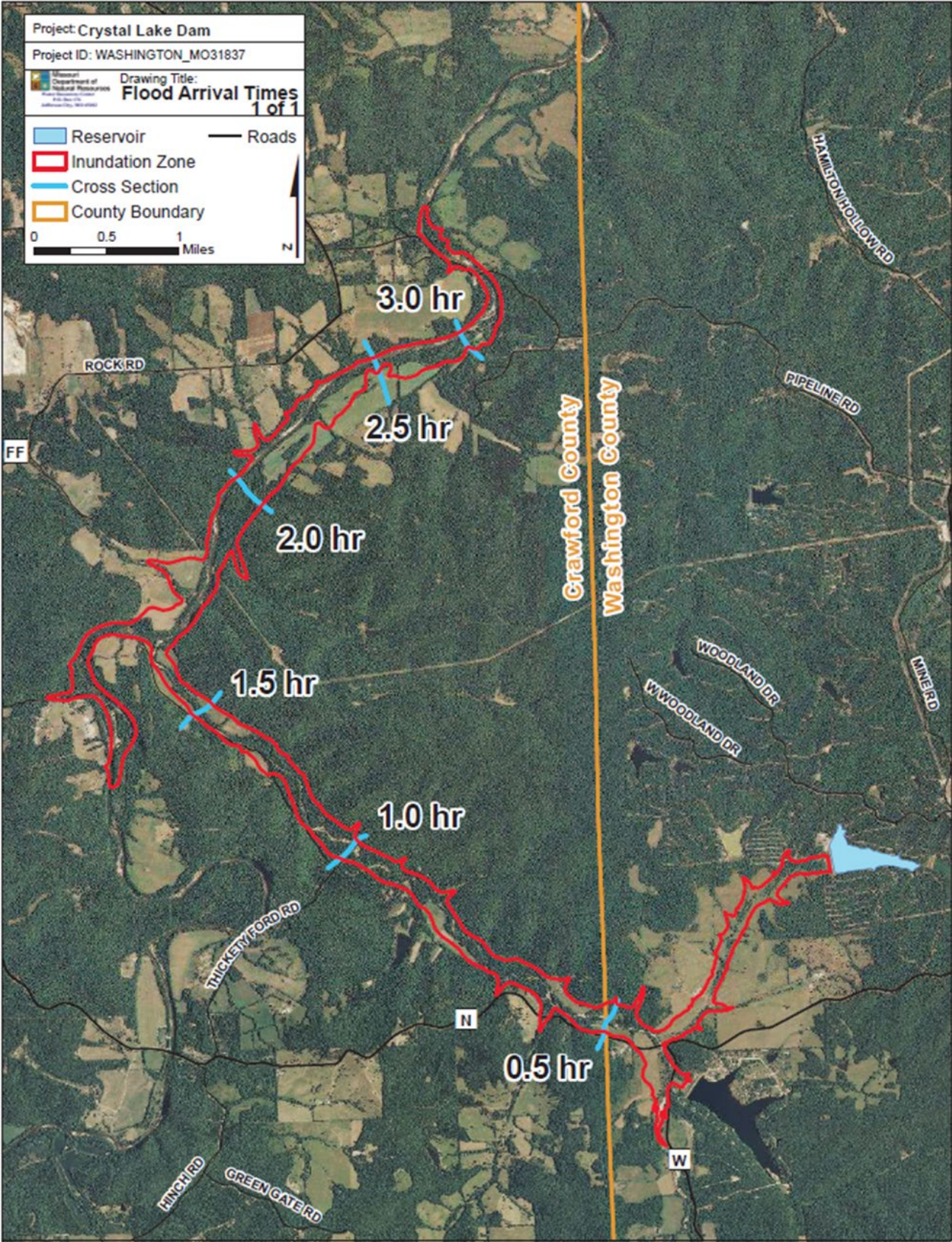


Figure 3.7. Emerald Lake Dam Inundation Zone

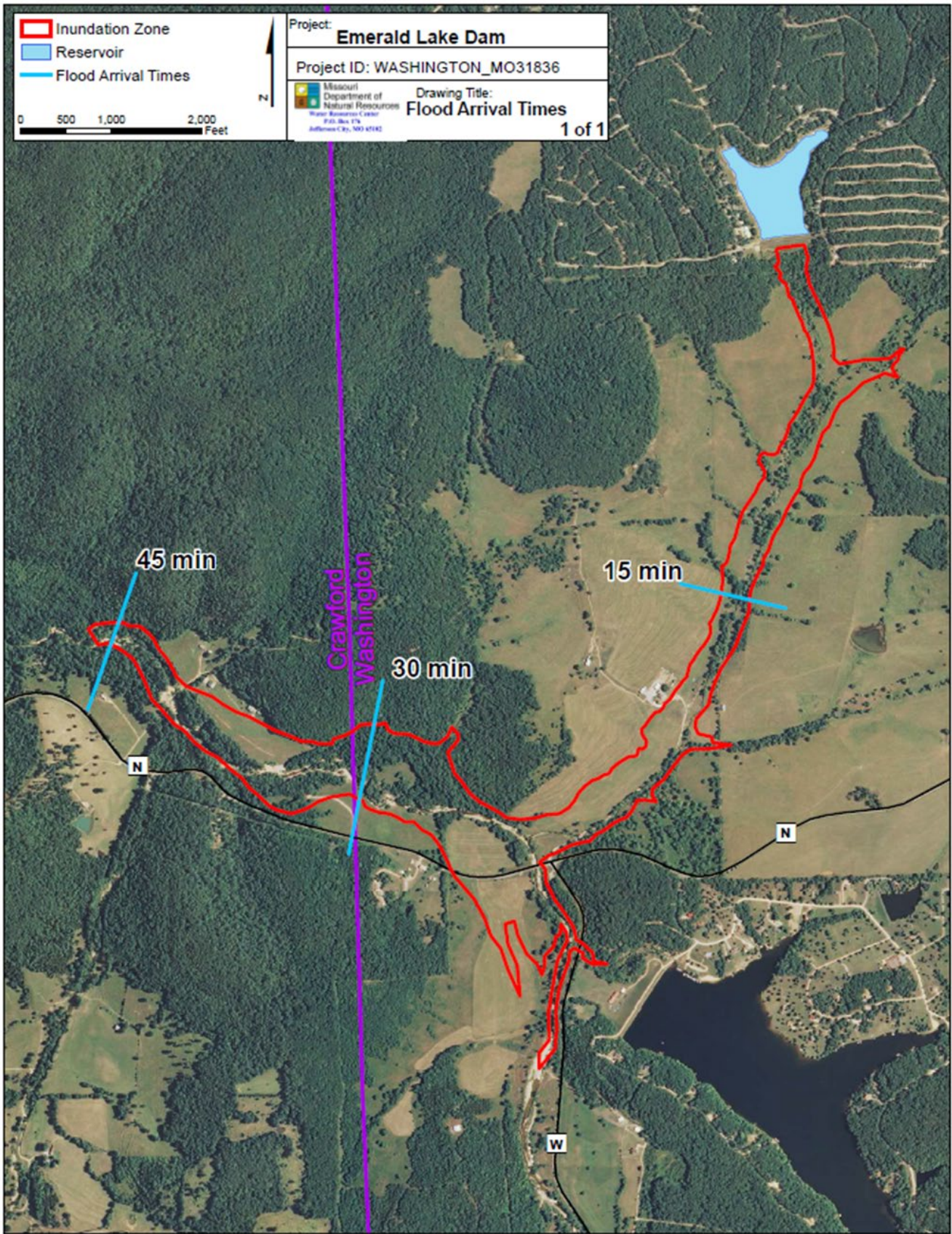


Figure 3.8. Forest Lake Dam Inundation Zone Continued

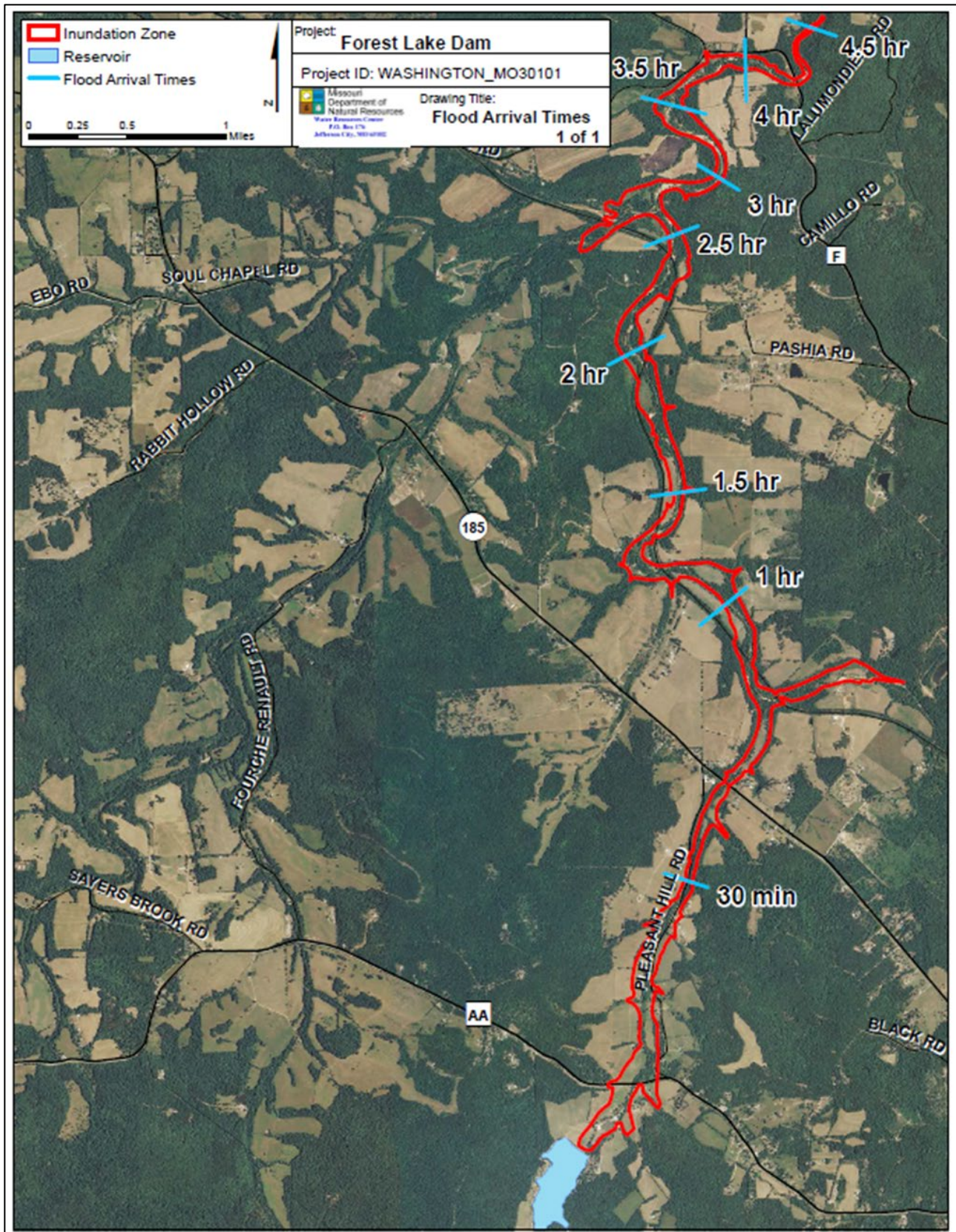


Figure 3.9. Gibson Memorial Dam Inundation Zone

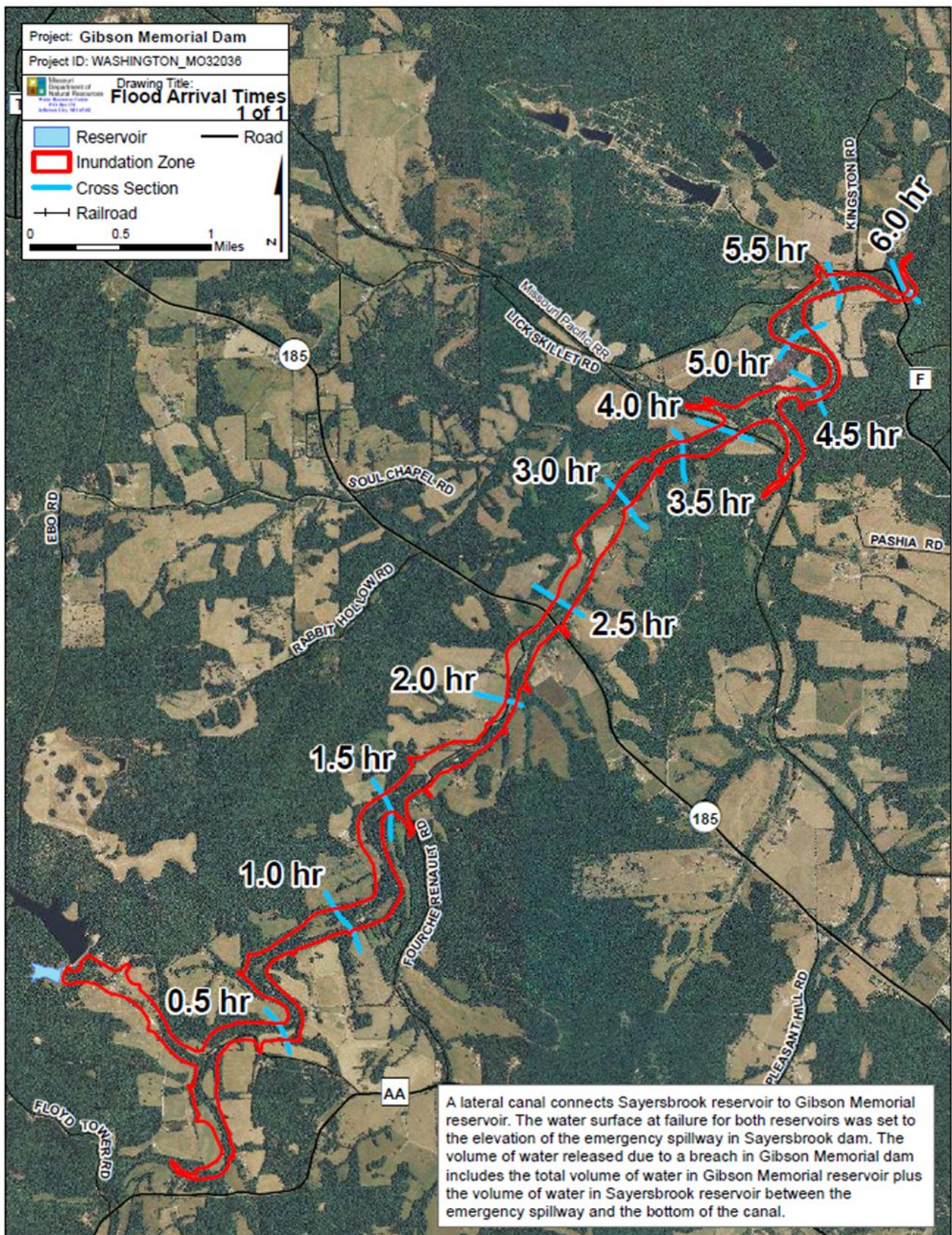


Figure 3.10. Keuss Dam Inundation Zone

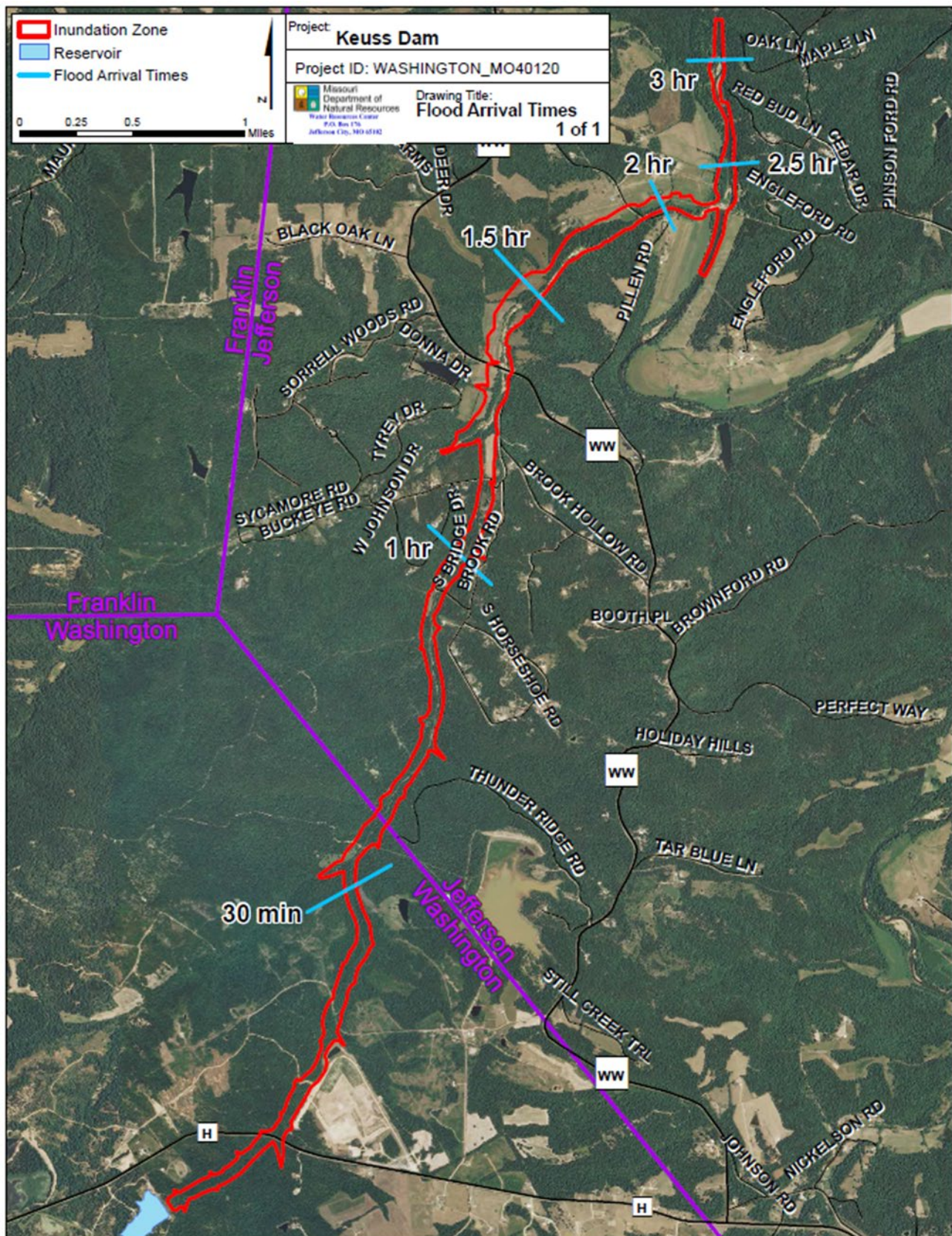


Figure 3.11. Lac Shayne Dam Inundation Zones

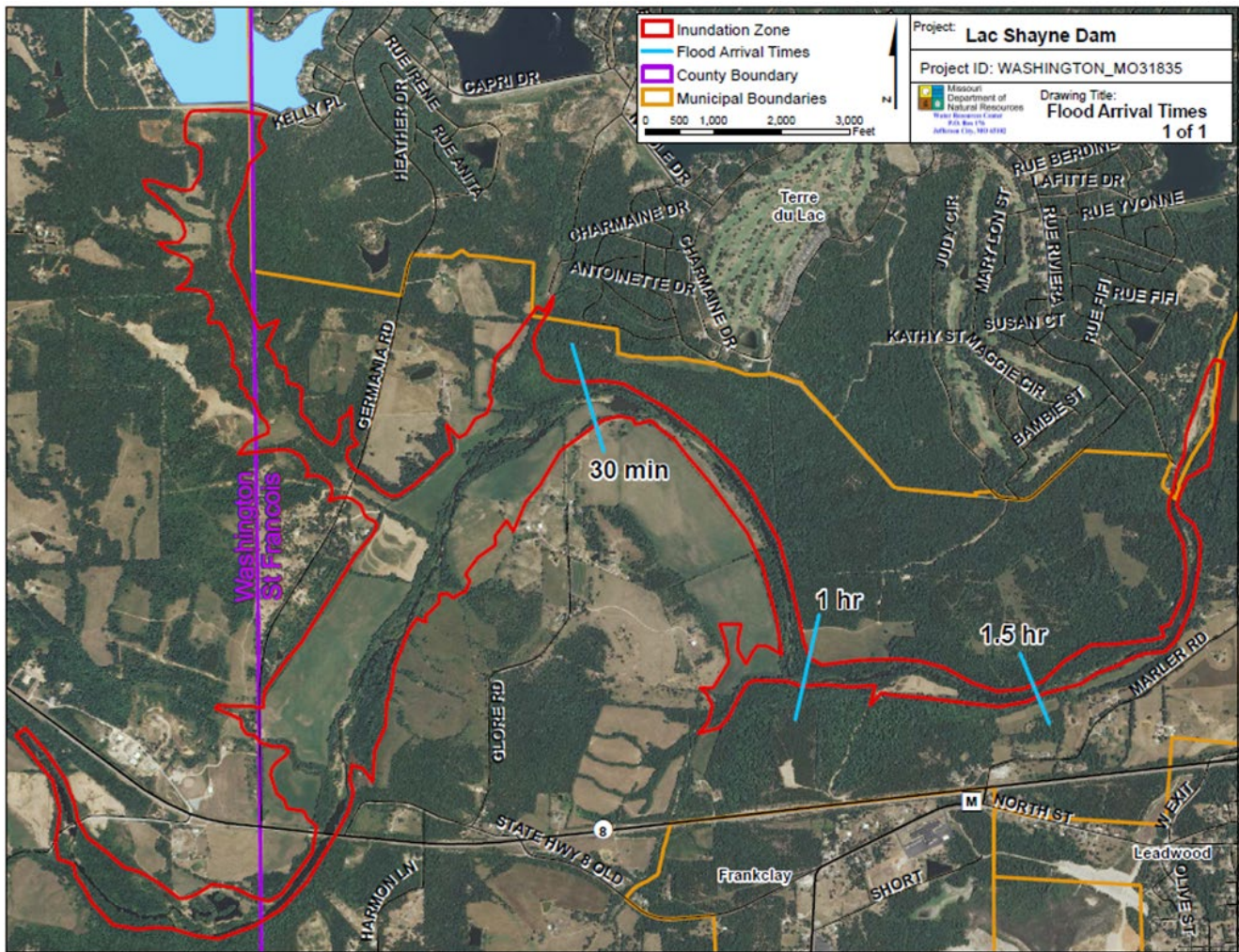
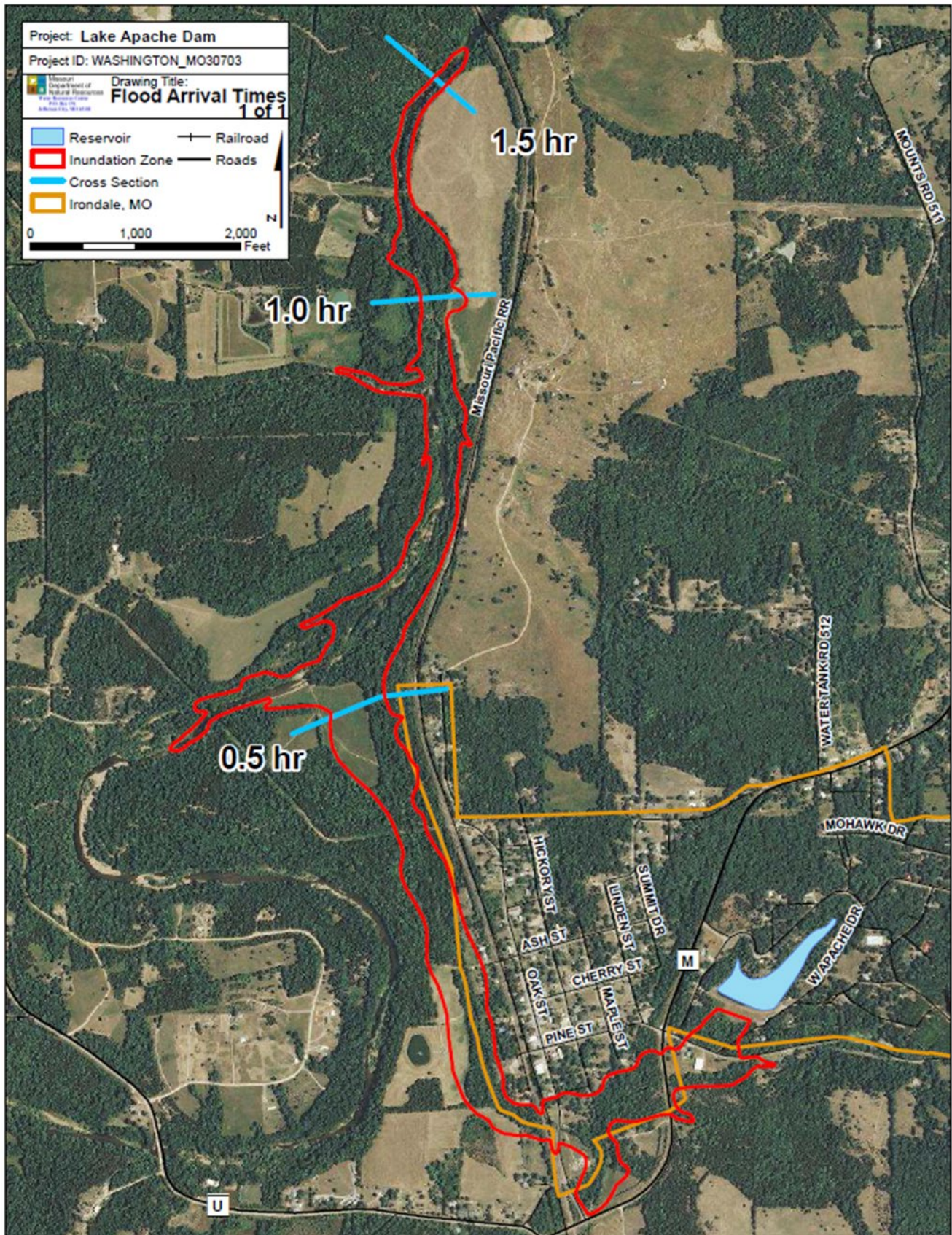


Figure 3.12. Lake Apache Dam Inundation Zones



**Figure 3.13. Sayersbrook Dam Inundation Zone**

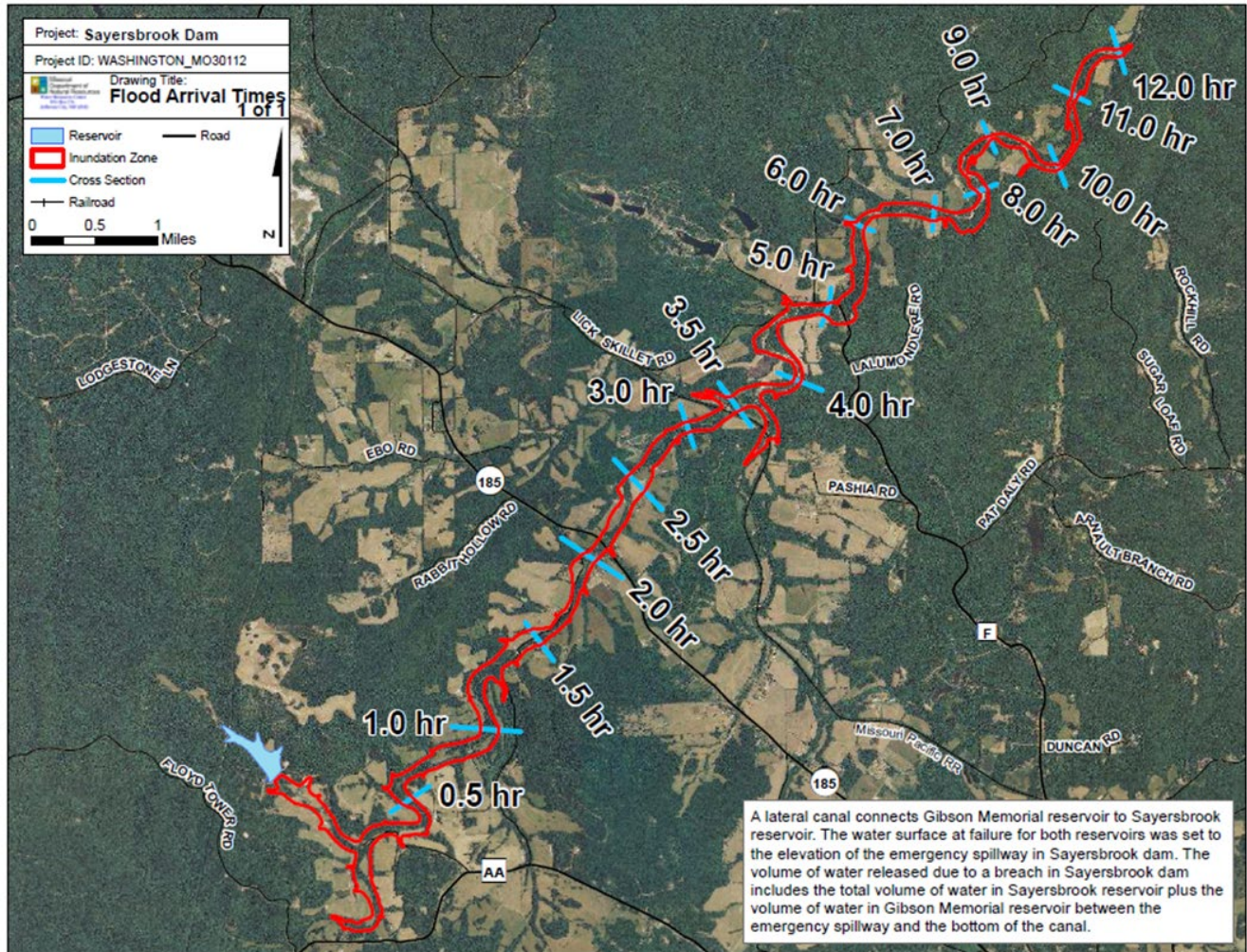
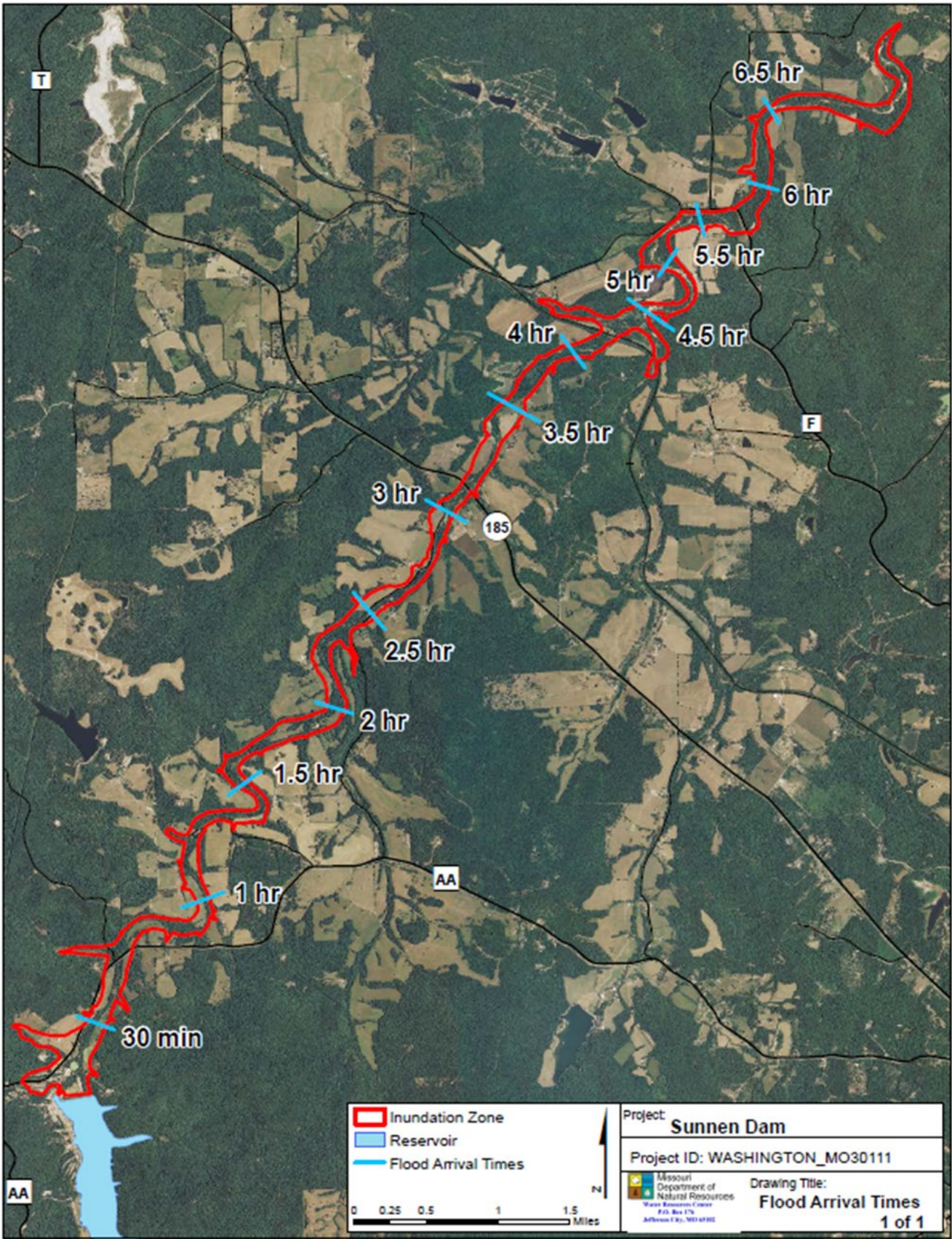


Figure 3.14. Sunnen Dam Inundation Zone

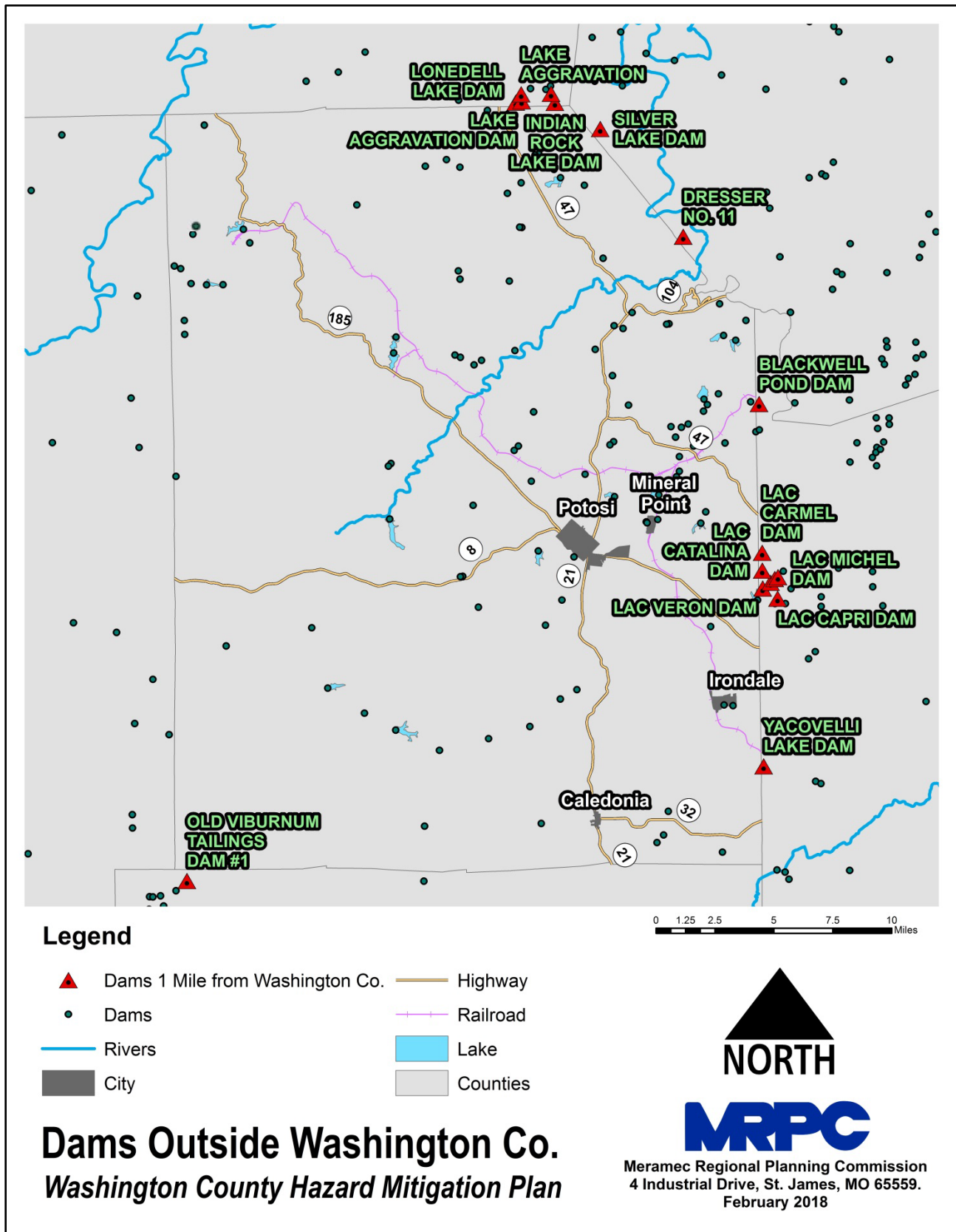


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### Upstream Dams Outside the Planning Area

**Figure 3.15** depicts dams outside of Washington County. Seventeen High Hazard dams (11 regulated) are located within a 1 mile buffer of the county. According to the Missouri Department of Natural Resources, Missouri Geological Survey, Water Resources Center, there are eight regulated high hazard dams that could flow into Washington County from surrounding counties during a failure event; Blackwell Pond Dam in St. Francois County (Regulated, High Hazard, Class 1) resides approximately 293 yards from the county (**Figure 3.16**); Lac Bourbon Dam (Regulated, High Hazard, Class 2), Lac Capri Dam (Regulated, High Hazard, Class 1), Lac Carmel Dam (Regulated, High Hazard, Class 2), Lac Darcie Dam (Regulated, High Hazard, Class 2), Lac Michel Dam (Regulated, High Hazard, Class 2), and Lac Veron Dam (Regulated, High Hazard, Class 2) in St. Francois County reside 300+ yards from the county line (**Figure 3.17**). Additionally, Old Viburnum Tailings Dam #1 in Iron County (Regulated, High Hazard, Class 1) resides 900 yards from the county (**Figure 3.18**). Two unregulated dams Lac Catalina Dam (Unregulated, High Hazard, Class 1) and Yacovelli Lake Dam (Unregulated, High Hazard, Class 2) in St. Francois County reside 200 to 300+ yards from the county (**Figure 3.17** and **Figure 3.19**).

Figure 3.15. Upstream Dams Outside Washington County



Source: MSDIS, MRPC

**Figure 3.16. Blackwell Pond Dam**



**Figure 3.17. Lac Dams (7)**



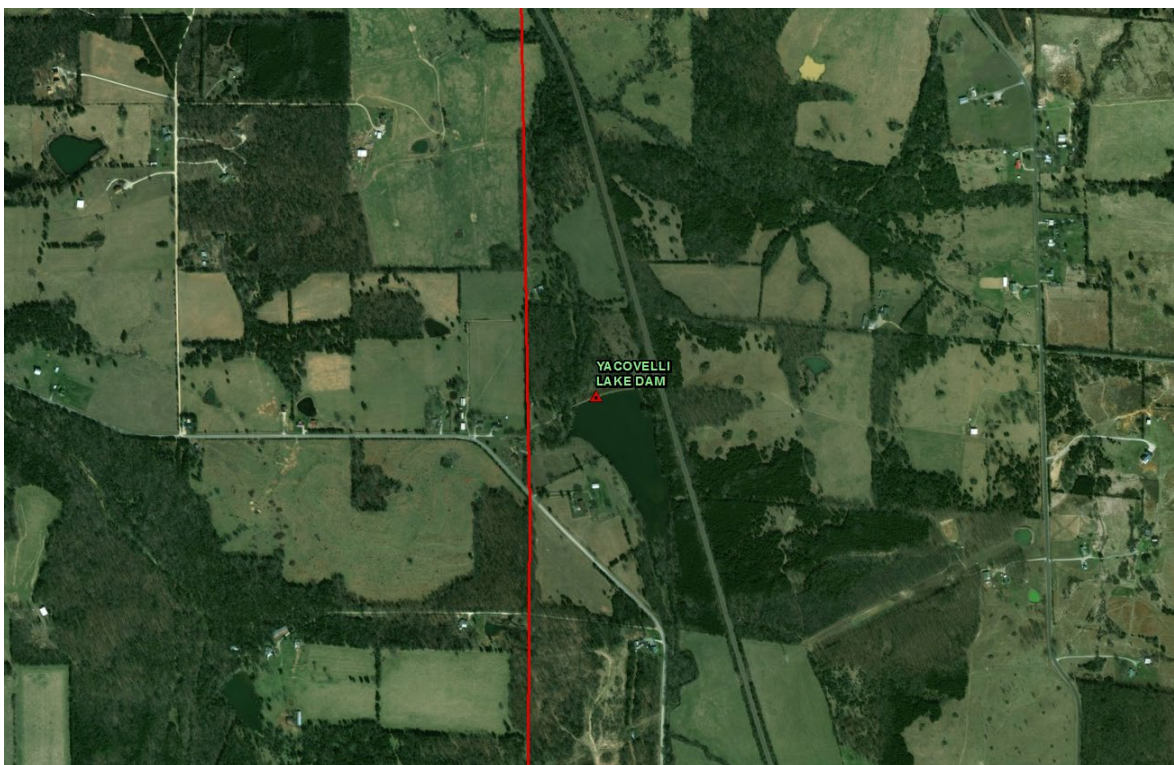
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**Figure 3.18. Old Viburnum Tailings Dam #1**



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**Figure 3.19. Yacovelli Lake Dam**



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## **Severity/Magnitude/Extent**

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

## **Previous Occurrences**

According to Stanford University's National Performance of Dams Program and the Missouri State Emergency Management Agency, there were 86 recorded dam incidents in Missouri between 1917 and 2008. For the 42-year period from 1975 to 2016 for which dam failure statistics are available, 19 dam failures and 68 incidents are recorded. Fortunately, only one drowning has been associated with a dam failure in the state. The problem of unsafe dams in Missouri was underscored by dam failures at Lawrenceton in 1968, Washington County in 1975, Fredricktown in 1977, and a near failure in Franklin County in 1979. A severe rainstorm and flash flooding in October 1998 compromised about a dozen small, unregulated dams in the Kansas City area. But perhaps the most spectacular and widely publicized dam failure in recent years was the failure of the Taum Sauk Hydroelectric Power Plant Reservoir atop Profitt Mountain in Reynolds County, MO.

In the early morning hours of December 14, 2005, a combination of human and mechanical error in the pump station resulted in the reservoir being overfilled. The manmade dam around the reservoir failed and dumped over a billion gallons of water down the side of Profitt Mountain, into and through Johnson's Shut-Ins State Park and into the East Fork of the Black River. The massive wall of water scoured a channel down the side of the mountain that was over 6000 feet wide and 7,000 feet long that carried a mix of trees, rebar, concrete, boulders and sand downhill and into the park<sup>10</sup>. The deluge destroyed Johnson's Shut-Ins State Park facilities, including the campground, and deposited sediment, boulders and debris into the park. The flood of debris diverted the East Fork of the Black River into an older channel and turned the river chocolate brown. Fortunately, the breach occurred in mid-winter. Five people were injured when the park superintendent's home was swept away by the flood, but all were rescued and eventually recovered. Had it been summer, and the campground filled with park visitors, the death toll could have been very high<sup>11</sup>. This catastrophe has focused the public's attention on the dangers of dam failures and the need to adequately monitor dams to protect the vulnerable.

Despite the significance of the immediate damage done by the Taum Sauk Reservoir dam failure, the incident also highlights the long-term environmental and economic impacts of an event of this magnitude. Four years later, the toll of the flooding and sediment on aquatic life in the park and Black River is still being investigated. Even after the removal of thousands of dump truck loads of debris and mud, the river is still being affected by several feet of sediment left in the park. The local economy, heavily reliant upon the tourism from the park and Black River, has also been hit hard<sup>12</sup>.

## **Event Description**

According to Stanford University's National Performance of Dams Program, 3 dam incidents have been

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<sup>10</sup> United States Geological Survey. Damage Evaluation of the Taum Sauk Reservoir Failure using LiDAR.

[https://www.researchgate.net/publication/268325451\\_Damage\\_Evaluation\\_of\\_the\\_Taum\\_Sauk\\_Reservoir\\_Failure\\_using\\_LiDAR](https://www.researchgate.net/publication/268325451_Damage_Evaluation_of_the_Taum_Sauk_Reservoir_Failure_using_LiDAR)

<sup>11</sup> The Alert. Spring 2006. After the Deluge...What's Ahead for Taum Sauk? By Dan Sherburne.

<sup>12</sup> The Alert. Spring 2006. After the Deluge...What's Ahead for Taum Sauk? By Dan Sherburne.

recorded for Washington County since 1990<sup>13</sup>. Rogue Creek Upper Dam experienced an inflow flood on May 25, 1990. An embankment slide occurred at Lac Shayne Dam on October 7, 1993. Furthermore, concrete deterioration was observed at Four Winds Way Dam on March 1, 1994. Additionally, both Bust Lake Dam and Hematite Lake Dam were breached according to MoDNR; specific data was not given. Lastly, on October 15, 1975 piping failed at the Dresser No. 4 Dam in Washington Co., resulting in failure<sup>14</sup>.

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

Since it is unknown which dams, if any might fail at any given time, determining the probability of future occurrence is not possible<sup>15</sup>. In addition, dam failure within the county has not occurred according to available data.

## **Vulnerability**

### ***Vulnerability Overview***

Data was obtained from the 2018 Missouri State Hazard Mitigation Plan for the vulnerability analysis of dam failure for Washington County. There are however data limitations regarding dams unregulated by the State of Missouri due to height requirements. These limitations hinder vulnerability analysis; nonetheless, failure potential still exists. **Table 3.21** provides vulnerability analysis data for the failure of State-regulated dams in Missouri.

**Table 3.21. Vulnerability Analysis for Failure of State-regulated Dams in Missouri**

County	Class 1	Class 2	Class 3	Total	Estimated # of Buildings Vulnerable	Average Exposure Value per Structure (\$)	Estimated Total Potential Building Exposure (\$)	Estimated Total Population Exposure	Estimated Building Losses (\$)
Washington	22	31	4	57	48	\$27,382	\$1,314,354	16	0

Source: 2018 Missouri State Hazard Mitigation Plan (DNR, MSDIS, Hazus)

For the vulnerability analysis of State regulated dams, the State developed the following assumptions for overview.

- Class 1 dams: the number of structures in the inundation area was estimated to be 10 or more permanent dwellings or any public building. Inspection of these dams must occur every two years.

<sup>13</sup> [http://www.npdp.standord.edu/dam\\_incidents](http://www.npdp.standord.edu/dam_incidents)

<sup>14</sup> 2013 Missouri State Hazard Mitigation Plan

<sup>15</sup> 2018 Missouri State Hazard Mitigation Plan

- Class 2 dams: the area downstream from the dam that would be affected by inundation contains one to nine permanent dwellings, or one or more campgrounds with permanent water, sewer and electrical services or one or more industrial buildings. Inspection of these dams must occur once every three years.
- Class 3 dams: the area downstream from the dam that would be affected by inundation does not contain any of the structures identified for Class 1 or Class 2 dams. Inspection of these dams must occur once every five years.

The 2018 Missouri State Hazard Mitigation Plan used many sources of information for dam data which is why some figures and tables have different data values. According to Table 3.19 which used DNR, MSDIS, and Hazus sources there is an estimated 48 buildings vulnerable to failure of State-regulated dams. However, the sources of DNR and MSDIS shown in **Figure 3.20** show zero buildings vulnerable to failure in Washington County. Furthermore, the state quantified potential loss estimates in terms of property damages. To execute the analysis, the following assumptions were utilized.

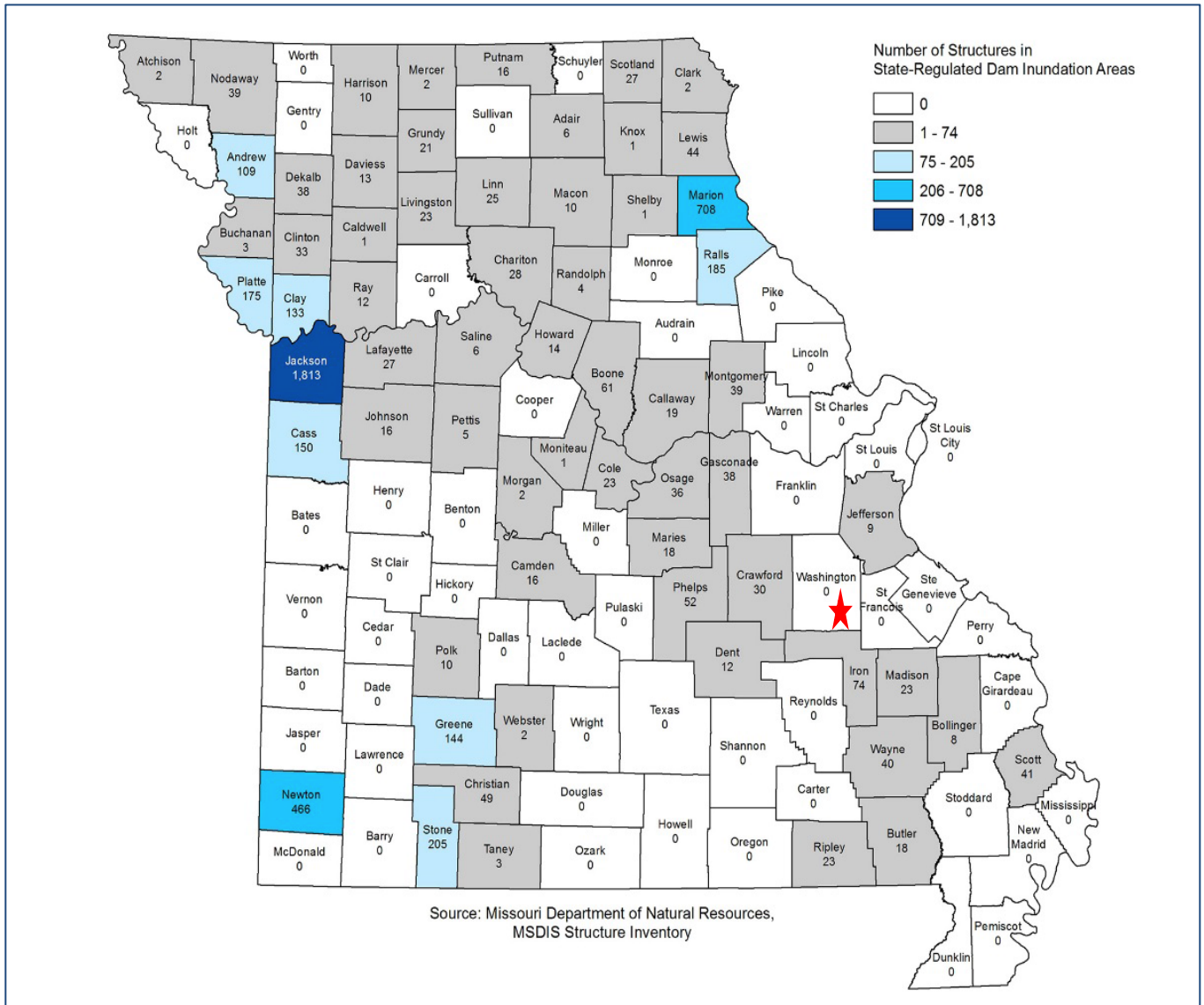
- For State-regulated Class 1 and Class 2 dams that have available inundation maps as well as USACE dams for which inundation maps were made available, GIS comparative analysis was accomplished against the building exposure data to determine the types, numbers and estimated values of buildings at risk to dam failure.
- The building exposure data was based on the structure inventory data layer available from the Missouri Spatial Data Inventory Service (MSDIS). The available dam inundation areas were compared against the structure inventory to determine the numbers and types of structures at risk to dam failure.
- To calculate estimated values of buildings at risk, buildings values available in the HAZUS census block data were used to determine an average value for each property type. This average value per property type was then applied to the number of structures in dam inundation areas by type to calculate an overall estimated value of buildings at risk by type.<sup>16</sup>

**Figure 3.21** and **Figure 3.22** depict the total estimated building losses and population exposure by county, respectively. The estimated building losses from failure of State-regulated dams is \$0. The estimated population exposure to failure of State-regulated dams ranges between 0.

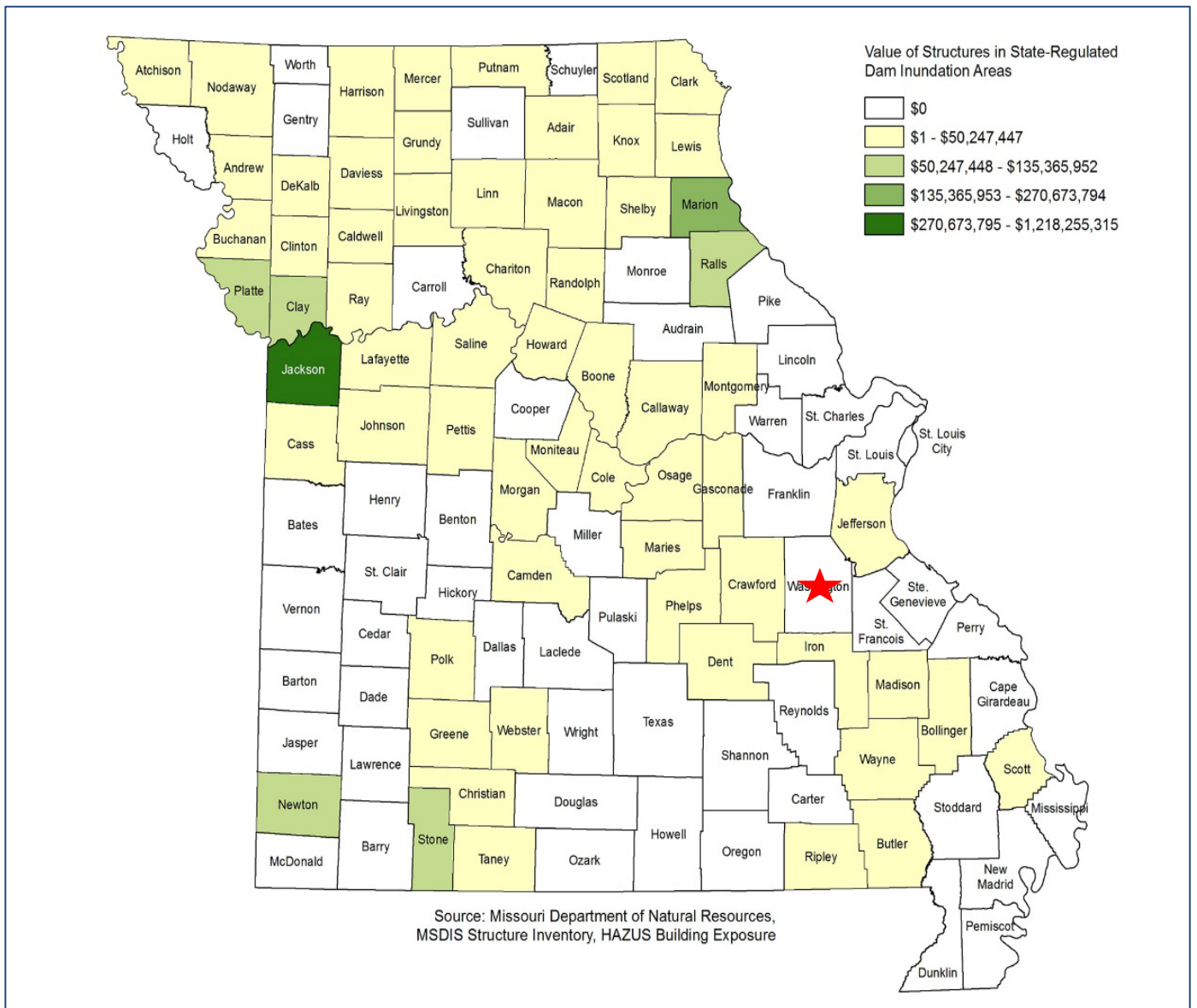
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<sup>16</sup> 2018 Missouri State Hazard Mitigation Plan

**Figure 3.20. Estimated Number of Buildings Vulnerable to Failure of State-regulated Dams**

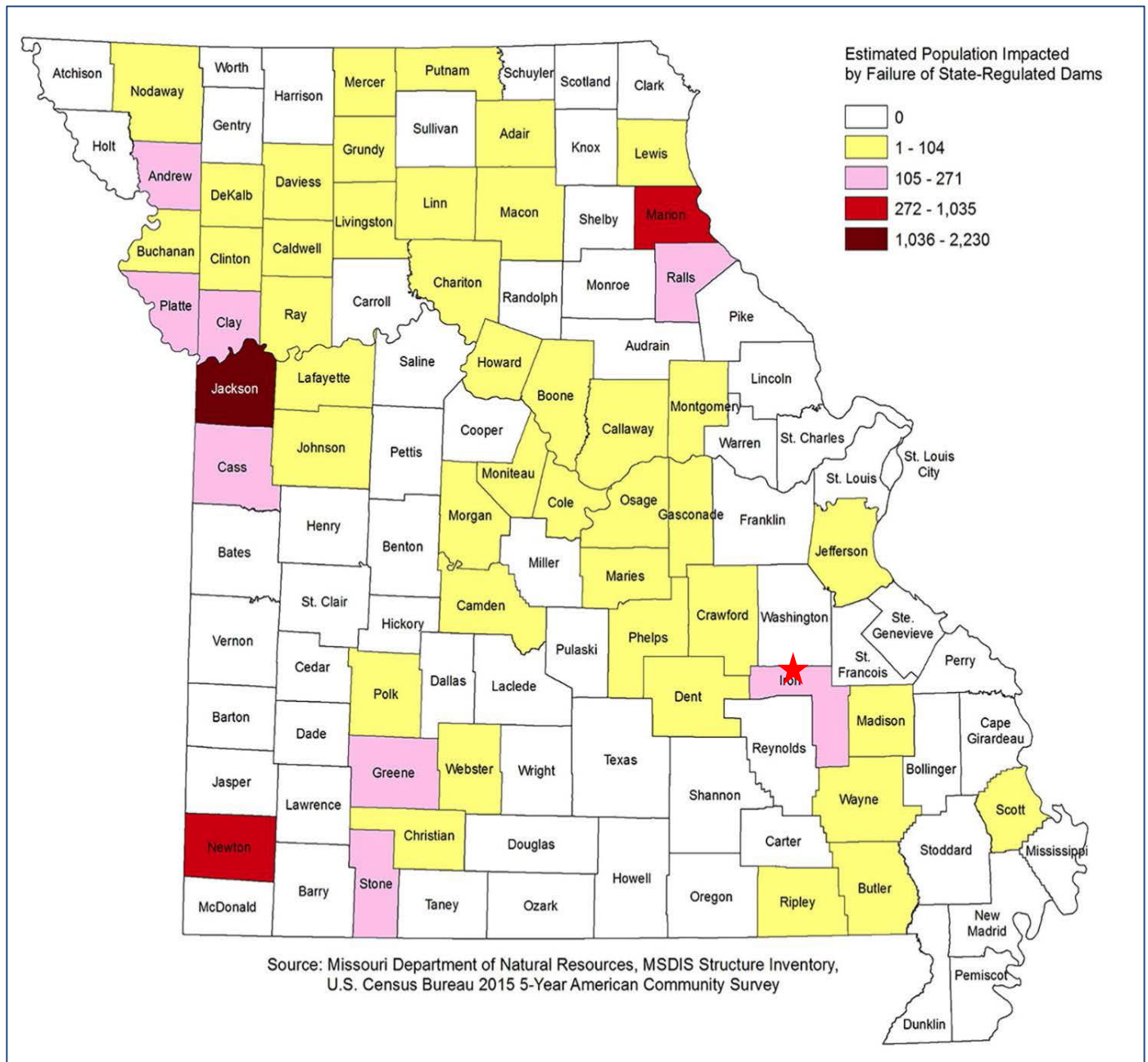


**Figure 3.21. Estimated Building Losses from Failure of State-regulated Dams**



Source: 2018 Missouri State Hazard Mitigation Plan – DNR, MSDIS, Hazus  
 \*Red star indicates Washington County

**Figure 3.22. Estimated Population Exposure to Failure of State-regulated Dams**



Source: 2018 Missouri State Hazard Mitigation Plan – DNR, MSDIS, Census Bureau  
 \*Red star indicates Washington County

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

The most obvious worst case dam failure scenario would occur at any High Hazard/Class 1 dam. During a failure event, serious loss to road infrastructure, commercial and residential structures, and human life is likely. However, the majority of dams in Washington County are rural in nature.

**Ashley Branch Dam Downstream Crossings**

- Ashley Rd

- 
- Anthonies Mill Rd.
  - Rte. N
  - Rte. W
  - Brazil Rd.
  - Thickety Ford Rd.
  - Carter Creek Rd.
  - Sappington Bridge Rd.

#### **Crystal Lake Dam Downstream Crossings**

- Ashley Rd
- Anthonies Mill Rd.
- Rte. N
- Rte. W
- Brazil Rd.
- Thickety Ford Rd.
- Carter Creek Rd.
- Sappington Bridge Rd

#### **Emerald Lake Dam Downstream Crossings**

- Leisure Dr.
- Rte. N
- Rte. W

#### **Forest Lake Dam Downstream Crossing**

- Rte. AA
- Pleasant Hill Rd.
- State Hwy 185
- Rte. F

#### **Gibson Memorial Dam Downstream Crossing**

- Sayersbrook Dam Rd.
- Sayersbrook Rd.
- Fourche Renault Rd.
- Kline Farm Rd.
- State Hwy 185
- Missouri Pacific Railroad
- Lick Skillet Rd.
- Rte. F

#### **Keuss Dam Downstream Crossing**

- Rte. H
- Still Creek Pass
- Thunder Ridge Rd
- Floras Pl
- South Bridge Rd
- Buckeye Rd
- Brook Hollow Rd
- Rte. WW
- Pillen Rd

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### **Lac Shayne Dam Downstream Crossing**

- Shayne Dr
- St Francois Rd
- State Hwy 8
- Benny Meyer Rd
- Glore Rd

### **Lake Apache Dam Downstream Crossing**

- Apache Rd
- Scout Camp Rd
- State Hwy M
- Elm St
- SGM Patrick R Hurley Dr

### **Sayersbrook Dam Downstream Crossing**

- Sayersbrook Dam Rd.
- Sayersbrook Rd.
- Fourche Renault Rd.
- Kline Farm Rd.
- State Hwy 185
- Missouri Pacific Railroad
- Lick Skillet Rd.
- Rte. F

### **Sunnen Dam Downstream Crossing**

- Rte. AA
- Floyd Tower Rd
- Sayersbrook Rd.
- Fourche Renault Rd.
- Kline Farm Rd.
- State Hwy 185
- Missouri Pacific Railroad
- Lick Skillet Rd.
- Rte. F

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

Future development within the County that has potential to be influenced by dam failure includes any areas downstream of a dam within the 100 Year Floodplain. No development is planned in any floodplain or areas downstream of dams in the county or cities.

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

Variations in vulnerability across the planning area depend upon multiple variables. For example, with 57 state-regulated dams and 86 NID high hazard dams, conclusions can be drawn that many of the high hazard dams in the county are un-regulated and may not be inspected/maintained appropriately. Kingston K-14 School District has assets located in two tailings dam inundation areas. Other jurisdictions have road and utility infrastructure assets located in dam breach inundation areas. Most dams within the county are rural in nature.

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## **Problem Statement**

In summary, the hazard risk for dam failure in Washington County ranges between high and low, dependent upon the dam. If a dam does fail, the expected impacts could vary from negligible to critical, and could potentially affect road infrastructure, residential structures, commercial buildings, public structures, and human life. It is recommended to encourage land use management practices to decrease the potential for damage from a dam collapse, including the discouragement of development in areas with the potential for sustaining damage from a dam failure. Installation of education programs to inform the public of dam safety measures and preparedness activities would be beneficial. In addition, the availability of training programs to encourage landowners how to properly inspect their dams and develop emergency action plans would be advantageous.

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### 3.4.2 Drought

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.6, Page 3.235
- Maps of effects of drought, National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln; <http://www.drought.unl.edu/>.
- Historical drought impacts, National Drought Mitigation Center (NDMC) located at the University of Nebraska in Lincoln; at <http://droughtreporter.unl.edu/>.
- Recorded low precipitation, NOAA Regional Climate Center, (<http://www.hprcc.unl.edu/>).
- Water shortages, Missouri's Drought Response Plan, Missouri Department of Natural Resources, <https://dnr.mo.gov/water/how-water/state-water/drought>
- Populations served by groundwater by county, USGS-NWIS, <http://maps.waterdata.usgs.gov/mapper/index.html>
- Census of Agriculture, [https://agcensus.library.cornell.edu/census\\_parts/2012-missouri/](https://agcensus.library.cornell.edu/census_parts/2012-missouri/)
- USDA Risk Management Agency, Insurance Claims, <https://www.rma.usda.gov/en/Information-Tools/Summary-of-Business/Cause-of-Loss>
- Natural Resources Defense Council, <http://www.nrdc.org/globalWarming/watersustainability/>
- Missouri Department of natural Resources (MDNR), Drought News, Conditions and Resources
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0jqF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Vulnerability to drought by County
  - Crop insurance claims due to drought by County

### **Hazard Profile**

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

Drought is generally defined as a condition of moisture levels significantly below normal for an extended period of time over a large area that adversely affects plants, animal life, and humans. A drought period can last for months, years, or even decades. There are four types of drought conditions relevant to Missouri, according to the 2018 Missouri State Hazard Mitigation Plan, which are as follows.

- Meteorological drought is defined in terms of the basis of the degree of dryness (in comparison to some "normal" or average amount) and the duration of the dry period. A meteorological drought must be considered as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.
- Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts also are out of phase with impacts in other economic sectors.

- Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.
- Socioeconomic drought refers to when physical water shortage begins to affect people<sup>17</sup> - which impacts supply and demand of some economic commodity.

### ***Geographic Location***

All areas and jurisdictions in Washington County are susceptible to drought, but particularly cities where thousands of residents are served by the same source of water. These cities use deep hard rock wells that are 1,100 to 1,800 feet deep and can experience drought when recharge of these wells is low. The majority of individuals living in Washington County rely on groundwater resources, often private wells, for drinking water. Approximately 21% of the land in the county is utilized for agricultural purposes. Furthermore, livestock sales comprise 84% of the market of agricultural products sold in Washington County. A drought would directly impact livestock production and the agriculture economy in Washington County<sup>18</sup>.

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

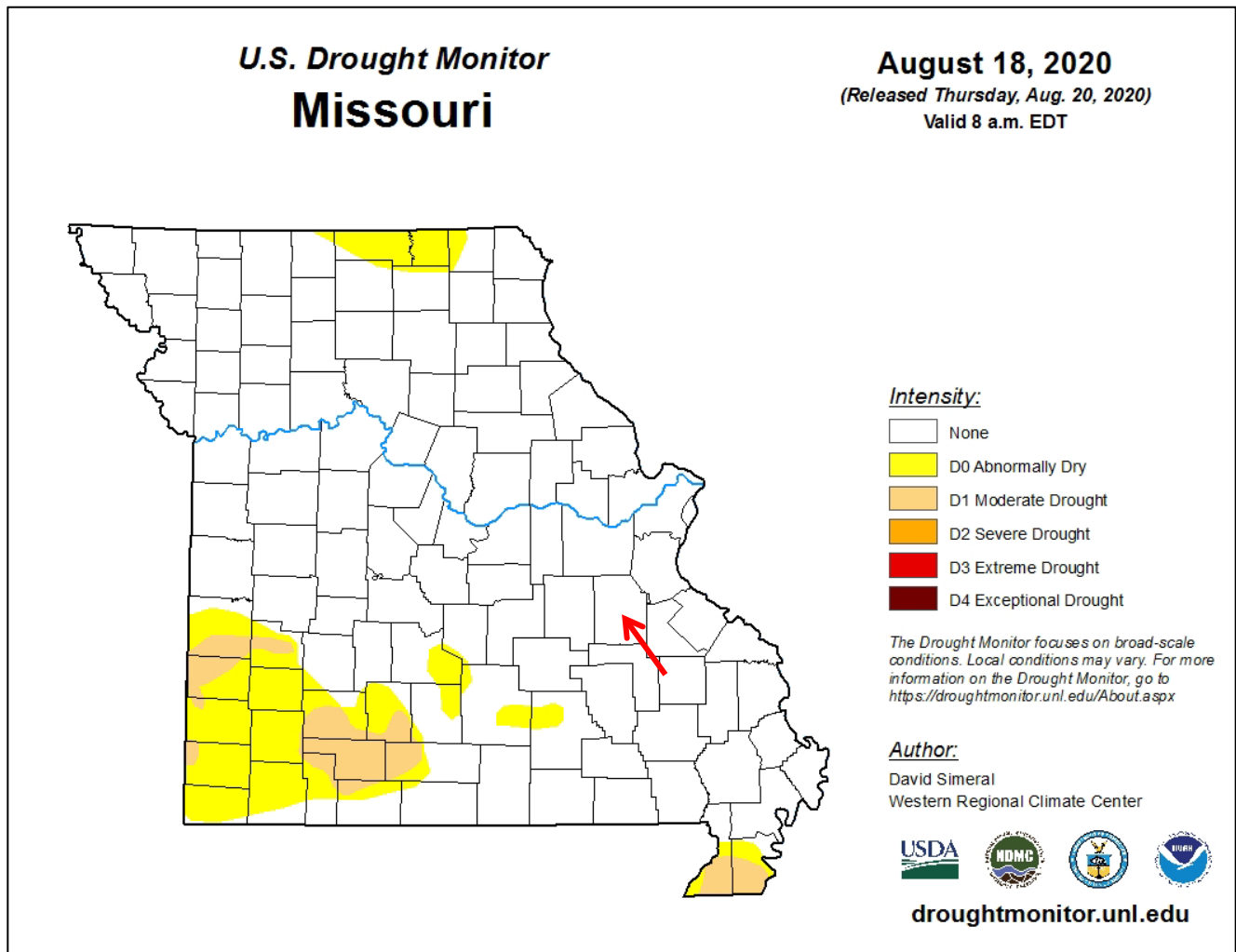
The National Drought Monitor Center at the University of Nebraska at Lincoln summarized the potential severity of drought as follows. Drought can create economic impacts on agriculture and related sectors, including forestry and fisheries, because of the reliance of these sectors on surface and subsurface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

**Figure 3.23** depicts a U.S. Drought Monitor map of Missouri on August 18, 2020. This map illustrates the planning area, which could be in drought at any given moment in time. A red arrow indicates the location of the planning area (Washington County).

<sup>17</sup> <http://www.drought.unl.edu/> <http://droughtreporter.unl.edu/>

<sup>18</sup> [http://www.agcensus.usda.gov/Publications/2012/Online\\_Resources/County\\_Profiles/Missouri/cp29161.pdf](http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Missouri/cp29161.pdf)

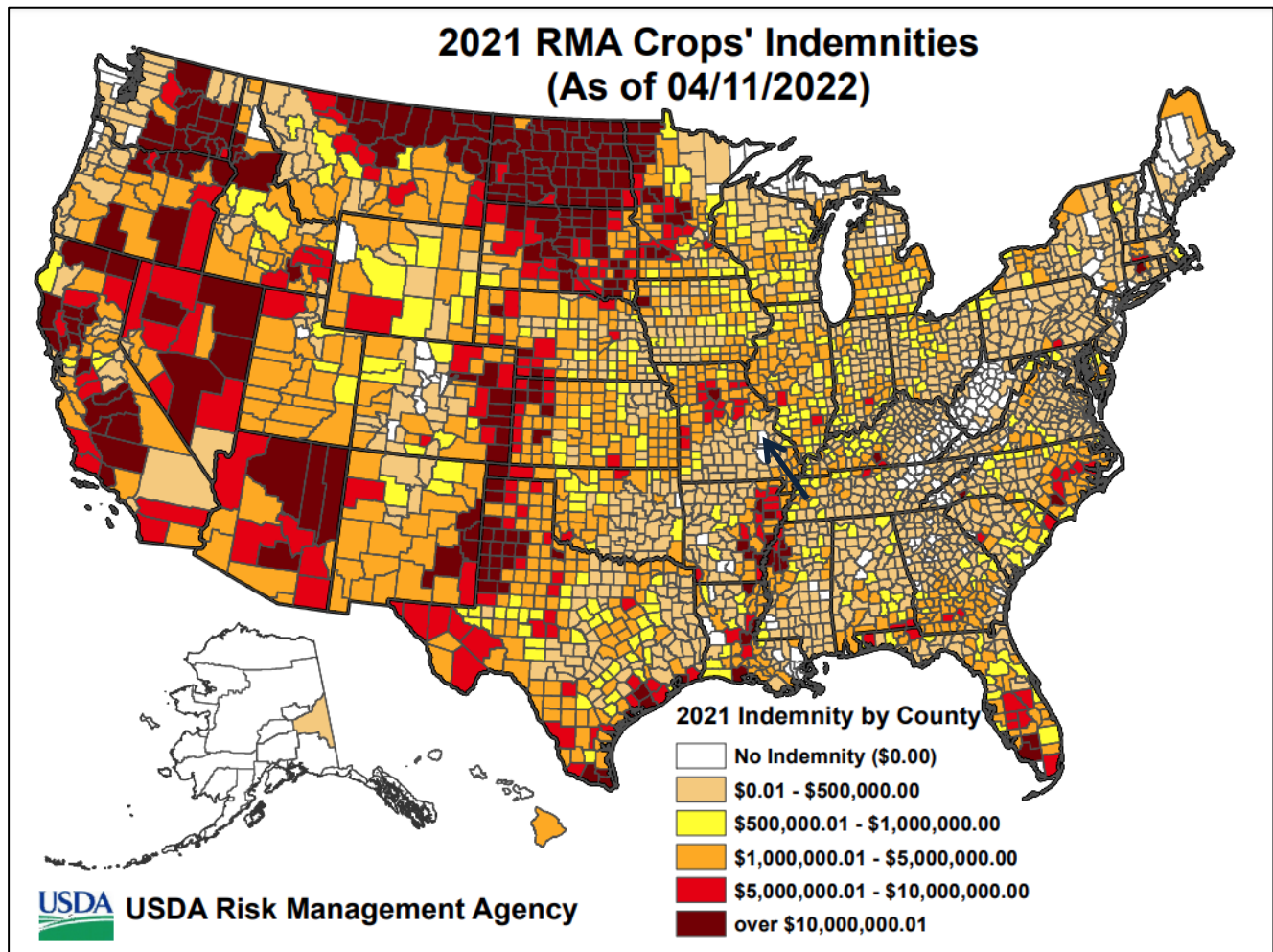
**Figure 3.23. U.S. Drought Monitor Map of Missouri on August 18, 2020**



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

**Figure 3.24** illustrates RMA crop indemnities for 2021 across the United States. Washington County fell in the \$0 category for crop indemnities.

**Figure 3.24. 2021 RMA Crop Indemnities for the United States**



Source: <https://www.rma.usda.gov/-/media/RMA/Maps/Total-Crop-Indemnity-Maps/Crop-Year-2021/041122map.ashx>

\*Black arrow indicates Washington County

According to the USDA's Risk Management Agency, there has been 1 crop insurance payments due to drought in Washington County since 2001, totaling \$4,590.00. **Table 3.22** illustrates the year, number of payments, and total amount of crop insurance payments.

**Table 3.22. Washington County Crop Indemnity Payments (1999-2019)**

Year	Number of Payments	Total
2018	1	\$4590.00
<b>TOTAL</b>	<b>1</b>	<b>\$4,590.00</b>

Source: <http://www.rma.usda.gov/en/Information-Tools/Summary-of-Business/Cause-of-Loss>

The Palmer Drought Indices measure dryness based on recent precipitation and temperature. The indices are based on a "supply-and-demand model" of soil moisture. Calculation of supply is relatively straightforward, using temperature and the amount of moisture in the soil. However, demand is more complicated as it depends on a variety of factors, such as evapotranspiration and recharge rates. These rates are harder to calculate. Palmer tried to overcome these difficulties by developing an

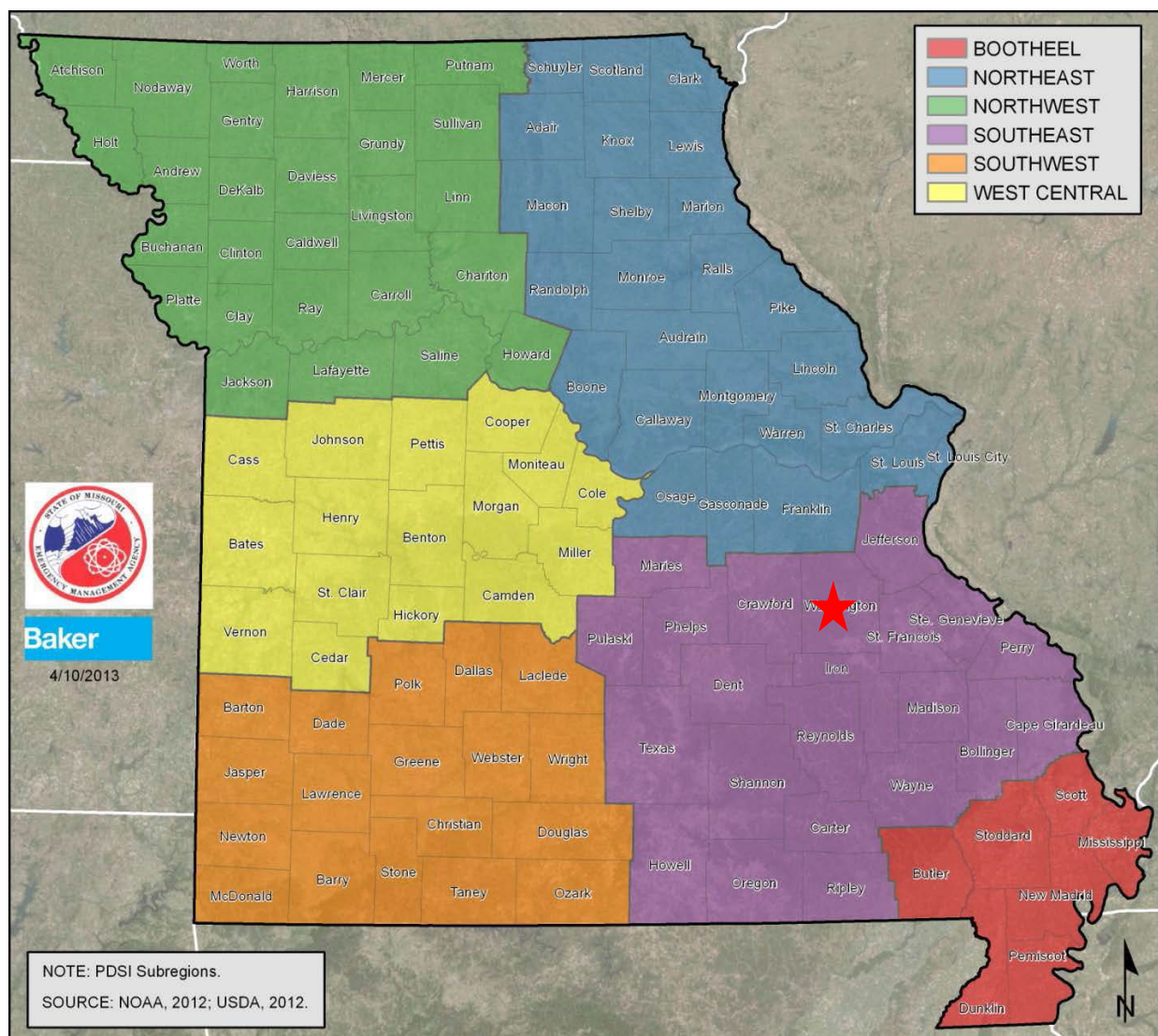
algorithm that approximated these rates and based the algorithm on the most readily available data — precipitation and temperature.

The Palmer Index has proven most effective in identifying long-term drought of more than several months. However, the Palmer Index has been less effective in determining conditions over a matter of weeks. It uses a “0” as normal, and drought is shown in terms of negative numbers; for example, negative 2 is moderate drought, negative 3 is severe drought, and negative 4 is extreme drought. Palmer’s algorithm also is used to describe wet spells, using corresponding positive numbers.

Palmer also developed a formula for standardizing drought calculations for each individual location based on the variability of precipitation and temperature at that location. The Palmer index can therefore be applied to any site for which sufficient precipitation and temperature data is available.

**Figure 3.25** illustrates the Palmer Drought Severity Index sub-regions of Missouri. Washington County is categorized under the Southeast sub-region.

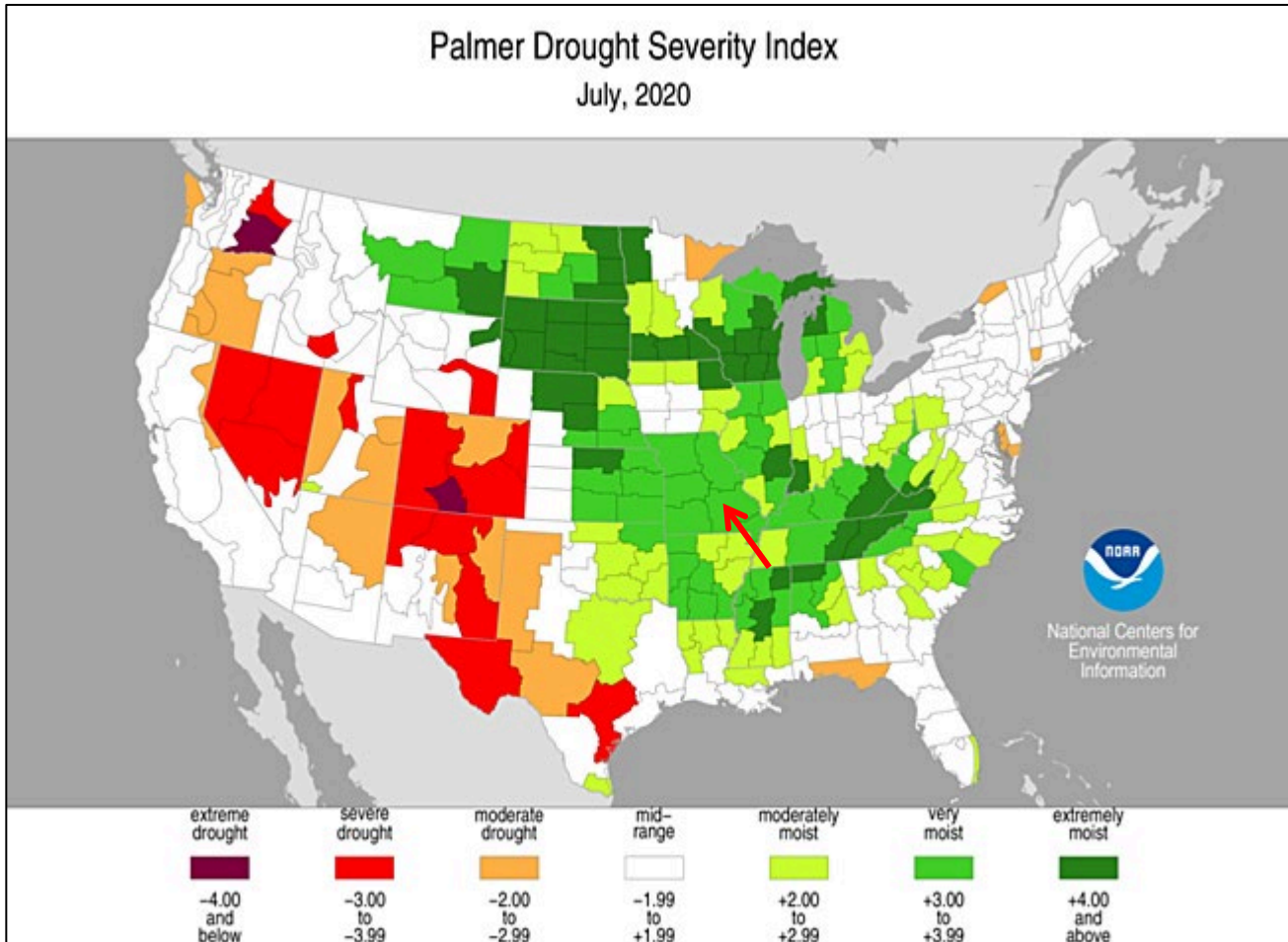
**Figure 3.25. Palmer Drought Severity Index: Missouri Sub-regions**



Source: 2018 Missouri State Hazard Mitigation Plan; \*Red star indicates Washington County

Figure 3.26 is an example of the Palmer Modified Drought Index for the United States on July, 2020.

**Figure 3.26. Palmer Modified Drought Index National Map July, 2020**



Source: <http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/>; \*Red arrow indicates Washington County

Data was collected from the Missouri Department of Natural Resources (2021 Census of Missouri Public Water Systems) to determine water source by jurisdiction. Washington County and the cities of Caledonia, Irondale, Mineral Point, and Potosi utilize well water as their sole source of water (**Table 3.23**). Communities that exclusively depend upon ground water could experience hardship in the event of a long term drought.

**Table 3.23. 2021 Water Source by Jurisdiction**

Jurisdiction	% of source that is groundwater
Washington County	100
Caledonia	100
Irondale	100
Mineral Point	100
Potosi	100

### Previous Occurrences

**Table 3.24** offers Palmer Drought Severity Index data for Washington County between 2011 and 2020. This information exemplifies drought conditions on a monthly basis for Missouri’s Southeast sub-region within the United States.

**Table 3.24. Palmer Drought Severity Index for Washington County, MO (2011 – 2020)**

	Year									
Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
<b>Jan.</b>	Extremely moist	Mid-range	Mid-range	Moderate Drought	Moderately moist	Extremely moist	Mid-range	Moderate drought	Mid-range	Extremely moist
<b>Feb.</b>	Extremely moist	Mid-range	Mid-range	Moderate Drought	Moderately moist	Very moist	Mid-range	Mid-range	Moderately moist	Very moist
<b>March</b>	Extremely moist	Mid-range	Mid-range	Moderate Drought	Mid-range	Very moist	Mid-range	Mid-range	Moderately moist	Very moist
<b>April</b>	Very moist	Mid-range	Moderately moist	Mid-range	Mid-range	Moderately moist	Mid-range	Mid-range	Moderately moist	Very moist
<b>May</b>	Very moist	Mid-range	Very moist	Mid-range	Mid-range	Moderately moist	Mid-range	Mid-range	Very moist	Very moist
<b>June</b>	Very moist	Moderate drought	Very moist	Mid-range	Very moist	Mid-range	Mid-range	Mid-range	Very moist	Very moist
<b>July</b>	Mid-range	Severe drought	Mid-range	Mid-range	Extremely moist	Mid-range	Mid-range	Moderate drought	Very moist	Very moist
<b>Aug.</b>	Mid-range	Extreme drought	Mid-range	Mid-range	Extremely moist	Very moist	Mid-range	Mid-range	Extremely moist	Very moist
<b>Sept.</b>	Mid-range	Severe drought	Mid-range	Moderately moist	Very moist	Very moist	Mid-range	Mid-range	Very moist	Very moist
<b>Oct.</b>	Moderate drought	Severe drought	Mid-range	Very moist	Moderately moist	Moderately moist	Mid-range	Mid-range	Very moist	Moderately moist
<b>Nov.</b>	Mid-range	Severe drought	Mid-range	Very moist	Very moist	Mid-range	Mid-range	Mid-range	Very moist	Moderately moist
<b>Dec.</b>	Mid-range	Severe drought	Moderate drought	Moderately moist	Extremely moist	Mid-range	Moderate drought	Mid-range	Very moist	Mid-range

Source: <https://www.ncei.noaa.gov/access/monitoring/historical-palmers/maps/psi/201101-202012>

### Probability of Future Occurrence

To calculate the probability of future occurrence of drought in Washington County, historical climate data was analyzed. There were 32 months of recorded drought (**Table 3.25**) over a 20-year span (January, 2001 to December, 2020). The number of months in drought (32) was divided by the total number of months (240) and multiplied by 100 for the annual average percentage probability of drought (**Table 3.26**). Although drought is not predictable, long-range outlooks and predicted impacts of climate change could indicate an increase change of drought.

**Table 3.25. Palmer Drought Severity Index for Washington County, MO (2001 – 2020)**

Month	Year											
	January	February	March	April	May	June	July	August	September	October	November	December
2001												
2002												
2003	x	x	x									
2004												
2005							x				x	x
2006	x	x	x	x	x	x	x	x	x			
2007										x	x	
2008												
2009												
2010												
2011										x		
2012						x	x	x	x	x	x	x
2013												x
2014	x	x	x									
2015												
2016												
2017												x
2018	x						x					
2019												
2020												

Source: <https://www.ncei.noaa.gov/access/monitoring/historical-palmers/maps/psi/200101-202012>

\*x indicates drought

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**Table 3.26. Annual Average Percentage Probability of Drought in Washington County, MO**

Location	Annual Avg. % P of Drought
Washington County	13.3%

Source: NOAA National Centers for Environmental Information, Historical Palmer Drought Indices

\*P = probability; see page 3.44 for definition.

## **Vulnerability**

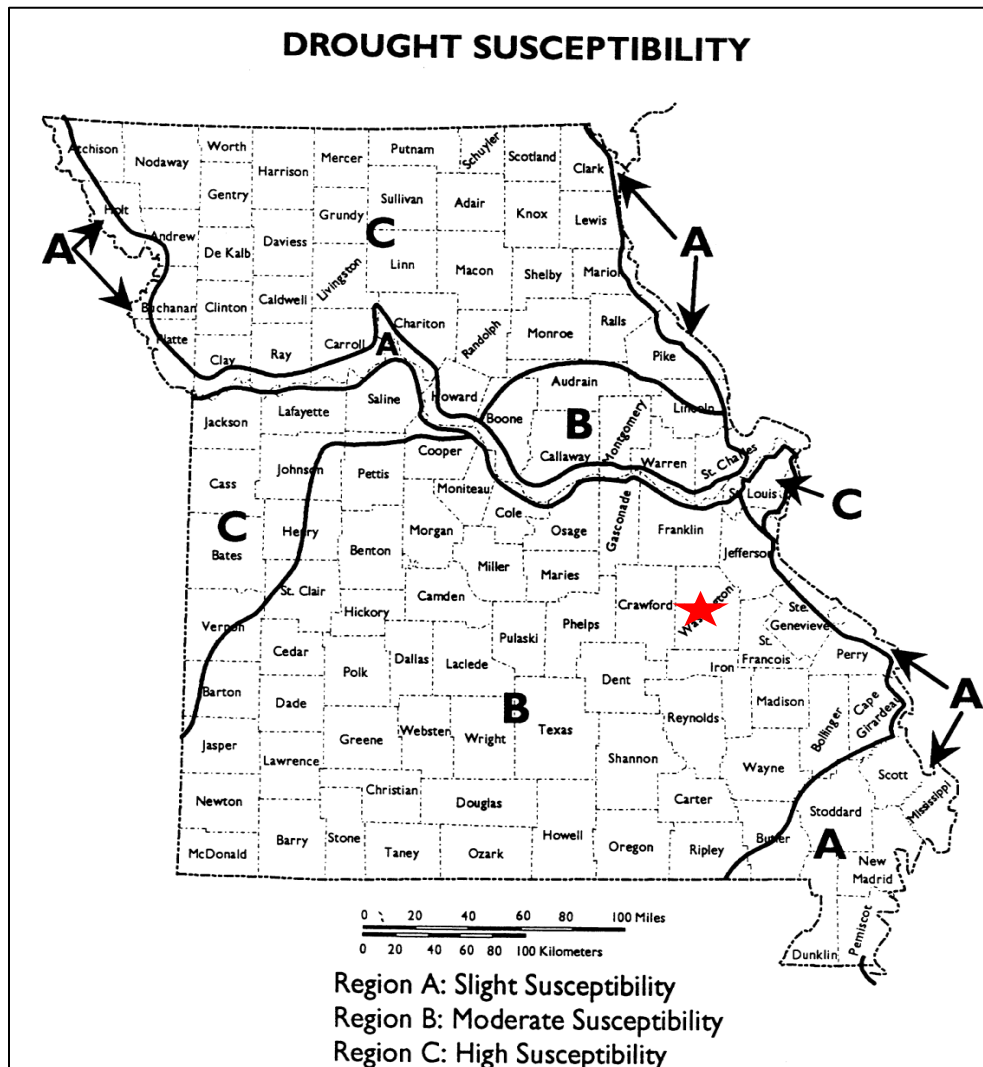
### ***Vulnerability Overview***

Data was obtained from the 2018 Missouri State Hazard Mitigation Plan for the drought vulnerability analysis. **Table 3.27** depicts the ranges for drought vulnerability factor ratings created by SEMA. The array ranges between 1 (low) and 5 (high). The factors considered include social vulnerability, crop exposure ratio, annualized crop claims paid and likelihood of occurrence. Once the ranges were determined and applied to all factors considered in the analysis, the ratings were combined to determine an overall vulnerability rating for drought. Washington County is determined as having a low vulnerability to crop loss (**Table 3.28**) as a result of a drought. Additionally, SEMA has divided the State into 3 regions in regards to drought susceptibility (**Figure 3.27**). Washington County is included in Region B (Moderate Susceptibility). Region B is described as having groundwater sources that are suitable in meeting domestic and municipal water needs, but due to required well depths, irrigation wells are very expensive. Also, the topography is commonly unsuitable for row-crop irrigation<sup>19</sup>.

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<sup>19</sup> 2018 Missouri State Hazard Mitigation Plan

**Figure 3.27. Drought Susceptibility in Missouri**



**Table 3.27. Ranges for Drought Vulnerability Factor Ratings**

Factors Considered	Low (1)	Medium-low (2)	Medium (3)	Medium-high (4)	High (5)
<b>Social Vulnerability Index</b>	1	2	3	4	5
<b>Crop Exposure Ratio Rating</b>	\$866,000 - \$10,669,000	\$10,669,001 - \$33,252,000	\$33,252,001 - \$73,277,000	\$73,277,001 - \$155,369,000	\$155,369,001 - \$256,080,000
<b>Annualized USDA Crop Claims Paid</b>	<\$340,000	\$340,000 - \$669,999	\$670,000 - \$999,999	\$1M - \$1,299,999	>\$1,300,000
<b>Likelihood of Occurrence of Severe or Extreme Drought</b>	1-1.9%	2-3.9%	4-5.9%	6-8.9%	9-10.72%
<b>Total Drought Vulnerability Rating</b>	7-8	9-10	11-12	13-14	15-17

Source: 2018 Missouri State Hazard Mitigation Plan

**Table 3.28. Vulnerability of Washington County to Drought**

SOVI index rating	USDA RMA Total Drought Crop Claims	Avg Annualized Crop Claims	USDA Claims Rating	2012 Crop Exposure	Crop Exposure Rating	Likelihood of severe drought %	Drought occurrence rating	Total Rating	Total rating (text) drought
3	\$0	\$0	1	\$2,301,000	1	6.42	4	9	Low-medium

Source: 2018 Missouri State Hazard Mitigation Plan

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

Drought is not limited to a hazard that affects just agriculture but can extend to encompass the nation's whole economy. Its impact can adversely affect a small town's water supply, the corner grocery store, commodity markets, or tourism. Additionally, extreme droughts have the ability to damage roads, water mains, and building foundations. On average, drought costs the U.S. economy about \$7 billion to \$9 billion a year, according to the National Drought Mitigation Center. Moreover, drought prone regions are also prone to increased fire hazards<sup>20</sup>.

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

Impacts of drought on future development within Washington County would be negligible. Population projections as provided by the Missouri Office of Administration suggest that Washington County will increase by approximately 2,500 individuals by 2030<sup>21</sup>. Moreover, with an increasing population, water use and demand would be expected to increase as well; potentially straining the water supply systems. Long term drought could expose vulnerabilities during construction/upgrades of water distribution and sewer infrastructures. Furthermore, any agriculture related development in terms of crop or livestock production would also be at risk.

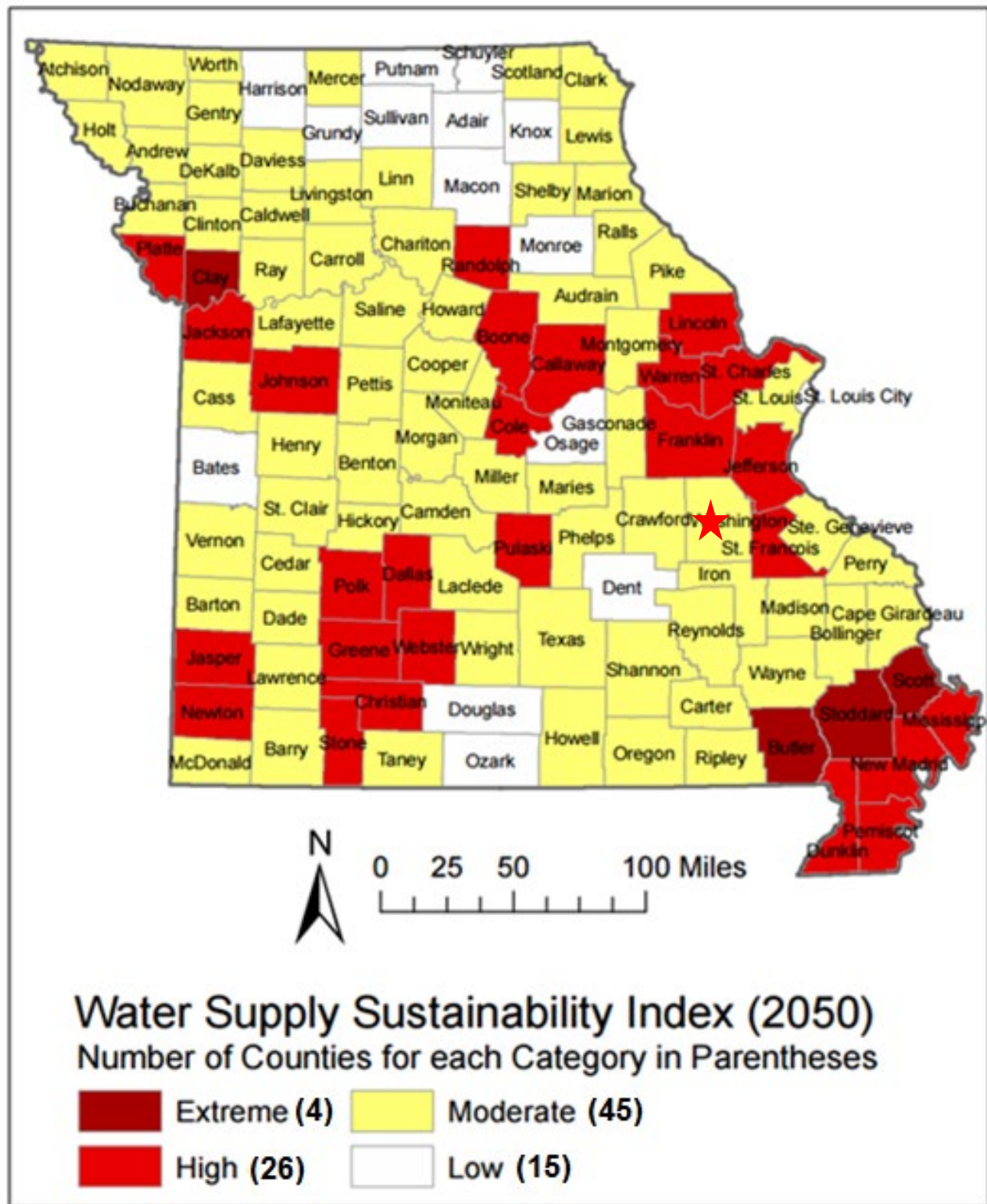
### ***Impact of Climate Change***

A new analysis, performed for the Natural Resources Defense Council, examined the effects of climate change on water supply and demand in the contiguous United States. The study found that more than 1,100 counties will face higher risks of water shortages by mid-century as a result of climate change. Two of the principal reasons for the projected water constraints are shifts in precipitation and potential evapotranspiration (PET). Climate models project decreases in precipitation in many regions of the U.S., including areas that may currently be described as experiencing water shortages of some degree. Washington County is predicted to experience moderate water shortages as a result of global warming (**Figure 3.28**) by the year 2050.

<sup>20</sup> <https://drought.unl.edu/>

<sup>21</sup> Missouri Office of Administration <https://mcdc.missouri.edu/applications/MO-county-factsheets/?c=29221>

Figure 3.28. Water Supply Sustainability Index (2050) with Climate Change Impacts



Source: Natural Resources Defense Council (NRDC), Climate Change, Water, and Risk  
 \*Red star indicates Washington County

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

The variations between jurisdictions are non-existent to minimal. All communities in Washington County utilize ground/well water as their water source. In all cities, drought conditions would be the same as those experienced in rural areas, but the magnitude would be different with only lawns and local gardens impacted. Long term drought, spanning months at a time, could negatively impact the amount of potable drinking water available.

### **Problem Statement**

In summary, drought within Washington County is considered low-moderate risk. Climate change predictions also suggest low-moderate risks by the year 2050. Washington County has some agricultural economy. Drought would impact commodities, specifically livestock and crops. Potential impacts to local economies and infrastructures are foreseeable in the event of a long-term drought.

The county and all cities should develop water monitoring plans as an early warning system. Each sector should inventory and review their groundwater operation plans. A water conservation awareness program should be presented to the public either through pamphlets, workshops or a drought information center. Voluntary water conservation should be encouraged to the public. The county and both cities should continually look for and fund water system improvements, new systems, and new wells.

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### 3.4.3 Earthquakes

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.4, Page 3.192
- U.S. Seismic Hazard Map, United States Geological Survey, <https://www.usgs.gov/programs/earthquake-hazards/maps>;
- Impact of Earthquakes on the Central USA  
[http://www.cusec.org/documents/aar/NMSZ\\_CAT\\_PLANNING\\_SCENARIO.pdf](http://www.cusec.org/documents/aar/NMSZ_CAT_PLANNING_SCENARIO.pdf)
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0JgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Total population impacted by earthquakes by County
  - Total number of structures impacted by earthquakes by County
  - Total value of structures impacted by earthquakes by County
  - Property loss ratio to earthquakes by County
- 6.5 Richter Magnitude Earthquake Scenario, New Madrid Fault Zone map, <https://iowageologicalsurvey.org/>;
- Facts about the New Madrid Seismic Zone, <https://dnr.mo.gov/land-geology/hazards/earthquakes/science/facts-new-madrid-seismic-zone>

#### **Hazard Profile**

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

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

The closest fault to Washington County is the New Madrid Seismic Zone (NMSZ). The NMSZ is the most active seismic area in the United States east of the Rocky Mountains. Unfortunately, the faults in the NMSZ are poorly understood due to concealment by alluvium deposits. Moreover, the NMSZ is estimated to be 30 years overdue for a 6.3 magnitude earthquake<sup>22</sup>.

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

There are eight earthquake source zones in the Central United States, one of which is located within the state of Missouri—the New Madrid Fault. Other seismic zones, because of their close proximity, also affect Missourians. These are the Wabash Valley Fault, Illinois Basin, and the Nemaha Uplift. The most active zone is the New Madrid Fault, which runs from Northern Arkansas through Southeast Missouri and Western Tennessee and Kentucky to the Illinois side of the Ohio River Valley.

**Figure 3.29** depicts impact zones for a magnitude 7.6 earthquake along the New Madrid Fault along with associated Modified Mercalli Intensities. Washington County is indicated by a red star.

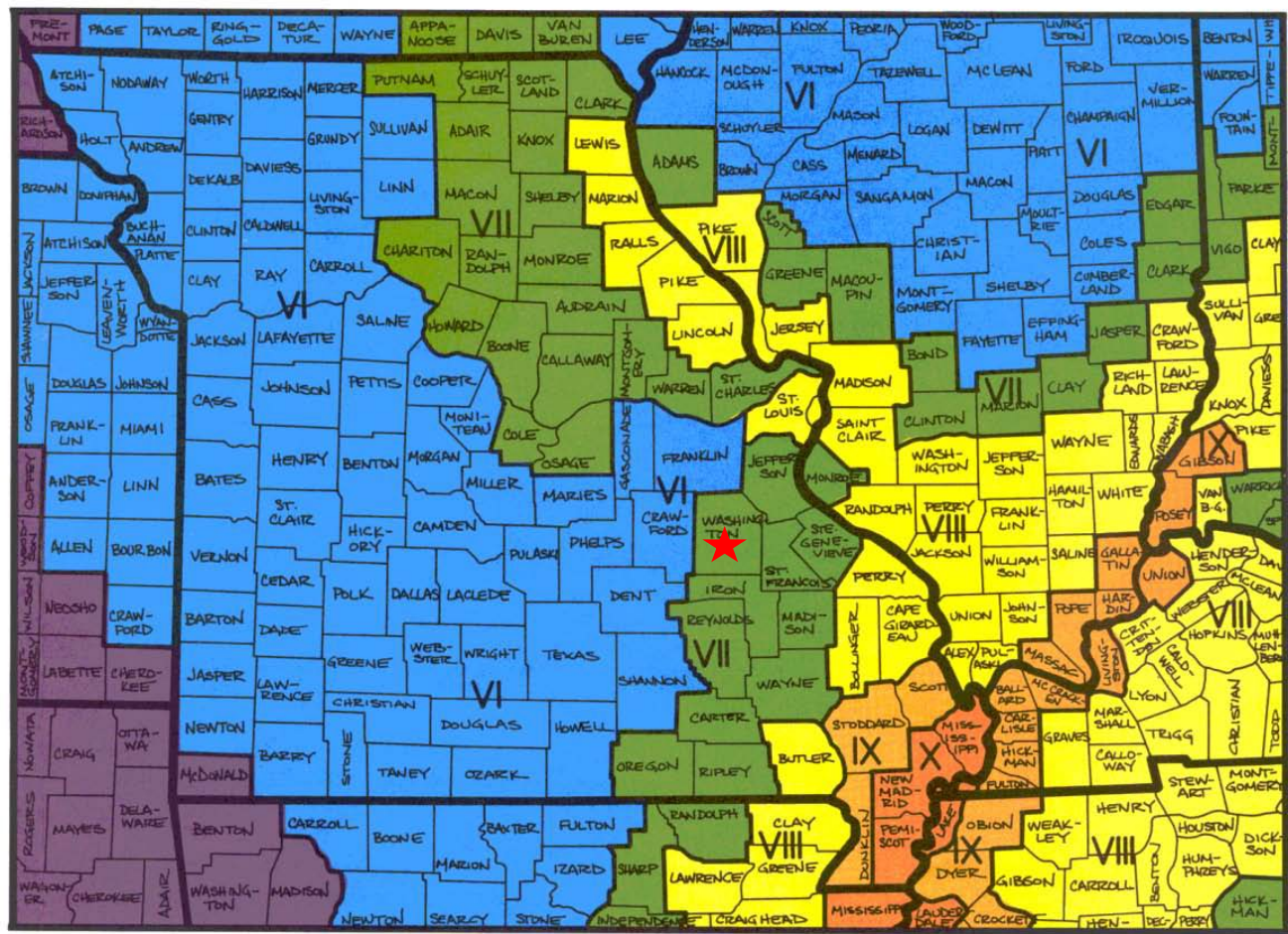
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<sup>22</sup> Missouri Department of Natural Resources, Facts about the New Madrid Seismic Zone

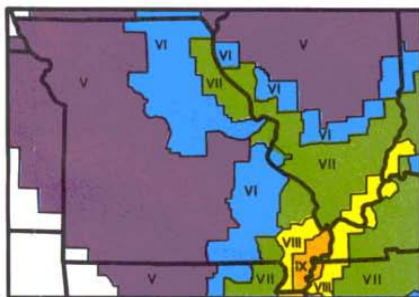
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Furthermore, the Modified Mercalli Intensities for potential 6.7 and 8.6 magnitude earthquakes are illustrated. In the event of a 6.7 magnitude earthquake, Washington County would experience a Modified Mercalli Intensity of VI (**Figure 3.30**). This intensity is categorized as being felt by everyone. Poorly built buildings are damaged slightly. Considerable quantities of dishes and glassware, and some windows are broken. People have trouble walking. Pictures fall off walls. Objects fall from shelves. Plaster in walls might crack. Some furniture is overturned. Small bells in churches, chapels, and schools ring. Additionally, in the occurrence of 7.6 and 8.6 magnitude earthquakes; the county would experience Modified Mercalli Intensities of VII and VIII respectively. There will actually be a range in intensities within any small area such as a town or county, with the highest intensity generally occurring at only a few sites. **Figure 3.30** and **Table 3.29** further define Richter Scale intensities.

**Figure 3.29. Impact Zones for Earthquake Along the New Madrid Fault**

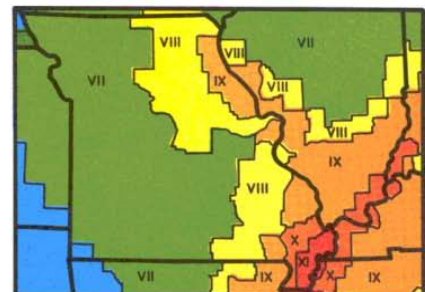


This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude – 7.6 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.



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: [sema.dps.mo.gov](http://sema.dps.mo.gov); \*Red star indicates Washington County

**Figure 3.30. Projected Earthquake Intensities**

<b>MODIFIED MERCALLI INTENSITY SCALE</b>	
I	People do not feel any Earth movement.
II	A few people might notice movement.
III	Many people indoors feel movement. Hanging objects swing.
IV	Most people indoors feel movement. Dishes, windows, and doors rattle. Walls and frames of structures creak. Liquids in open vessels are slightly disturbed. Parked cars rock.
V	Almost everyone feels movement. Most people are awakened. Doors swing open or closed. Dishes are broken. Pictures on the wall move. Windows crack in some cases. Small objects move or are turned over. Liquids might spill out of open containers.
VI	Everyone feels movement. Poorly built buildings are damaged slightly. Considerable quantities of dishes and glassware, and some windows are broken. People have trouble walking. Pictures fall off walls. Objects fall from shelves. Plaster in walls might crack. Some furniture is overturned. Small bells in churches, chapels and schools ring.
VII	People have difficulty standing. Considerable damage in poorly built or badly designed buildings, adobe houses, old walls, spires and others. Damage is slight to moderate in well-built buildings. Numerous windows are broken. Weak chimneys break at roof lines. Cornices from towers and high buildings fall. Loose bricks fall from buildings. Heavy furniture is overturned and damaged. Some sand and gravel stream banks cave in.
VIII	Drivers have trouble steering. Poorly built structures suffer severe damage. Ordinary substantial buildings partially collapse. Damage slight in structures especially built to withstand earthquakes. Tree branches break. Houses not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Temporary or permanent changes in springs and wells. Sand and mud is ejected in small amounts.
IX	Most buildings suffer damage. Houses that are not bolted down move off their foundations. Some underground pipes are broken. The ground cracks conspicuously. Reservoirs suffer severe damage.
X	Well-built wooden structures are severely damaged and some destroyed. Most masonry and frame structures are destroyed, including their foundations. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, and lakes. Railroad tracks are bent slightly. Cracks are opened in cement pavements and asphalt road surfaces.
XI	Few if any masonry structures remain standing. Large, well-built bridges are destroyed. Wood frame structures are severely damaged, especially near epicenters. Buried pipelines are rendered completely useless. Railroad tracks are badly bent. Water mixed with sand, and mud is ejected in large amounts.
XII	Damage is total, and nearly all works of construction are damaged greatly or destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move. Lakes are dammed, waterfalls formed and rivers are deflected.

Intensity is a numerical index describing the effects of an earthquake on the surface of the Earth, on man, and on structures built by man. The intensities shown in these maps are the highest likely under the most adverse geologic conditions. There will actually be a range in intensities within any small area such as a town or county, with the highest intensity generally occurring at only a few sites. Earthquakes of all three magnitudes represented in these maps occurred during the 1811 - 1812 "New Madrid earthquakes." The isoseismal patterns shown here, however, were simulated based on actual patterns of somewhat smaller but damaging earthquakes that occurred in the New Madrid seismic zone in 1843 and 1895.

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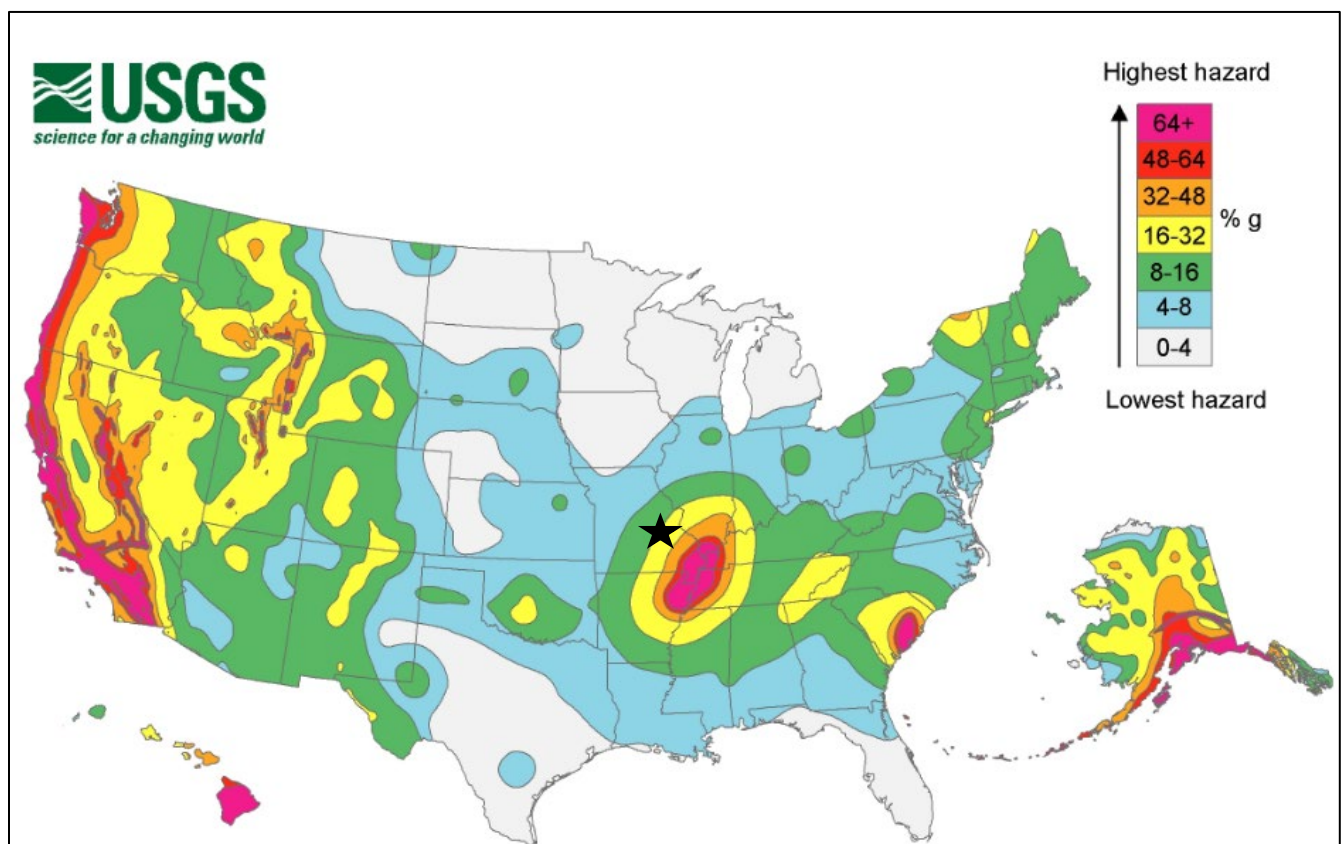
Source: [sema.dps.mo.gov](http://sema.dps.mo.gov)

**Table 3.29. Richter Scale of Earthquake Magnitude**

Magnitude Level	Category	Effects	Earthquake per Year
Less than 1.0 to 2.9	Micro	Generally not felt by people, though recorded on local instruments	More than 100,000
3.0-3.9	Minor	Felt by many people; no damage	12,000-100,000
4.0-4.9	Light	Felt by all; minor breakage of objects	2,000-12,000
5.0-5.9	Moderate	Some damage to weak structures	200-2,000
6.0-6.9	Strong	Moderate damage in populated areas	20-200
7.0-7.9	Major	Serious damage over large areas; loss of life	3-20
8.0 and higher	Great	Severe destruction and loss of life over large areas	Fewer than 3

**Figure 3.31** illustrates the seismicity in the United States. A black star indicates the location of Washington County. The seismic hazard map displays earthquake peak ground acceleration (PGA) that has a 2% chance of being exceeded in 50 years, which has a value between 16-32% g.

**Figure 3.31. United States Seismic Hazard Map**



Source: USGS, <http://earthquake.usgs.gov>; \*Black star indicates Washington County

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

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

### ***Richter Magnitude Scale***

The Richter Magnitude Scale was developed in 1935 as a device to compare the size of earthquakes. The magnitude of an earthquake is measured using a logarithm of the maximum extent of waves recorded by seismographs. Adjustments are made to reflect the variation in the distance between the various seismographs and the epicenter of the earthquakes. On the Richter Scale, magnitude is expressed in whole numbers and decimal fractions. Each whole number increase in magnitude represents a tenfold increase in measured amplitude, an estimate of energy. For example, comparing a 5.3 and a 6.3 earthquake shows that a 6.3 earthquake is ten times bigger than a magnitude 5.3 earthquake on a seismogram, but is 31.622 times stronger (energy release)<sup>23</sup>.

### ***Modified Mercalli Intensity Scale***

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

## ***Previous Occurrences***

Most of Missouri's earthquake activity has been concentrated in the southeast corner of the state, which lies within the New Madrid seismic zone. The written record of earthquakes in Missouri prior to the nineteenth century is virtually nonexistent; however, there is geologic evidence that the New Madrid seismic zone has had a long history of activity. The first written account of an earthquake in the region was by a French missionary on a voyage down the Mississippi River. He reported feeling a distinct tremor on Christmas Day 1699 while camped in the area of what is now Memphis, TN.

Whatever the seismic history of the region may have been before the first Europeans arrived, after Dec. 16, 1811, there could be no doubt about the area's potential to generate severe earthquakes. On that date, shortly after 2 a.m., the first tremor of the most violent series of earthquakes in the United States history struck southeast Missouri. In the small town of New Madrid, about 290 kilometers south of St. Louis, residents were aroused from their sleep by the rocking of their cabins, the cracking of timbers, the clatter of breaking dishes and tumbling furniture, the rattling of falling chimneys, and the crashing of falling trees. A terrifying roaring noise was created as the earthquake waves swept across the ground. Large fissures suddenly opened and swallowed large quantities of river and marsh water. As the fissures closed again, great volumes of mud and sand were ejected along with the water.

The earthquake generated great waves on the Mississippi River that overwhelmed many boats and washed others high upon the shore. The waves broke off thousands of trees and carried them into the river. High riverbanks caved in, sand bars gave way, and entire islands disappeared. The violence of

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<sup>23</sup> Measuring the Size of an Earthquake, <http://earthquake.usgs.gov/learn/topics/measure.php>

---

the earthquake was manifested by great topographic changes that affected an area of 78,000 to 130,000 square kilometers.

On Jan. 23, 1812, a second major shock, seemingly more violent than the first, occurred. A third great earthquake, perhaps the most severe of the series, struck on Feb. 7, 1812.

The three main shocks probably reached intensity XII, the maximum on the Modified Mercalli scale, although it is difficult to assign intensities, due to the scarcity of settlements at the time. Aftershocks continued to be felt for several years after the initial tremor. Later evidence indicates that the epicenter of the first earthquake (Dec. 16, 1811) was probably in northeast Arkansas. Based on historical accounts, the epicenter of the Feb. 7, 1812, shocks were probably close to the town of New Madrid.

Although the death toll from the 1811-12 series of earthquakes has never been tabulated, the loss of life was very slight. It is likely that if at the time of the earthquakes the New Madrid area had been as heavily populated as at present, thousands of persons would have perished. The main shocks were felt over an area covering at least 5,180,000 square kilometers. Chimneys were knocked down in Cincinnati, Ohio, and bricks were reported to have fallen from chimneys in Georgia and South Carolina. The first shock was felt distinctly in Washington, D.C., 700 miles away, and people there were frightened badly. Other points that reported feeling this earthquake included New Orleans, 804 kilometers away; Detroit, 965 kilometers away; and Boston, 1,769 kilometers away.

The New Madrid seismic zone has experienced numerous earthquakes since the 1811-12 series, and at least 35 shocks of intensity V or greater have been recorded in Missouri since 1811. Numerous earthquakes originating outside of the state's boundaries have also affected Missouri. Five of the strongest earthquakes that have affected Missouri since the 1811-12 series are described below.

On Jan. 4, 1843, a severe earthquake in the New Madrid area cracked chimneys and walls at Memphis, Tennessee. One building reportedly collapsed. The earth sank at some places near New Madrid; there was an unverified report that two hunters were drowned during the formation of a lake. The total felt area included at least 1,036,000 square kilometers.

The Oct. 31, 1895, earthquake near Charleston, MO probably ranks second in intensity to the 1811-12 series. Every building in the commercial area of Charleston was damaged. Cairo, Illinois, and Memphis, Tennessee, also suffered significant damage. Four acres of ground sank near Charleston and a lake was formed. The shock was felt over all or portions of 23 states and at some places in Canada.

A moderate earthquake on April 9, 1917, in the Ste. Genevieve/St. Mary's area was reportedly felt over a 518,000 square kilometer area from Kansas to Ohio and Wisconsin to Mississippi. In the epicentral area people ran into the street, windows were broken, and plaster cracked. A second shock of lesser intensity was felt in the southern part of the area.

The small railroad town of Rodney, MO experienced a strong earthquake on Aug. 19, 1934. At nearby Charleston, windows were broken, chimneys were overthrown or damaged, and articles were knocked from shelves. Similar effects were observed at Cairo Mounds and Mound City, IL, and at Wickliff, KY. The area of destructive intensity included more than 596 square kilometers.

The Nov. 9, 1968, earthquake centered in southern Illinois was the strongest in the central United States since 1895. The magnitude 5.5 shock caused moderate damage to chimneys and walls at Hermann, St. Charles, St. Louis, and Sikeston, Missouri. The felt areas include all or portions of 23 states<sup>1</sup>.

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Small earthquakes continue to occur frequently in Missouri. Averages of 200 earthquakes are detected every year in the New Madrid Seismic Zone alone. Most are detectable only with sensitive instruments, but on an average of every 18 months, southeast Missouri experiences an earthquake strong enough to crack plaster in buildings<sup>24</sup>.

## **Vulnerability**

### ***Vulnerability Overview***

As stated in the 2018 Missouri Hazard Mitigation Plan, the impacts and severity of earthquakes on Missouri can be significant. The New Madrid earthquakes of 1811-1812 are among the largest that have happened on the North American continent. Losses at the time were limited due to low population and little development. However, a similar quake at this time would result in devastating damage.

The most important direct earthquake hazard is ground shaking, which affects structures close to the earthquake epicenter. However, ground shaking can also affect structures located great distances from epicenters, particularly where thick clay-rich soils can amplify ground motions. Certain types of buildings are more vulnerable to ground shaking than others. Unreinforced masonry structures, tall structures without adequate lateral resistance and poorly maintained structures are specifically susceptible to large earthquakes.

According to MDNR's Missouri Geological Survey, damage from earthquakes in the New Madrid Seismic Zone will vary depending on the earthquake magnitude, the character of the land and the degree of urbanization. Washington County is rural with few clusters of population. Infrastructure in the region such as highways, bridges, pipelines, communication lines and railroads might suffer damage, which would adversely affect Washington County, even if the county itself did not suffer heavy damage. Infrastructure could take a significant time to repair.

An important tool for homeowners to address the risk of earthquake damage to property is the purchase of earthquake insurance coverage. The Missouri Department of Insurance, Financial Institutions and Professional Registration (DIFP) prepared a report in 2020 on the state of earthquake insurance coverage in Missouri. The report notes that earthquake coverage has become less available and less affordable over the last 15 years. The cost of earthquake insurance has increased from an average of \$50 per year to \$209 per year. In high-risk counties the increases have been more substantial – from \$57 per year in 2000 to \$490 per year in 2020. The number of residences covered by earthquake insurance has dropped over the last 15 years – likely due to the increased cost of premiums. In 2020 the percentage of residential policies with earthquake coverage in Washington County was 27.2 percent with the average cost of coverage at \$90 per year.<sup>25</sup>

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

Three earthquakes have been reported in Washington County since 2001. **Table 3.30** provides details about earthquakes in Washington County 2001 – 2020.

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<sup>24</sup> Missouri State Hazard Mitigation Plan 2018

<sup>25</sup> The State of Earthquake Coverage Report,

<https://insurance.mo.gov/earthquake/documents/OverviewofResidentialEarthquakeInsurancein2020.pdf>

**Table 3.30. Earthquakes detected originating in Washington County 2001-2020**

Date	Origin	Magnitude	Felt Report	Damages
03/07/2009	38.174°N 91.076°W	2.6	23	-
06/07/2011	38.077°N 90.902°W	3.9	5707	-
02/03/2014	38.064°N 90.932°W	2.6	11	-

Source: United State Geological Survey, <https://earthquake.usgs.gov/earthquakes/eventpage/nm610279/executive>

The county, located in south central Missouri, is a good distance from the southeast corner of the state where the New Madrid Fault resides. Should a significant earthquake occur, it would have the potential to cause moderate damage within the county.

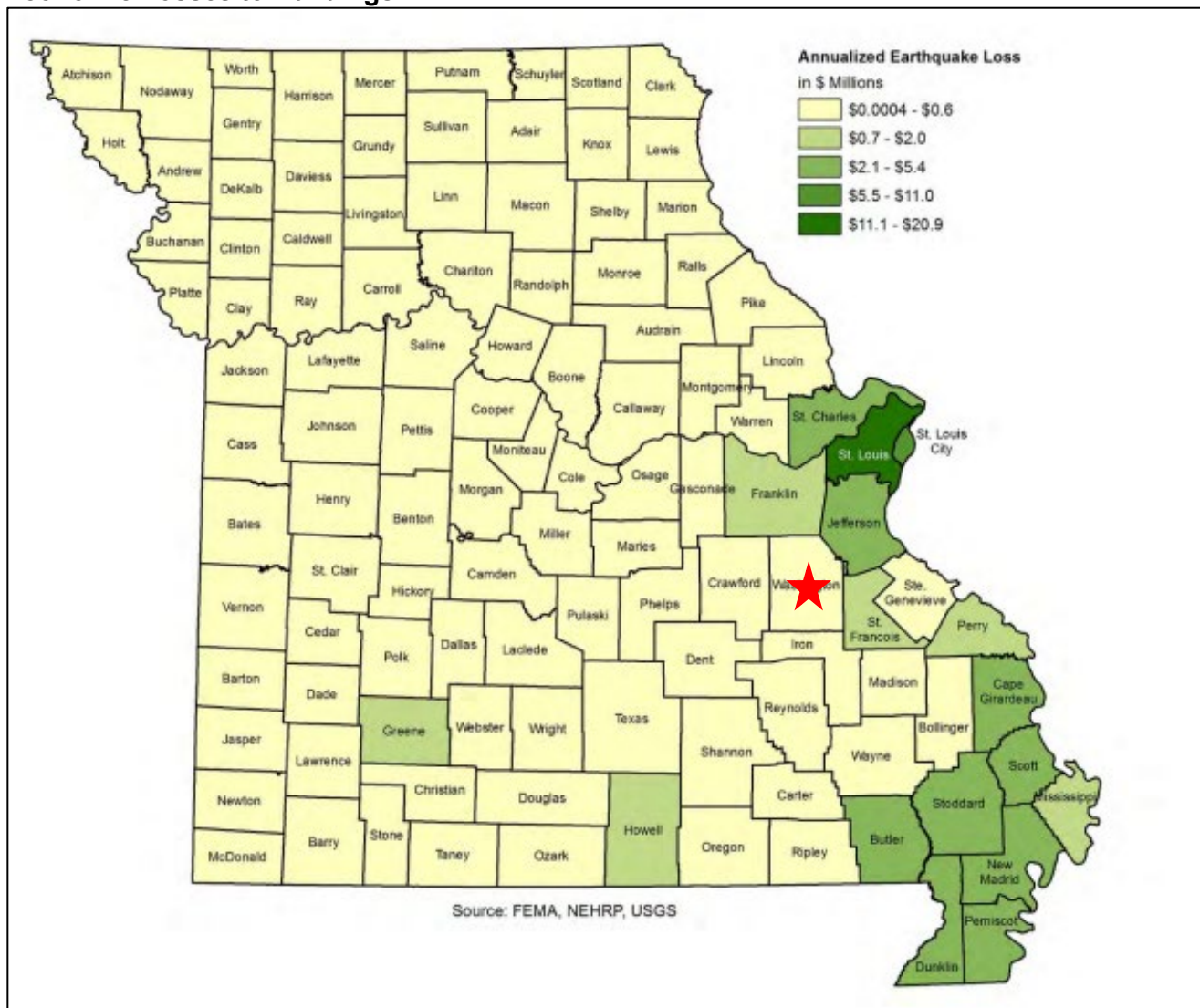
The 2018 Missouri Hazard Mitigation Plan states that there have been 31 recorded earthquake events greater than or equal to M 4.0 in the 43-year period from 1973 to 2018. According to this data, annual probability calculates to 72 percent. Additionally, the USGS estimated in 2006 that the probability of a repeat of the 1811-1812 earthquakes (magnitude 7.5 – 8.0) was seven to ten percent in a 50-year time period (Source: <http://pubs.usgs.gov/fs/2006/3125>). Given the historical frequency of earthquake events, this hazard is determined to have a high probability of occurrence within the State.

SEMA utilized Hazus V 3.2 to analyze vulnerability and estimate losses to earthquakes. Hazus is a program developed by FEMA which is a nationally applicable standardized methodology that encompasses models for assessing potential losses from earthquakes, floods, and hurricanes. All Hazus analyses were run using Level 1 building inventory database comprised of updated demographic and aggregated data based on the 2010 census. An annualized loss scenario that enabled an “apples to apples” comparison of earthquake risk for each county was synthesized from a FEMA nationwide annualized loss study (FEMA 366 Hazus Estimated Annualized Earthquake Losses for the United States, April 2017). A second scenario, based on an event with a two percent probability of exceedance in 50 years, was done to model a worst-case earthquake using a level of ground shaking recognized in earthquake-resistant design.

Annualized loss is the maximum potential annual dollar loss resulting from eight return periods (100, 200, 500, 750, 1,000, 1,500, 2,000, and 2,500 years) averaged on a ‘per year’ basis<sup>26</sup>. This is the scenario that FEMA uses to compare relative risk from earthquakes and other hazards at the county level nationwide. The Hazus earthquake loss estimation is depicted in **Figure 3.32** which shows annualized loss scenario direct economic losses to buildings. In this scenario, the annualized earthquake loss for buildings in Washington County in any one year is estimated to be \$4,000 to \$600,000. **Table 3.31** provides information on total estimated losses, estimated losses per capita and loss ratio. This results in the county being ranked 28<sup>th</sup> in the state for expected loss with low vulnerability for this hazard. This loss ratio indicates impacts on local economies in the event of an earthquake, and the difficulty for jurisdictions to recover from said event.

<sup>26</sup> 2018 Missouri State Hazard Mitigation Plan

**Figure 3.32. HAZUS-MH Earthquake Loss Estimation: Annualized Loss Scenario –Direct Economic Losses to Buildings.**



Source: 2018 Missouri State Hazard Mitigation Plan; \*Red star indicates Washington County

**Table 3.31. HAZUS-MH Earthquake Loss Estimation-Washington County: Annualized Loss Scenario**

Total Losses in \$ Thousands	Loss Per Capita, In \$ Thousands	Loss Ratio in \$ Per Million	Statewide Ranking for Expected Losses
\$265	\$0.0105	\$153	28th

Source: 2018 Missouri State Hazard Mitigation Plan

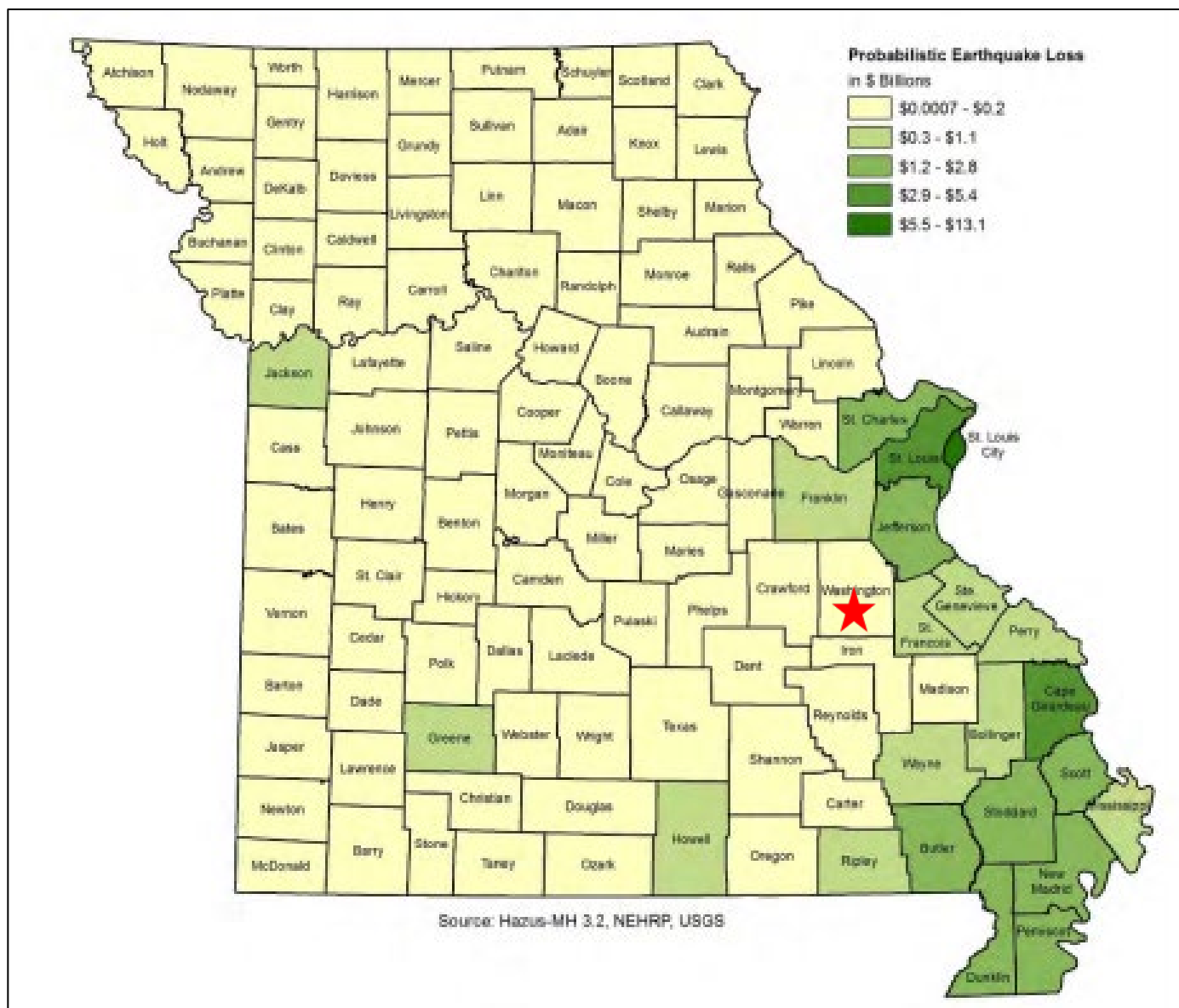
\*All \$values are in thousands

\*\*Loss ratio is the sum of structural and nonstructural damage divided by the entire building inventory value within a county

Likewise, SEMA developed a second scenario which incorporated a 2% probability of exceedance in 50 years. This model was to demonstrate a worst-case scenario. This scenario is equivalent to the 2,500-year earthquake scenario in HAZUS-MH. The methodology is based on probabilistic seismic hazard shaking grids developed by the U.S. Geological Survey (USGS) for the National Seismic Hazard

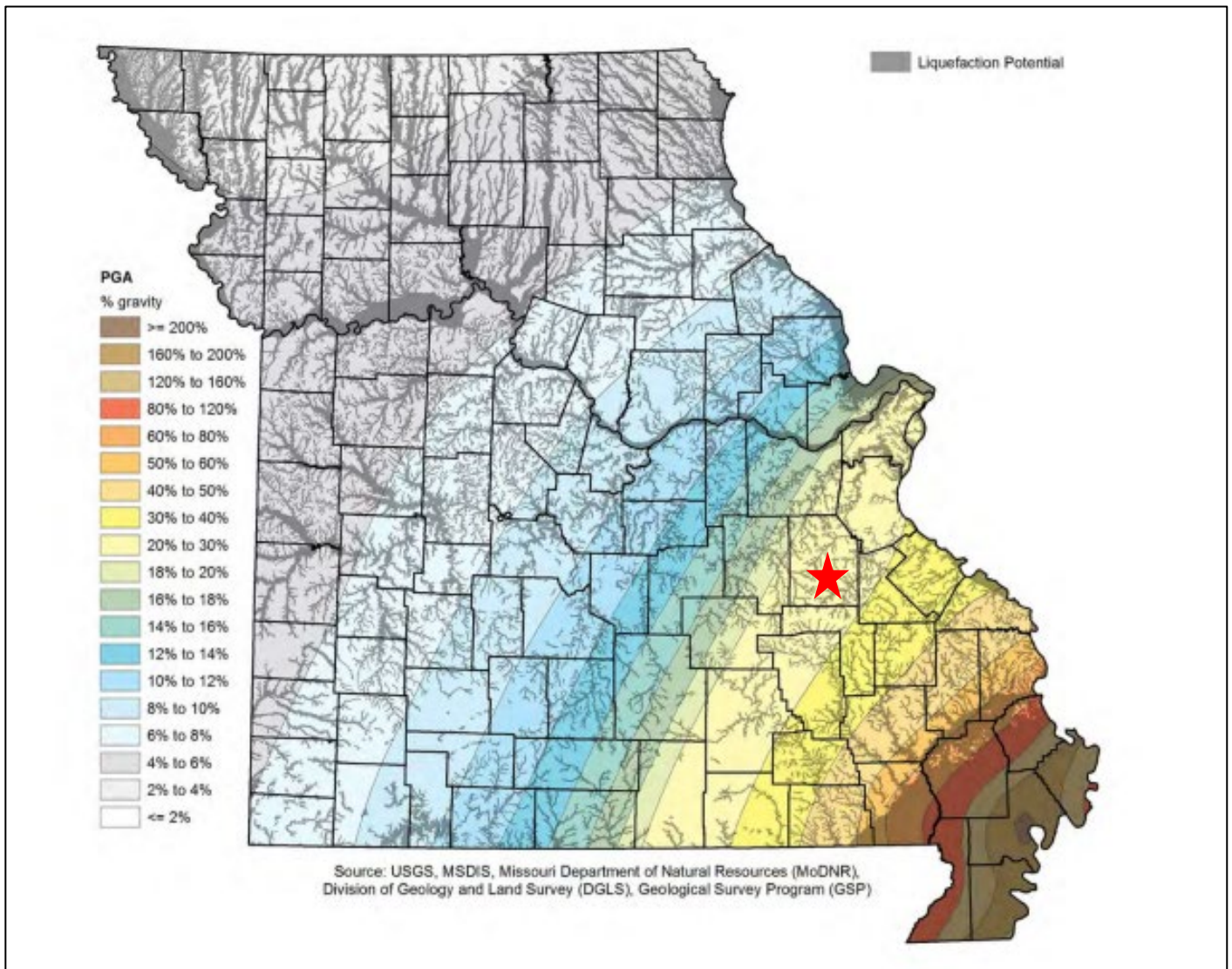
Maps that are included with HAZUS-MH. The USGS updated this mapping in 2014. **Figure 3.33** illustrates direct economic loss to buildings. Washington County is anticipated to lose between \$700,000 and \$200,000,000 in a 50-year scenario. **Figure 3.34** provides estimates of peak ground acceleration and spectral acceleration (ground shaking potential) at intervals of 0.3 and 1.0 seconds, respectively which have a two percent probability of exceedance in the next 50 years. These acceleration events have a 2% probability of exceedance in the next 50 years. A 7.7 magnitude earthquake was utilized in this scenario, which is typically utilized for New Madrid fault planning scenarios in Missouri. Furthermore, this pattern of shaking can be seen in with corresponding potential for damage and areas with soils potentially susceptible to liquefaction. Washington County is estimated to have peak ground acceleration between 20 percent and 30 percent.

**Figure 3.33. HAZUS-MH Earthquake Loss Estimation with a 2% Probability of Exceedance in 50 Years Scenario – Total Building Loss**



Source: 2018 Missouri State Hazard Mitigation Plan; \*Red star indicates Washington County

**Figure 3.34. Hazus Earthquake 2% Probability of Exceedance in 50 Years – Ground Shaking and Liquefaction Potential**



Source: 2018 Missouri State Hazard Mitigation Plan; \*Red star indicates Washington County

**Figure 3.35** depicts a map of the modeled earthquake impacts by county based on building losses, including structural and nonstructural damage, content and inventory loss, and wage and income loss. Washington County shows a loss ratio of 3.5 percent to 10.9 percent. **Figure 3.35** depicts loss ratio by county, which is the ratio of the building structure and nonstructural damage to the value of the entire building inventory. The loss ratio is a measure of the disaster impact to community sustainability, which is generally considered at risk when losses exceed 10 percent of the built environment (FEMA). **Table 3.32** provides information on estimated direct economic losses for Washington County, including structural, nonstructural, inventory, contents, relocation costs, capital related loss, wages, and rental income loss. According to the 2018 Missouri Hazard Mitigation Plan, Washington County's loss ratio is 7.57 percent. Washington County ranks 28<sup>th</sup> in the state for direct economic losses in this scenario.

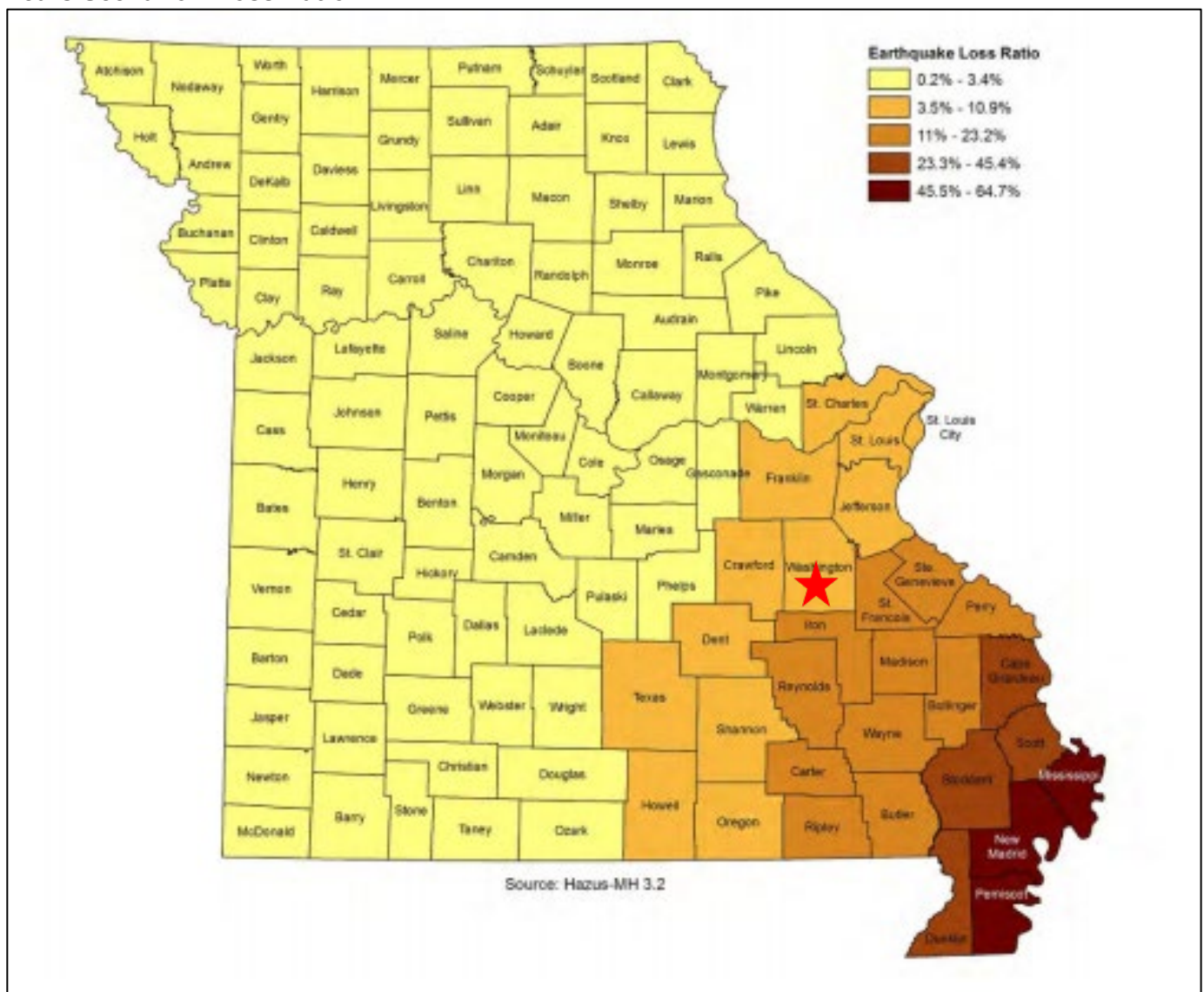
**Table 3.32. HAZUS-MH Earthquake Loss Estimation 2% Probability of Exceedance in 50 Years Scenario Direct Economic Losses Results Summary for Washington County\***

Cost Structural Damage	Cost Non-Structural Damage	Cost Contents Damage	Inventory Loss	Loss Ratio %	Relocation Loss	Capital Related Loss	Wages Losses	Rental Income Loss	Total Loss
\$32,398	\$98,709	\$32,139	\$436	7.57	\$22,252	\$3,321	\$5,511	\$7,078	\$201,844

Source: 2018 Missouri Hazard Mitigation Plan

\*All values in thousands

**Figure 3.35. Hazus Earthquake Loss Estimation with a 2% Probability of Exceedance in 50 Years Scenario – Loss Ratio**



Source: 2018 Missouri State Hazard Mitigation Plan; \*Red star indicates Washington County

## Changing Future Conditions Considerations

Scientists are beginning to believe that there may be a correlation between changing climate conditions and earthquakes. Changing ice caps and sea-level redistribute weight over fault lines, which could potentially have an influence on earthquake occurrences. However, currently no studies quantify the relationship to a high level of detail, so recent earthquakes should not be linked with climate change. While not conclusive, early research suggests that more intense earthquakes and tsunamis may eventually be added to the adverse consequences that are caused by changing future conditions.<sup>27</sup>

## Impact of Previous and Future Development

Future development is not expected to increase the risk other than contributing to the overall exposure of what could be damaged as a result of an earthquake. As new development arises, minimum standards of building codes should be established in all jurisdictions to decrease the potential damage/loss should an earthquake occur.

The Revised Statutes of MO, Section 160.451 require that: The governing body of each school district which can be expected to experience an intensity of ground shaking equivalent to a Modified Mercalli Intensity 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<sup>28</sup>.

## Hazard Summary by Jurisdiction

There will be a range in intensities within any small areas such as a town or county, with the highest intensity generally occurring at only a few sites. Washington County is not near the New Madrid Seismic Zone, but it will most likely endure mild secondary effects from the earthquake, such as fire, structure damage, utility disruption, environmental impacts, and economic disruptions/losses. However, damages could differ if there are structural variations in the planning area's built environment. For example, if one community has a higher percentage of residences built prior to 1939 than the other participants, that community is likely to experience higher damages. **Table 3.33** depicts the percent of residences built prior to 1939 in Washington County. In addition, if school districts have buildings built prior to 1939, those facilities may be at higher risk of damage should an earthquake occur. If a major earthquake should occur, Washington County would likely be impacted by the number of refugees traveling through the area seeking safety and assistance.

**Table 3.33. Washington County Residences Built Prior to 1939**

Jurisdiction	Number of Residences Built Prior to 1939	% of Residences Built Prior to 1939
Unincorporated Washington County	588	7.5%
Caledonia	41	45.1%
Irondale	35	16.0%
Mineral Point	20	16.4%
Potosi	147	13.9%

Source: US Census Bureau 2016-2020 ACS Data

<sup>27</sup> Missouri State Hazard Mitigation Plan 2018

<sup>28</sup> <https://revisor.mo.gov/main/OneSection.aspx?section=160.451>

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### **Problem Statement**

In a worst-case scenario, the county is expected to encounter \$201,844,000 in total economic losses to buildings. Caledonia and Irondale both have a higher risk of damage to buildings due to over 30 percent of the homes having been built prior to 1939.

Jurisdictions should encourage purchase of earthquake hazard insurance. As well as establishing structurally sound emergency shelters in several parts of the county. In addition, stringent minimum standards of building codes should be established. Lastly, outreach and education should be utilized more frequently to prepare citizens for the next occurrence.

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### 3.4.4 Extreme Temperatures

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#### **Hazard Profile**

Some specific sources for this hazard are:

- 2018 Missouri State hazard Mitigation Plan, Chapter 3, Section 3.3.7, Page 3.253  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- National Centers for Environmental Information, Storm Events Database,  
<http://www.ncdc.noaa.gov/stormevents/>
- Heat Index Chart & typical health impacts from heat, National Weather Service; National Weather Service Heat Index Program, <https://www.weather.gov/safety/heat-index>;
- Wind Chill chart, National Weather Service, [http://www.nws.noaa.gov/om/cold/wind\\_chill.shtml](http://www.nws.noaa.gov/om/cold/wind_chill.shtml) ;
- Daily temperatures averages and extremes, High Plains Regional Climate Summary,  
[https://hprcc.unl.edu/climate\\_extremes.php](https://hprcc.unl.edu/climate_extremes.php), <http://climod.unl.edu/>;
- Hyperthermia mortality, Missouri; Missouri Department of Health and Senior Service,  
<http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper1.pdf>;
- Hyperthermia mortality by Geographic area, Missouri Department of Health and Senior Services,  
<http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper2.pdf>;
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0jqF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Average annual occurrence for extreme heat by County
  - Vulnerability to extreme heat by County
  - Average annual occurrence for extreme cold by County
  - Vulnerability to extreme cold by County

#### **Hazard Profile**

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

Extreme temperature events, both hot and cold, can impact human health and mortality, natural ecosystems, agriculture and other economic sectors. According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown in **Figure 3.36** uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions. Other factors that should be taken into account include duration of exposure to high temperatures, wind and activity.

The NWS has increased its efforts to more effectively alert the general public and local authorities on the hazards of heat waves. The Heat Index (HI) is an effective tool in helping people understand the dangers of high temperatures and how temperature and relative humidity together provide a more accurate gauge of heat intensity. The HI, provided in degrees Fahrenheit, is an accurate measure of how hot it actually feels when the relative humidity is added to the air temperature. For example – using the Heat Index Chart in **Figure 3.36** - if the air temperature is 96 degrees Fahrenheit, (found in the top of the table), and the relative humidity is 55 percent (found on the left of the table), the Heat Index is 112 degrees Fahrenheit (the intersection of the 96-degree row and the 55 percent column). Because

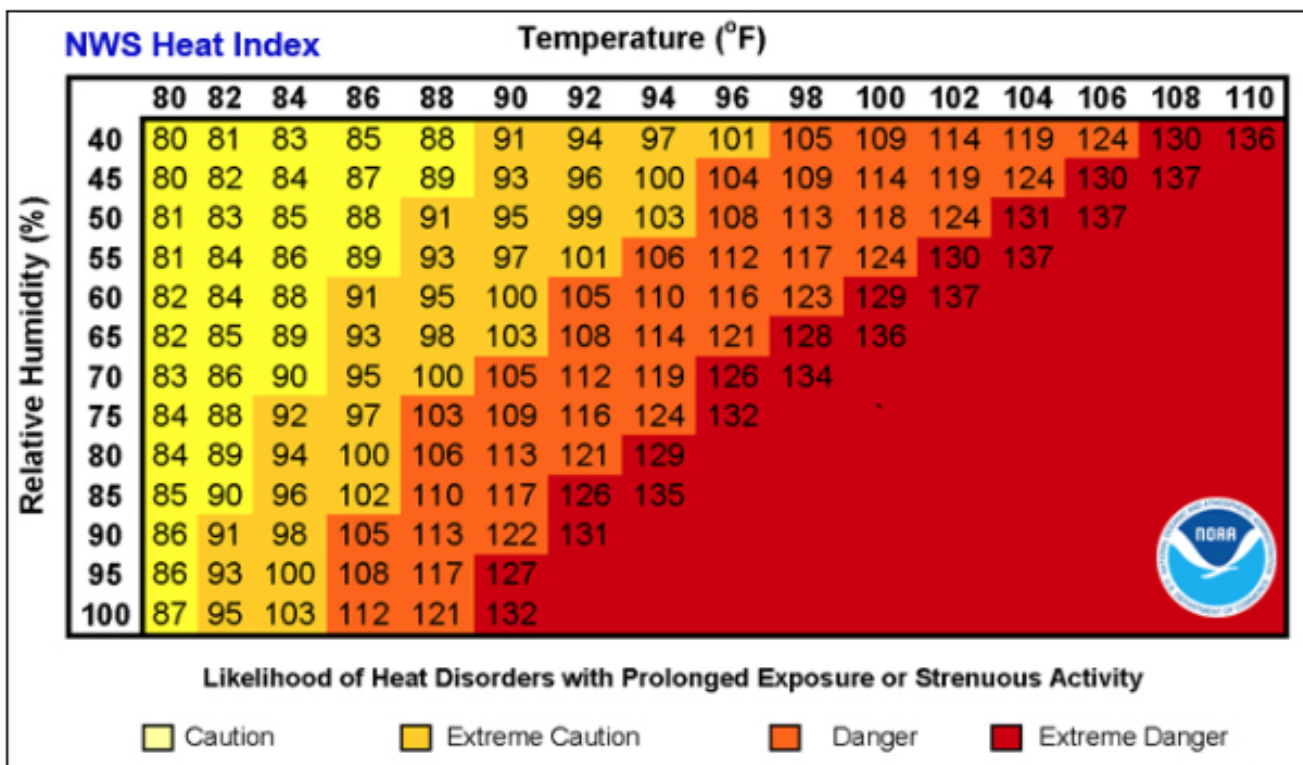
HI values were devised for shady, light wind conditions, exposure to full sunshine can increase HI values by up to 15 degrees Fahrenheit. Also, strong winds, particularly with very hot, dry air, can be extremely dangerous.

High humidity, a common factor in Missouri, can magnify the effects of extreme heat. While heat-related illness and death can occur from 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 threat to public health.

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

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

**Figure 3.36. Heat Index (HI) Chart**



Source: National Weather Service (NWS); <https://www.weather.gov/safety/heat-index>

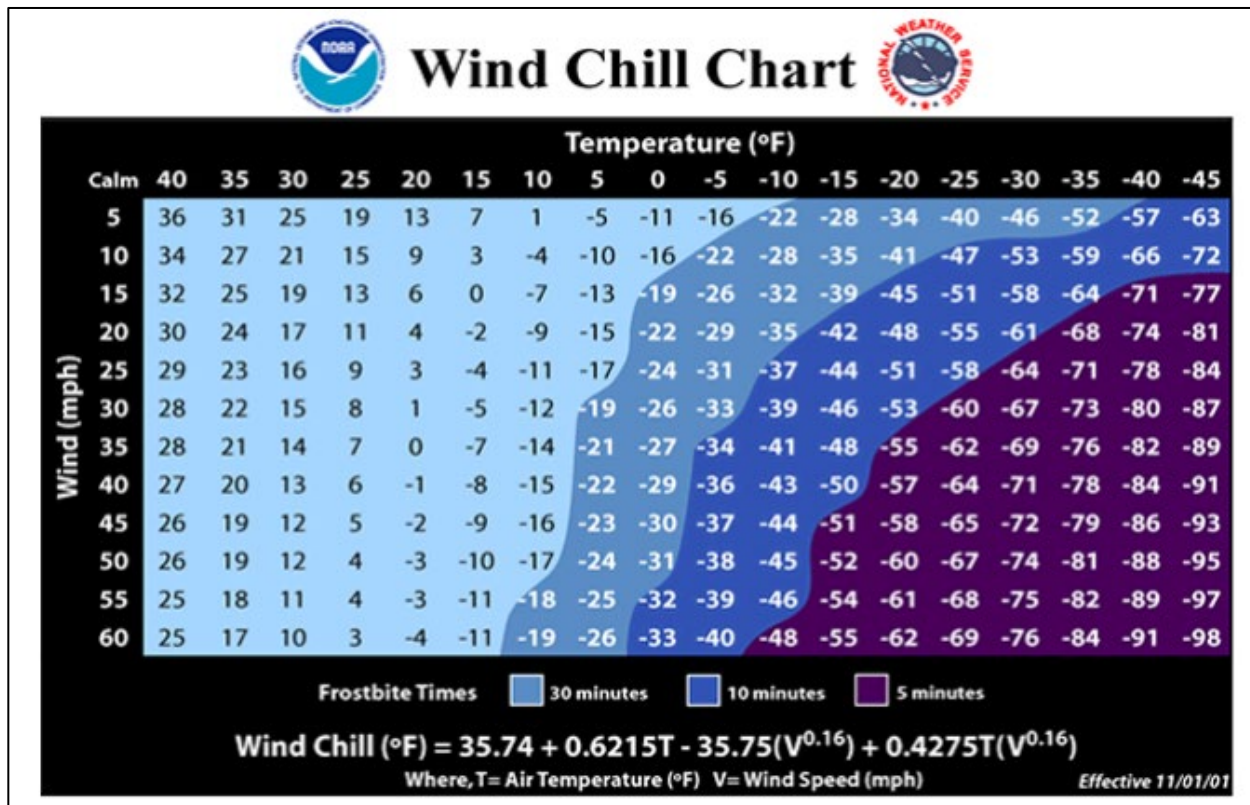
Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

Also at risk, are those without shelter, those who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or death from a lack of oxygen) from toxic fumes from emergency heaters; household fire, which can be

caused by fireplaces and emergency heaters; and frozen/burst pipes.

The NWS Wind Chill Temperature (WCT) index, shown in **Figure 3.37**, uses advances in science, technology, and computer modeling to provide an accurate understandable and useful formula for calculating the dangers from winter winds and freezing temperatures. The figure below presents wind chill temperatures which are based on the rate of heat loss from exposed skin caused by wind and cold. As the wind increases, it draws heat from the body, driving down skin temperature and eventually the internal body temperature.

**Figure 3.37. Wind Chill Chart**



Source: <https://www.weather.gov/safety/cold-wind-chill-chart>

### Geographic Location

Extreme temperature is considered to be an area-wide hazard event. In such a case, the chance of variation in temperatures across Washington County is minimal to nonexistent.

### Strength/Magnitude/Extent

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

issued at 115 degrees.

Extreme heat can cause stress to crops and animals. However, according to the NOAA Storm Events Data Base and USDA Risk Management website, there were no reported agricultural losses for Washington County during that 20-year time period. Extreme heat can also strain electricity delivery infrastructure overloaded during peak use of air conditioning during extreme heat events. Another type of infrastructure damage from extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

From 1988 through 2011, there were 3,496 fatalities in the U.S. attributed to summer heat. This translates to an annual average of 146 deaths. During the same time period, zero deaths were recorded in Washington County, according to NOAA Storm Events Data Base. The national Weather Service stated that among natural hazards, no other natural disaster – not lightning, hurricanes, tornadoes, floods or earthquakes – causes more deaths.

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

**Table 3.34** lists typical symptoms and health impacts due to exposure to extreme heat.

**Table 3.34. Typical Health Impacts of Extreme Heat**

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

Source: National Weather Service Heat Index Program, <https://www.weather.gov/safety/heat-index>

### **Previous Occurrences**

**Table 3.35** provides data in relation to record heat events between 2001 and 2020 in Washington County. Maximum heat index values and temperatures are shown for each extreme temperature event. Fortunately, there were zero recorded injuries and fatalities during this time. In addition, **Figure 3.38** illustrates heat related deaths by county in Missouri between 1980 and 2016.

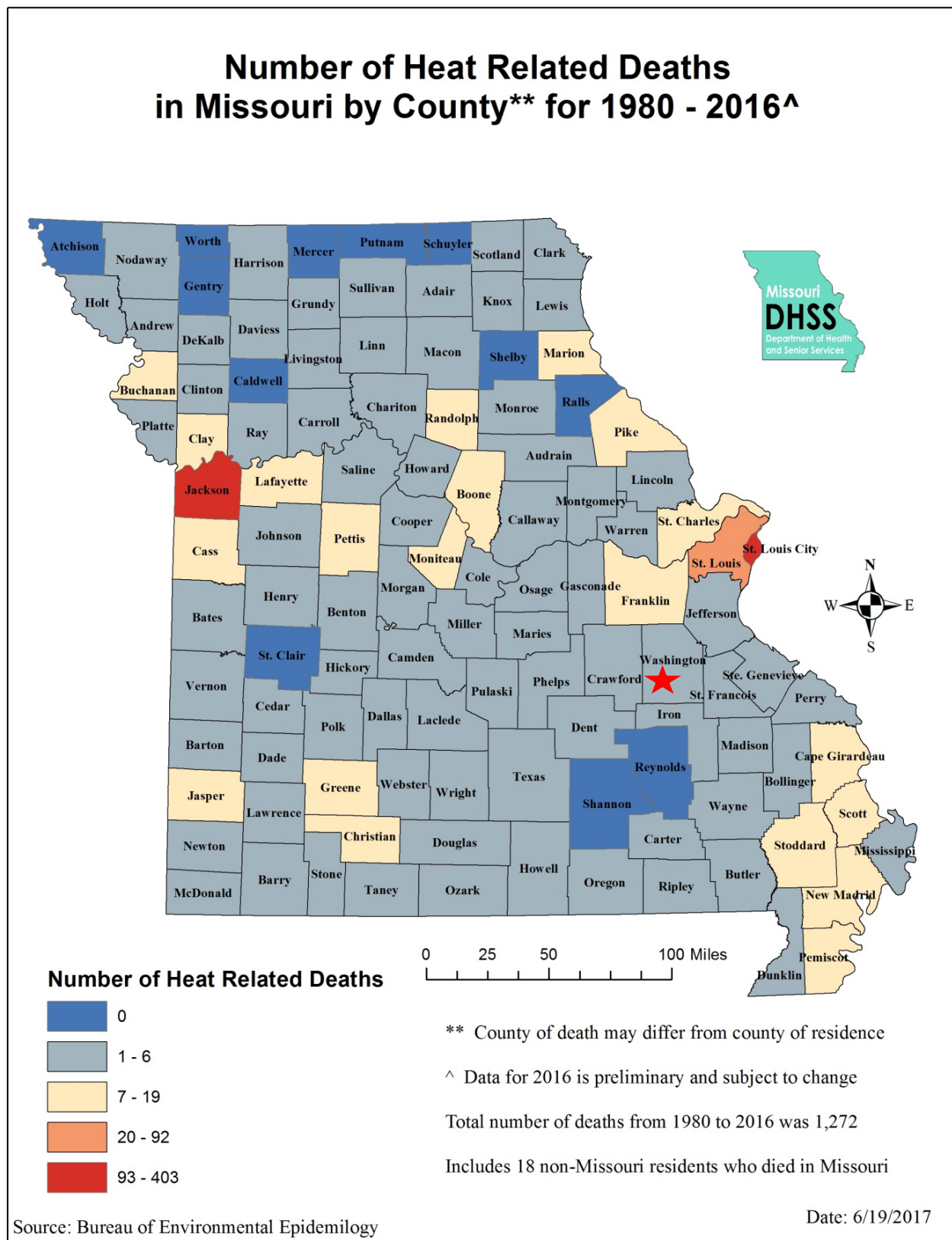
**Table 3.35. Washington County Recorded Heat Events 2001 – 2020**

<b>Month, Year</b>	<b># of Event Days</b>	<b>Fatalities</b>	<b>Injuries</b>	<b>Temperature (F°)</b>	<b>Heat Index Values (F°)</b>
7/7/2001	3	0	0	95-100	105-110
7/17/2001	1	0	0	95-100	110-115
7/21/2001	3	0	0	95-100	105-115
7/29/2001	2	0	0	90-95	105-110
8/1/2001	1	0	0	95-100	105
8/7/2001	2	0	0	95-100	102-110
8/21/2001	1	0	0	95-100	105-110
6/1/2002	3	0	1	85-95	-
7/8/2002	1	1	0	95-100	105-110
7/20/2002	2	0	0	95-100	105-115
7/26/2002	5	0	3	95-100	105-115
8/1/2002	5	0	1	95-100	-
8/15/2003	6	0	9	95-105	-
8/24/2003	4	0	0	95-100	105-110
7/20/2004	2	0	0	90-95	105-110
7/20/2005	6	0	0	100+	105-120
7/17/2006	3	0	0	95-100	105-110
7/30/2006	1	0	0	95-100	105-110
8/1/2006	1	0	0	100+	-
7/1/2011	2	0	0	95-100	105
7/10/2011	2	0	0	95-100	-
8/6/2011	1	0	0	95-100	105-110
8/31/2011	1	0	0	100+	105-110
9/1/2011	2	0	0	100	105

Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)
8/31/2013	1	0	0	100	105-110
9/1/2013	1	0	0	100	105-110
6/15/2016	1	0	0	95-100	105
<b>Total</b>	<b>63</b>	<b>1</b>	<b>14</b>	-	-

Source: <http://www.ncdc.noaa.gov/stormevents/>

Figure 3.38. Heat Related Deaths in Missouri 2000 - 2016

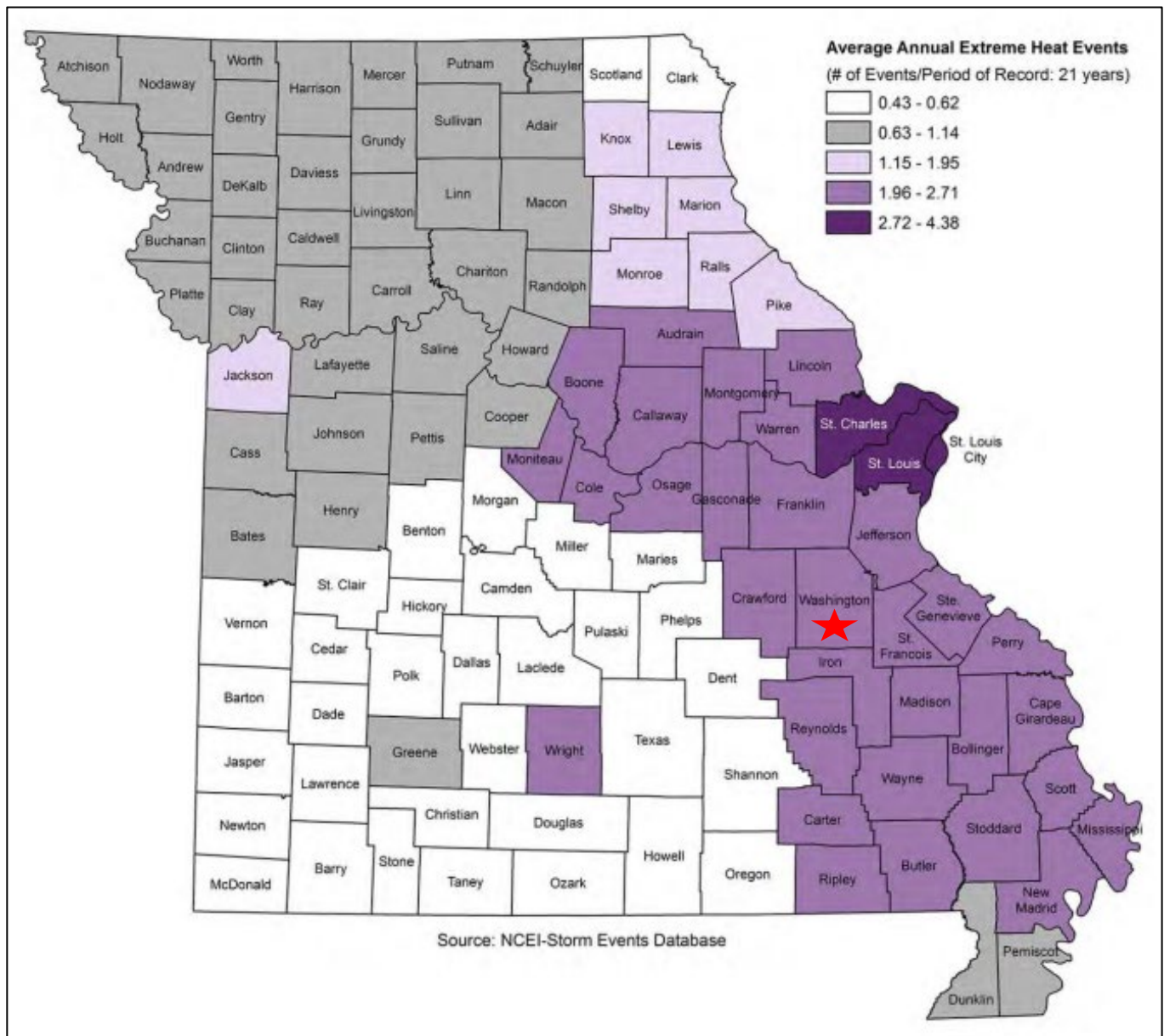


Source: <https://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/stat-report.pdf>  
 \*Red star indicates Washington County

## Probability of Future Occurrence

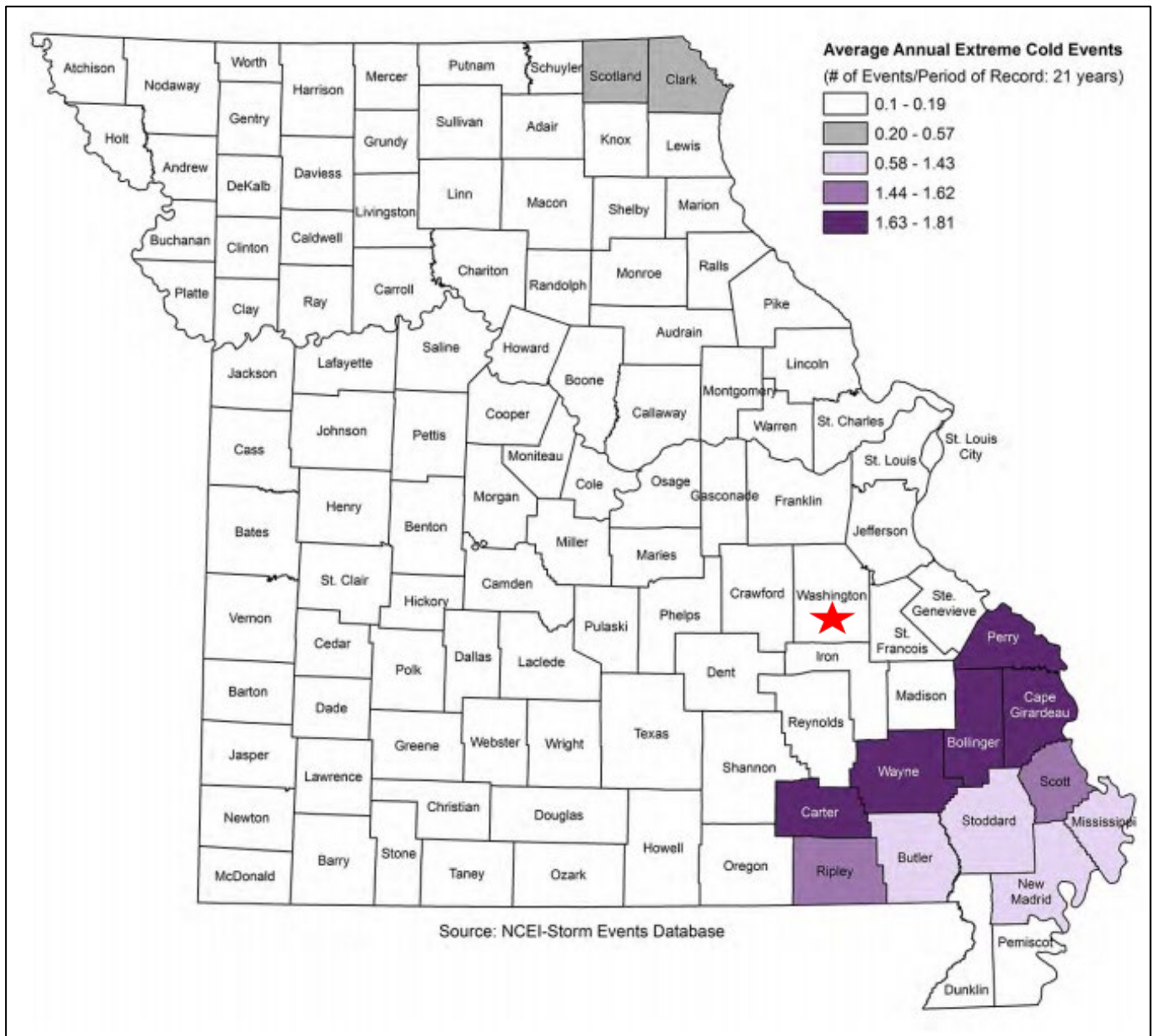
**Figure 3.39** illustrates the average annual occurrence for extreme heat statewide. Based on information provided in the 2018 Missouri State Hazard Mitigation Plan, Washington County has an average of 1.96 to 2.71 events per year based on data from 21 years. **Figure 3.40** illustrates the average annual occurrence for extreme cold statewide. Washington County has an average of 0.1 to 0.19 events per year based on data from 21 years. It should be noted that there are data limitations due to underreporting of extreme heat and cold events.

**Figure 3.39. Average Annual Occurrence for Extreme Heat**



Source: 2018 Missouri State Hazard Mitigation Plan; \*Red star indicates Washington County

**Figure 3.40. Average Annual Occurrence for Extreme Cold**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

### **Changing Future Conditions Considerations**

According to the 2018 Missouri Hazard Mitigation Plan, under a higher emissions pathway, historically unprecedented warming is projected by the end of the century. Even under a pathway of lower greenhouse gas emissions, average annual temperatures are projected to most likely exceed historical record levels by the middle of the 21<sup>st</sup> century. For example, in southern Missouri, the annual maximum number of consecutive days with temperatures exceeding 95 degrees F is projected to increase by up to 20 days. Temperature increases will cause future heat waves to be more intense, a concern for this region which already experiences hot and humid conditions. If the warming trend continues, future heat waves are likely to be more intense and cold spells are

projected to decrease.

Furthermore, higher temperatures are experienced more acutely by vulnerable populations such as the elderly, the very young, the homeless, the ill and disabled, and those living in poverty. Higher demands and costs for electricity to run air conditioners can stress power systems. Higher temperatures can also cause harmful algal blooms in warmer water – resulting in poor water quality.

Mitigation against the impacts of future temperature increases may include increasing education on heat stress prevention, organizing cooling centers, allocating additional funding to repair and maintain roads damaged by buckling and potholes and reducing nutrient runoff that contributes to algal blooms. Local governments should also prepare for increased demand on utility systems. Improving energy efficiency in public buildings will also present an increasingly valuable savings potential.

## **Vulnerability**

### ***Vulnerability Overview***

Washington County, along with the rest of the state of Missouri is vulnerable to extreme heat and cold events. **Table 3.36** shows the typical health impacts of extreme heat. Jurisdictions with higher percentages of individuals below the age of 5, and above the age of 65 tend to be more at risk for extreme heat (**Table 3.39**). People who are overweight, ill or on certain medication can also be more vulnerable to high temperatures. Unincorporated Washington County has an estimated 16.0 percent of individuals are 65 or older. The city of Mineral Point had the lowest number of older residents with 8.5 percent aged 65 and over. Caledonia had the highest rate overall with 24.0 percent of residents falling into the 65 and older category. However, even young and healthy individuals are susceptible if they participate in strenuous physical activities during hot weather. The exposure to extreme temperatures of farm workers and livestock is also a major concern.

**Table 3.36. Typical Health Impacts of Extreme Heat**

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

Source: National Weather Service Heat Index Program, <https://www.weather.gov/safety/heat-index>

The method used by state planners to determine vulnerability to extreme temperatures across Missouri was statistical analysis of data from several sources: National Centers for Environmental Information (NCEI) storm events data (1996- December 31, 2016), percentage of population over 65 data from the U.S. Census (2015 ACS) and the calculated Social Vulnerability Index for Missouri counties from the hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina. Four factors were considered in determining overall vulnerability to extreme temperatures – total population, percentage of population over 65, likelihood of occurrence and social vulnerability. Based on natural breaks in the data, a rating value of one through five was assigned with one being low, two being low-medium, three being medium, four being medium-high and five being high.

**Table 3.37** shows the population, percent of population over 65 and social vulnerability index data for

Washington County overall.

**Table 3.37. Population, Percent of Population Over 65 and SOVI Data for Washington County**

County	Total Population Rating	Percentage of Population Over 65	Percent of Population Over 65 Rating	SOVI Ranking	SOVI Rating
Washington	3	14.7	2	Medium	3

Source: 2018 Missouri Hazard Mitigation Plan

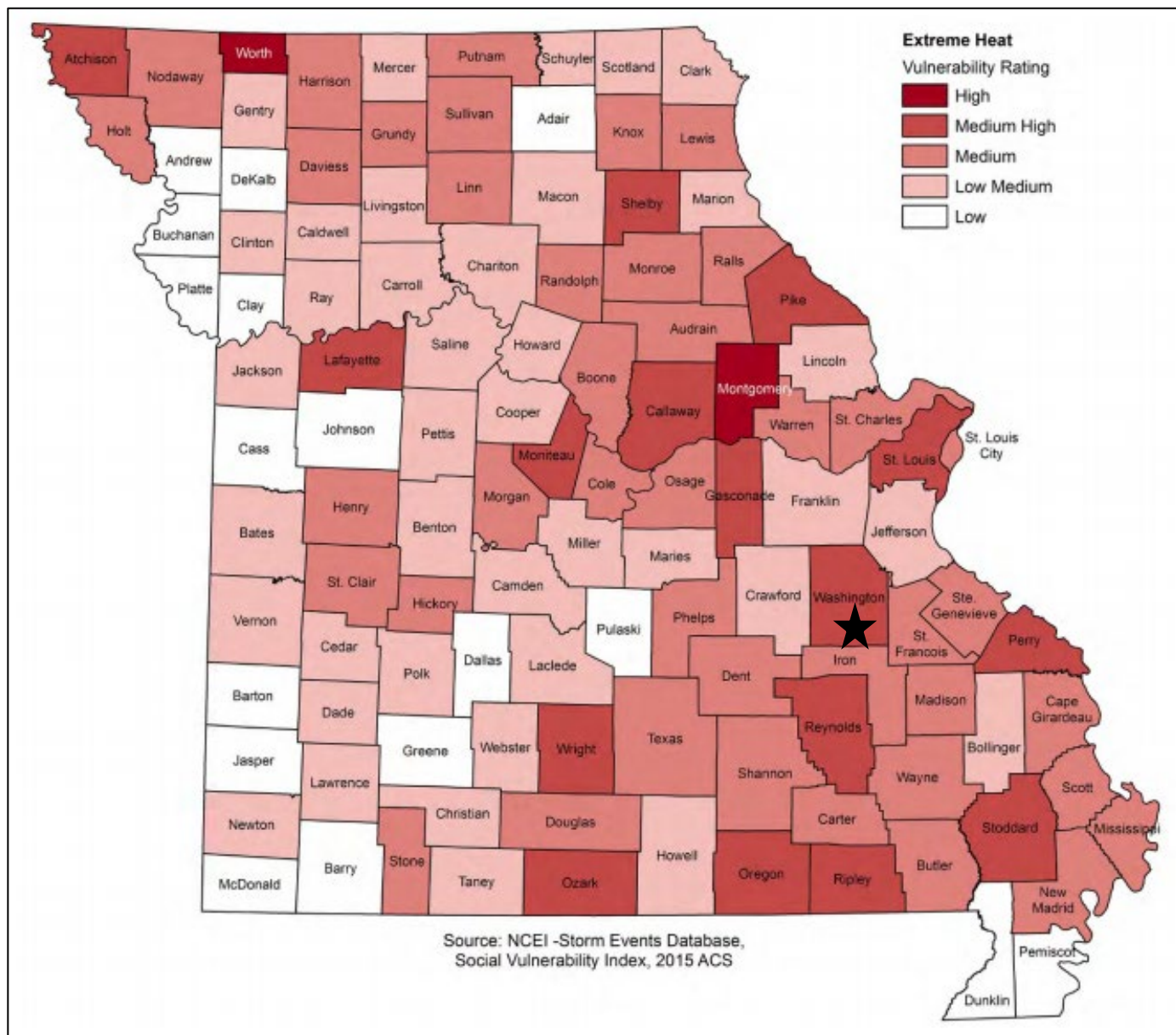
**Table 3.38** illustrates the likelihood of occurrence and overall vulnerability rating for extreme temperatures for Washington County. **Figure 3.41** and **Figure 3.42** provide a vulnerability summary for extreme heat and extreme cold, respectively. Washington County has medium vulnerability for extreme heat and Medium-High vulnerability for extreme cold.

**Table 3.38. Washington County Likelihood of Occurrence and Overall Vulnerability Rating for Extreme Temperatures**

Heat					Cold				
Total Events	Likelihood of Occurrence	Likelihood Rating	Total Vulnerability	Total Vulnerability Description	Total Events	Likelihood of Occurrence	Likelihood Rating	Total Vulnerability	Total Vulnerability Description
50	2.38	4	12	Medium-High	2	0.10	1	9	Medium

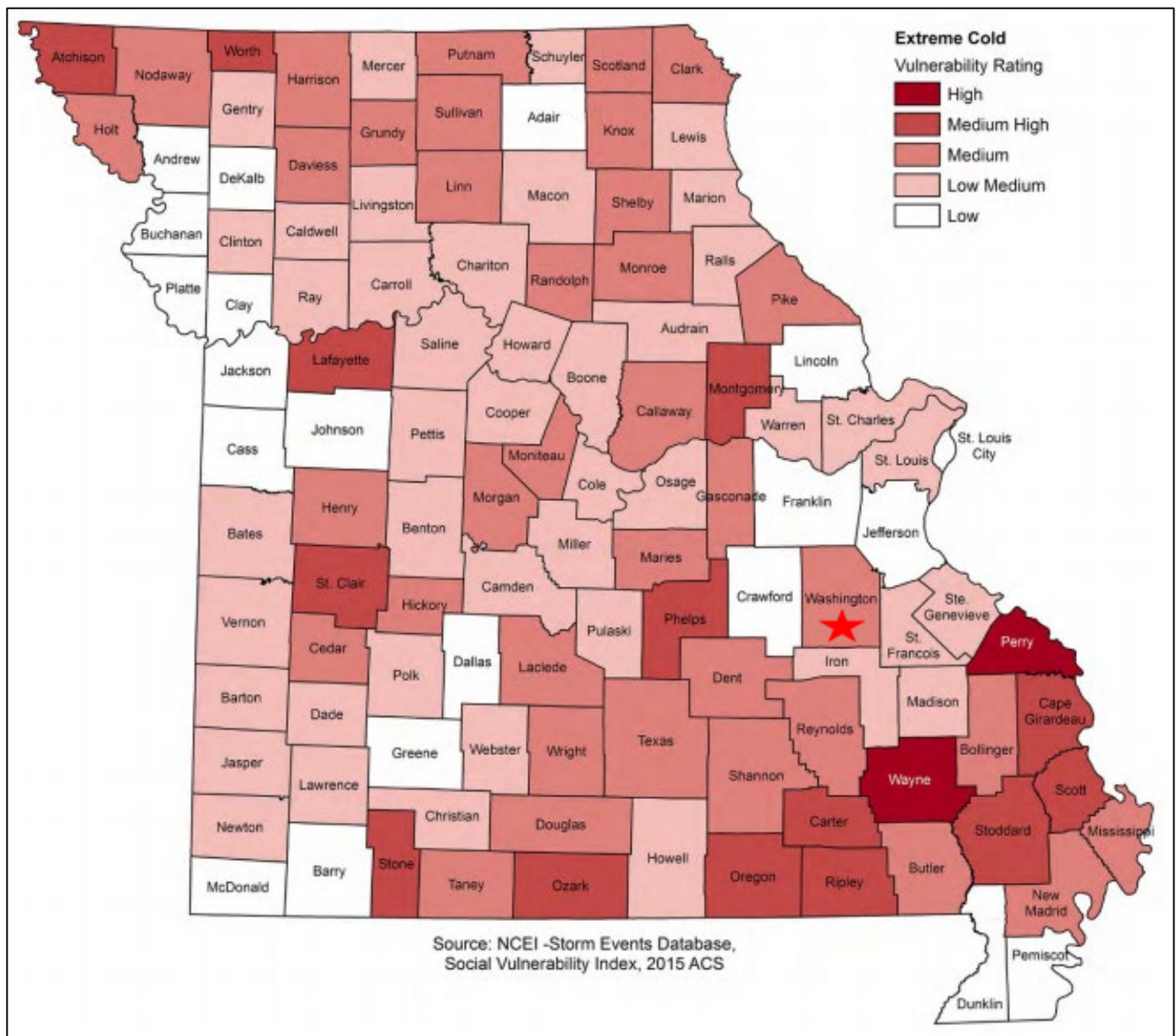
Source: 2018 Missouri Hazard Mitigation Plan

**Figure 3.41. Vulnerability Summary for Extreme Heat**



Source: 2018 Missouri Hazard Mitigation Plan, \*Black star indicates Washington County

**Figure 3.42. Vulnerability Summary for Extreme Cold**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

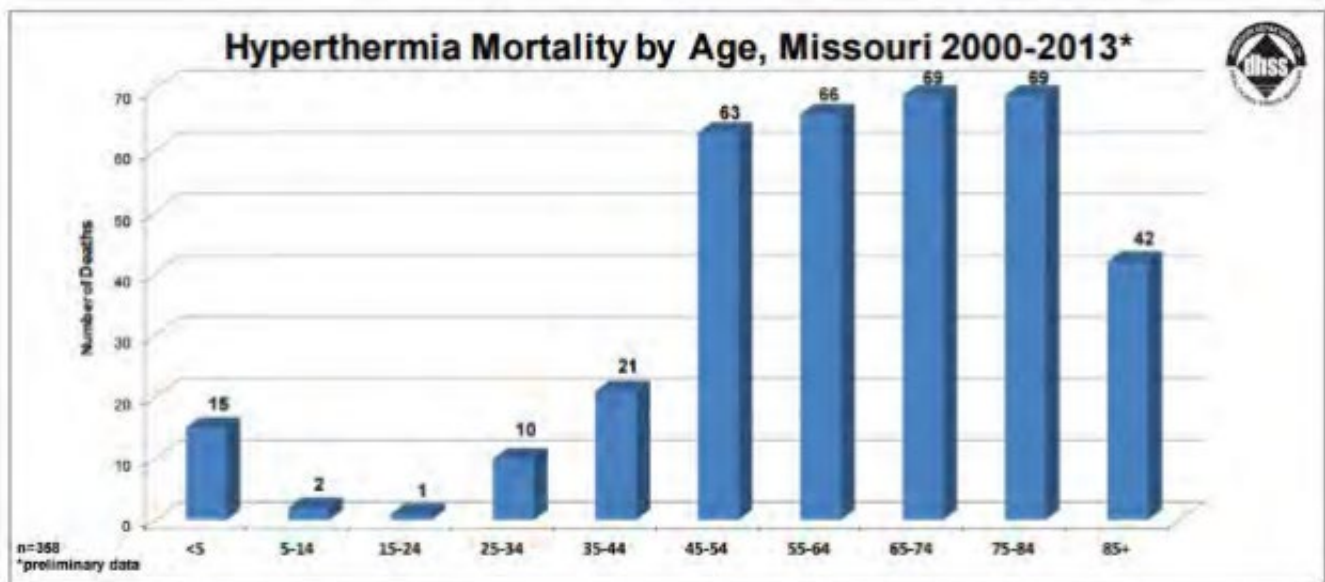
### **Potential Losses to Existing Development**

#### **Extreme Heat/Heat Wave**

Of greatest concern during extreme heat events are hyperthermia injuries and deaths. The 2018 Missouri Hazard Mitigation plan states that there were 358 heat-related deaths reported in Missouri from 2000 through 2013. There were 217 (61%) deaths in the metropolitan areas of Kansas City and St. Louis and 141 (39%) deaths in rural parts of the state. Half of the deaths were age 65 or older. People in this demographic group are more vulnerable to this hazard for a number of reasons. Many live alone and have medical conditions that put them at higher risk. The lack of air conditioning or the refusal to use it for fear of higher utility bills further increases their risk. Deaths among children under the age of five are often linked to being left in vehicles during hot weather. Between 2000 and 2013 there were 15 (4%) heat-related deaths of children less than five years old. In the age group between

5 years and 65 years deaths are generally due to over exertion at work or in sports activities, complicating medical conditions or substance abuse. **Figure 3.43** shows the hyperthermia mortality rate by age for the 2000-2013 timeframe.

**Figure 3.43. Hyperthermia Mortality of Age, Missouri 2000-2013**



Source: Missouri DHSS, <http://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/hyper4.pdf>

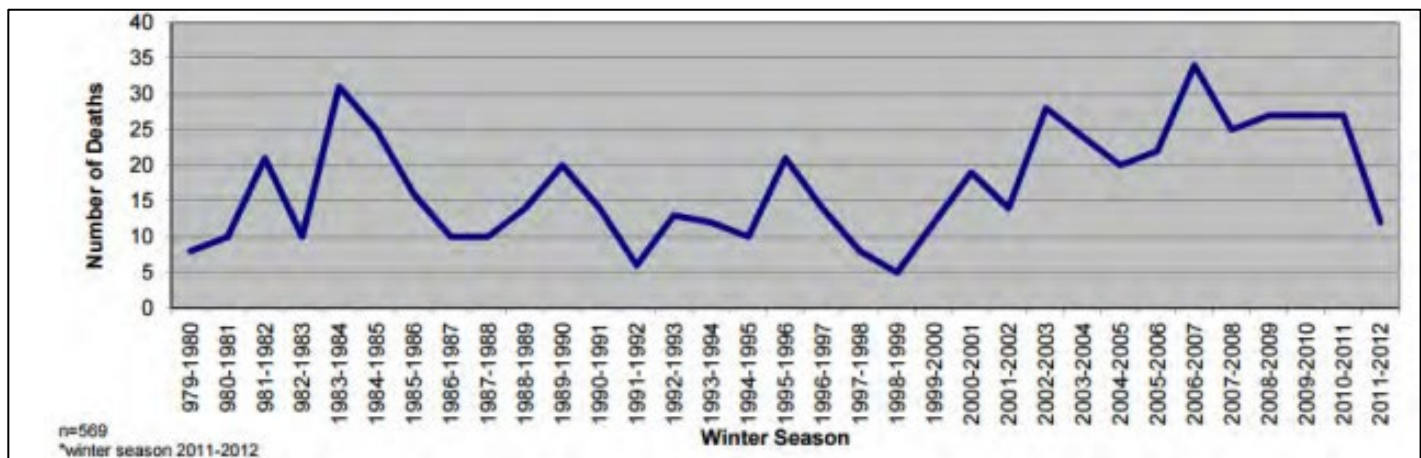
During extreme heat events structural, road, and electrical infrastructure are vulnerable to damages. Depending upon temperatures and duration of extreme heat, losses will vary.

### Extreme Cold

According to the Missouri Department of Health and Senior Services, 569 people died in Missouri due to extreme cold conditions between 1979 and 2012, see **Figure 3.44**. As with extreme heat, the elderly are more vulnerable to cold-related deaths. Elderly or disabled individuals fall outside their homes and are not able to call for help or reach the safety of shelter during periods of extreme cold. According to the 2018 Missouri State Hazard Mitigation plan, during the winters of 1989-2012, a total of 414 hypothermia deaths occurred, with 186 (44.9%) being 65 years of age or older. As with extreme heat, substance abuse can be a contributing factor for people between the ages of 25 and 64. Between 1989 and 2012, substance abuse factored into the hypothermia deaths of 107 of the 208 (51.4%) deaths in this age group. Fortunately, hypothermia deaths in people under the age of 25 are rare in Missouri, accounting for only 19 (4.6%) of the total extreme cold related deaths during this timeframe. There were two (0.5%) deaths of children under the age of five. Over 72 percent of hypothermia deaths are among males – 299 of the total 414. The remaining 115 (27.8%) were female.

In regards to urban versus rural, hypothermia deaths tend to be higher in rural areas than in urban communities. There were 183 (44.2%) cold related deaths in the Kansas City and St. Louis metropolitan areas, while 231 (55.8%) occurred in other parts of the state.

**Figure 3.44. Hypothermia Deaths, Missouri: Winter Seasons 1979-2012**



Source: Missouri DHSS, <http://health.mo.gov/living/healthcondiseases/hypothermia/pdf/hypo1.pdf>

### **Impact of Future Development**

Population trends from 2010 to 2020 for Washington County indicate that the population in unincorporated areas has fallen by an estimated 2.17 percent. The city of Potosi's population has increased by a 2.26 percent. The city of Mineral Point has fallen by 34.19 percent. Overall, the county's population has shrunk 6.7 percent. Population growth can result in increased age groups that are more susceptible to extreme heat and cold. Additionally, as populations increase, so does the strain on each jurisdiction's electricity and road infrastructure. Local government and local emergency management should take extreme heat and cold in consideration when upgrades occur to the local power grid.

### **Hazard Summary by Jurisdiction**

Those at greatest risk for heat-related illness and deaths include children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications or have medical conditions that make them more vulnerable. To determine jurisdictions within the planning area with populations more vulnerable to extreme heat, demographic data was obtained from the 2016-2020 census on population percentages in each jurisdiction comprised of those under age 5 and over age 65. Data was not available for overweight individuals and those on medications vulnerable to extreme heat or with medical conditions that made them more vulnerable. **Table 3.39** below summarizes vulnerable populations in the participating jurisdictions. Note that school and special districts are not included in the table because students and those working for the special districts are not customarily in these age groups.

**Table 3.39. County Population Under Age 5 and Over Age 65 (2016-2020)**

Jurisdiction	Population Under 5 Years	Population 65 Years and over
Unincorporated Washington County	5.4%	16.6%
Caledonia	3.7%	21.6%
Irondale	8.7%	6.4%
Mineral Point	6.8%	21.1%
Potosi	8.5%	18.1%

Source: U.S. Census Bureau, 2016-2020 American Community Survey 5-Year Estimates

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Due to lack of data, strategic buildings that lack air-conditioning could not be analyzed for this report. Additionally, school policy data in regard to extreme heat or cold were not available.

In summary, the risks of extreme heat or cold can impact the health/lives of citizens within the county, specifically the young and elderly. The city of Caledonia has a high percentage of individuals 65 and over, with 21.6 percent.

Many people do not realize how deadly a heat wave can be. Extreme heat is a natural disaster that is not as dramatic as floods or tornadoes. Working with the Washington County Health Department and EMD, local governments should encourage residents to:

- Stay indoors as much as possible and limit exposure to the sun;
- Stay on the lowest floor out of the sunshine if air conditioning is not available;
- Consider spending the warmest part of the day in public buildings such as libraries or other public or community buildings. Circulating air can cool the body by increasing the evaporation rate of perspiration;
- Eat light, well-balanced meals at regular intervals and avoid using salt tablets unless directed by a physician;
- Hydrate by drinking plenty of water. Individuals with epilepsy or heart, kidney or liver disease who are on fluid restricted diets or have problems with fluid retention should consult their physicians on liquid intake;
- Limit consumption of alcoholic beverages;
- Dress in loose-fitting, lightweight and light colored clothes that cover as much skin as possible;
- Protect your face and head by wearing a wide-brimmed hat. Wear sunscreen;
- Check on family, friends and neighbors who do not have air conditioning and are generally alone;
- Never leave children or pets in closed vehicles;
- Avoid strenuous work during the warmest part of the day and use the buddy system when working in extreme heat and take frequent breaks.

People who work outdoors should be educated about the dangers and warning signs of heat disorders. Buildings, ranging from homes (particularly those of the elderly) to factories, should be equipped with properly installed, working air conditioning units, or have fans that can be used to generate adequate ventilation. However, although fans are less expensive to operate than air conditioning, they may not be effective, and may even be harmful when temperatures are very high. As the air temperature rises, air flow is increasingly ineffective in cooling the body. At temperatures above 100° F, the fan may be delivering overheated air to the skin at a rate that exceeds the capacity of the body to get rid of this heat – even with perspiring – and the net effect is to add heat rather than to cool the body. An air conditioner is a much better option. Charitable organizations and the health department should work together to provide fans, when appropriate, to at-risk residents during times of critical heat. When temperatures are too high, however, these groups should work to get at-risk populations into cooling shelters.

## **Extreme Cold**

Extreme cold can also be life-threatening and the following precautions should be taken when someone is suffering from hypothermia:

- Call 9-1-1 for immediate medical assistance;
- Move the victim to a warm place;
- Monitor the victim's blood pressure and breathing;

- 
- If necessary, provide rescue breathing and CPR;
  - Remove wet clothing;
  - Dry off the victim;
  - Take the victim's temperature;
  - Warm the body core first, NOT the extremities. Warming the extremities first can cause the victim to go into shock and can also drive cold blood toward the heart and lead to heart failure;
  - Do not warm the victim too fast – rapid warming may cause heart arrhythmias

### **Problem Statement**

In summary, the risks of extreme heat and cold can impact the health/lives of citizens within the county, specifically the young and elderly. Based on the vulnerability analysis, the city of Caledonia and the city of Potosi have the highest risk because both have large populations of people aged 65 and over (**Table 3.39**).

All jurisdictions should make sure they have plans in place to provide both cooling and warming shelters during times of extreme temperatures. School districts should have policies in place to minimize strenuous exercise outdoors during heat waves and to consider policies for delaying or cancelling school during times of extreme cold to reduce risk to students waiting for buses.

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### 3.4.5 Flooding (Riverine and Flash)

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.1, Page 3.80  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- Watershed map, Environmental Protection Agency,  
[http://cfpub.epa.gov/surf/county.cfm?fips\\_code=19169](http://cfpub.epa.gov/surf/county.cfm?fips_code=19169)
- FEMA Map Service Center, Digital Flood Insurance Rate Maps (DFIRM) for all jurisdictions, if available, <https://msc.fema.gov/portal/home>
- NFIP Community Status Book, <http://www.fema.gov/national-flood-insurance-program/national-flood-insurance-program-community-status-book>
- NFIP claims status, BureauNet, <http://bsa.nfipstat.fema.gov/reports/reports.html>
- Flood Insurance Administration—Repetitive Loss List (this must be requested from the State Floodplain Management agency or FEMA)
- National Centers for Environmental Information, Storm Events Database,  
<http://www.ncdc.noaa.gov/stormevents/>
- USDA Risk Management Agency, Insurance Claims, <https://www.rma.usda.gov/en/Information-Tools/Summary-of-Business/Cause-of-Loss>
- FEMA Data Visualization Tool, <https://www.fema.gov/data-visualization-floods-data-visualization>
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0JgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Risk MAP, DFIRM, and Hazus based depth grids used in Hazus Analysis
  - Flood losses by County 1978-2018
  - Number of flood insurance claims by County
  - Total building exposure to flooding (1% annual chance) by County
  - Buildings impacted by flooding (1% annual chance) by County
  - Flood insurance coverage by County
  - Number of flood insurance policies by County
  - NFIP participation status by County
  - Number of state facilities impacted by flooding (1% annual chance) by County
  - Critical facilities impacted by flooding (1% annual chance) by County

### **Hazard Profile**

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

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

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

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

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

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

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

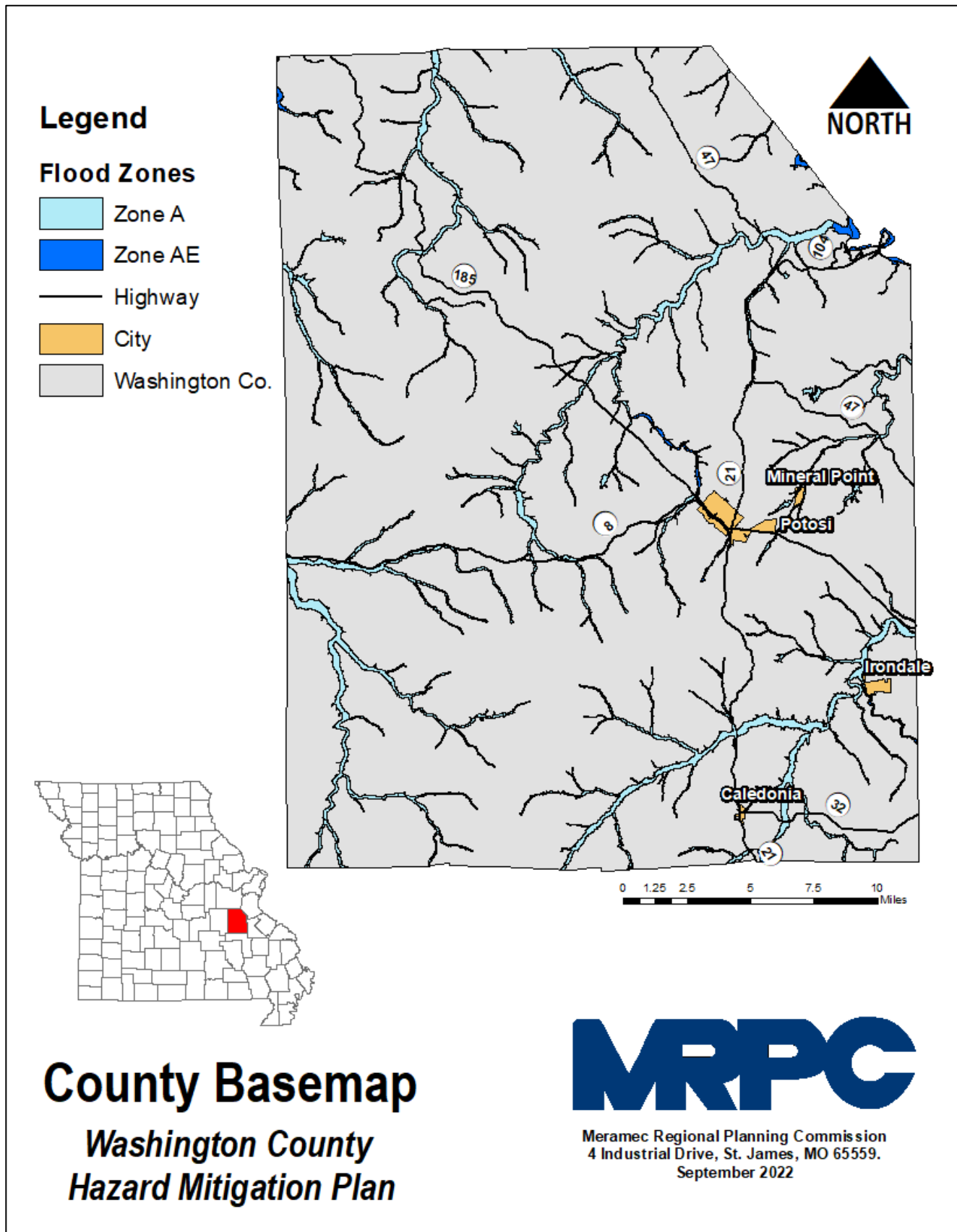
In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with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

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

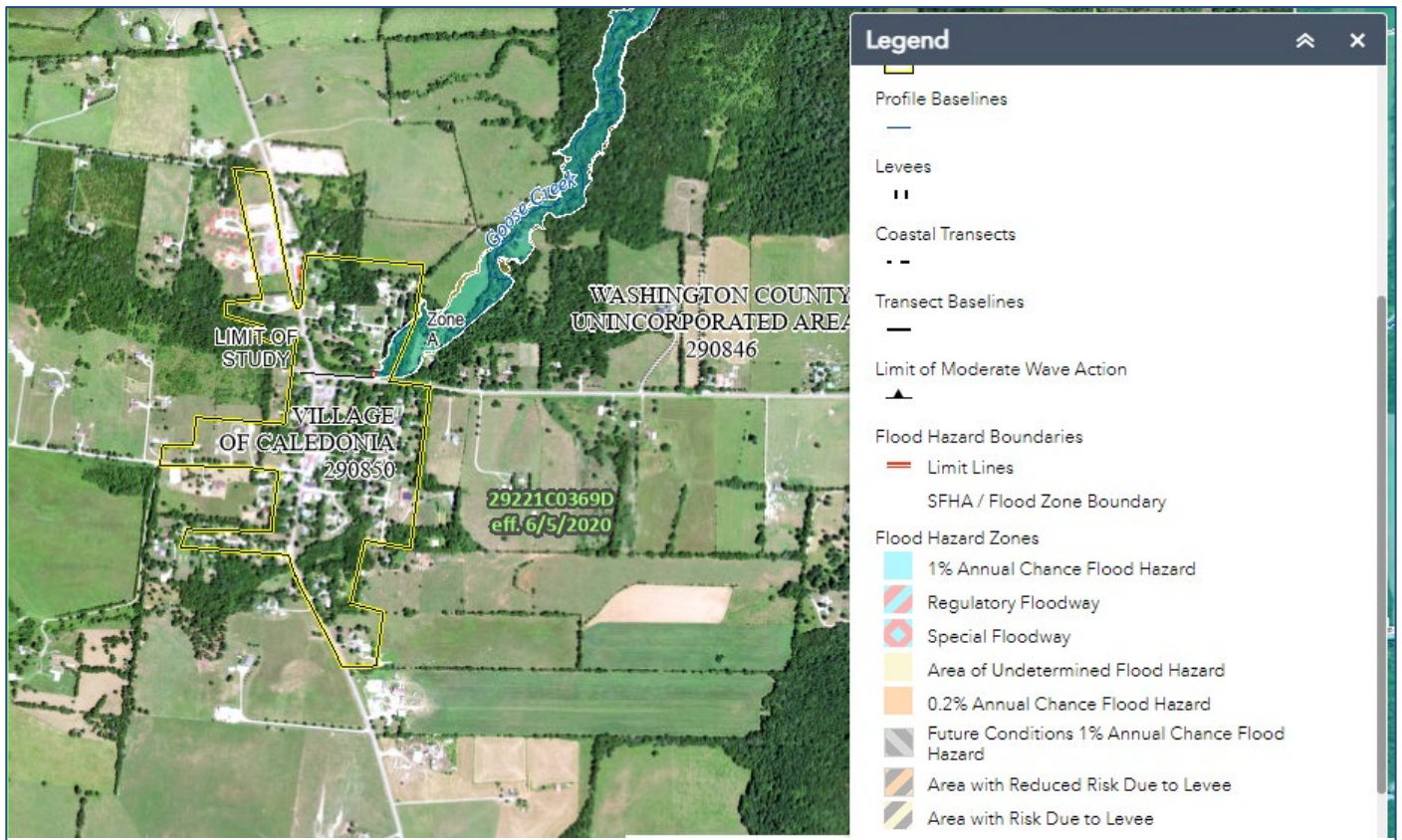
### ***Geographic Location***

Riverine flooding is most likely to occur in Special Flood Hazard Areas (SFHA). Below in **Figure 3.45** is a map of Washington County showing the floodplain boundaries. Following the county-wide map are FIRMs for Caledonia, Irondale, Mineral Point, and Potosi (**Figure 3.46 through Figure 3.49**). **Figure 3.50** shows a map of the school districts in Washington County with an overlay of the SFHA. There are no school districts within the county that have school building located in the floodplain. **Table 3.40** shows Washington County NCEI flood events by location between 2001 and 2020.

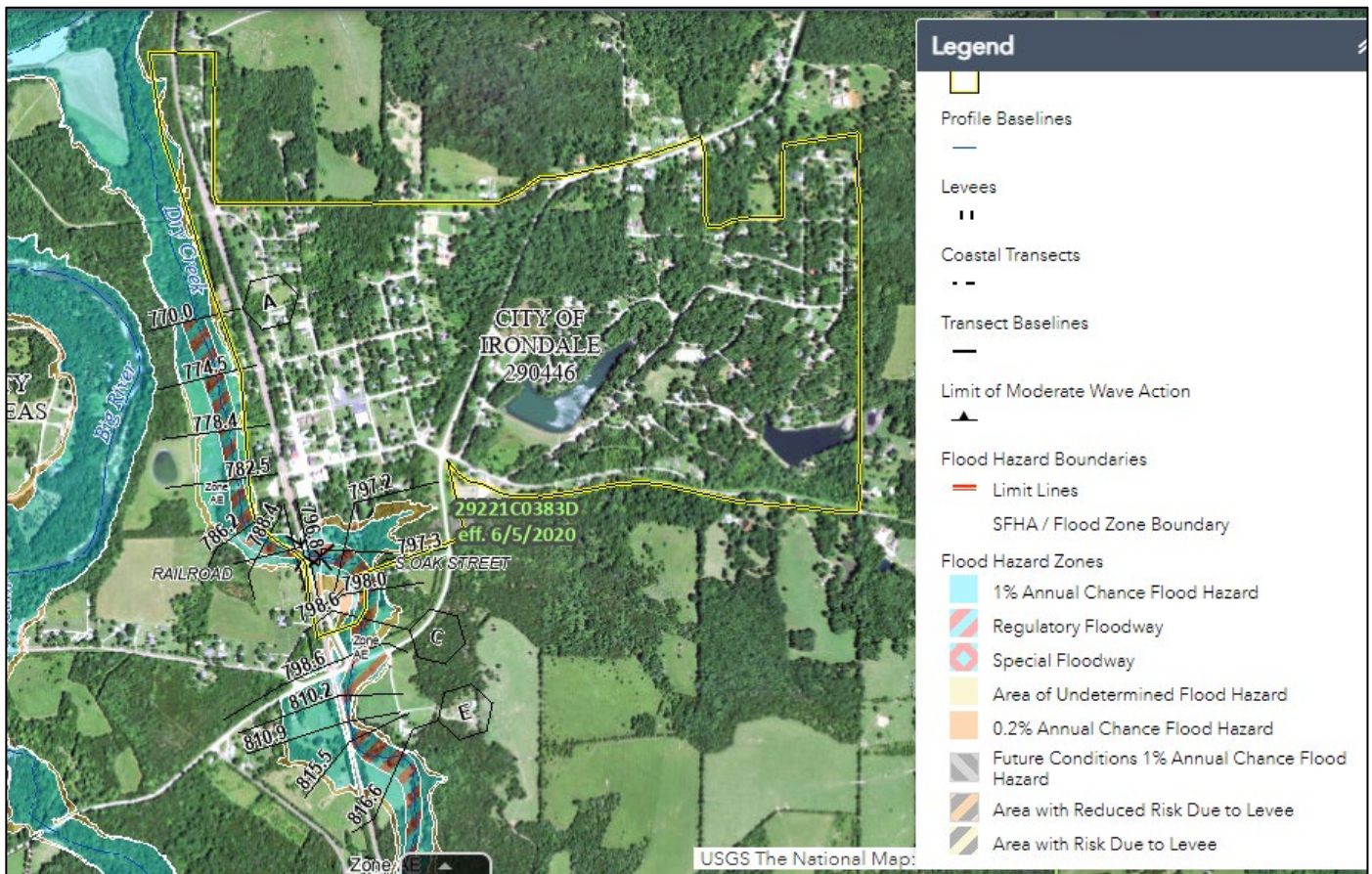
Figure 3.45. Map of Washington County with Special Flood Hazard Areas.



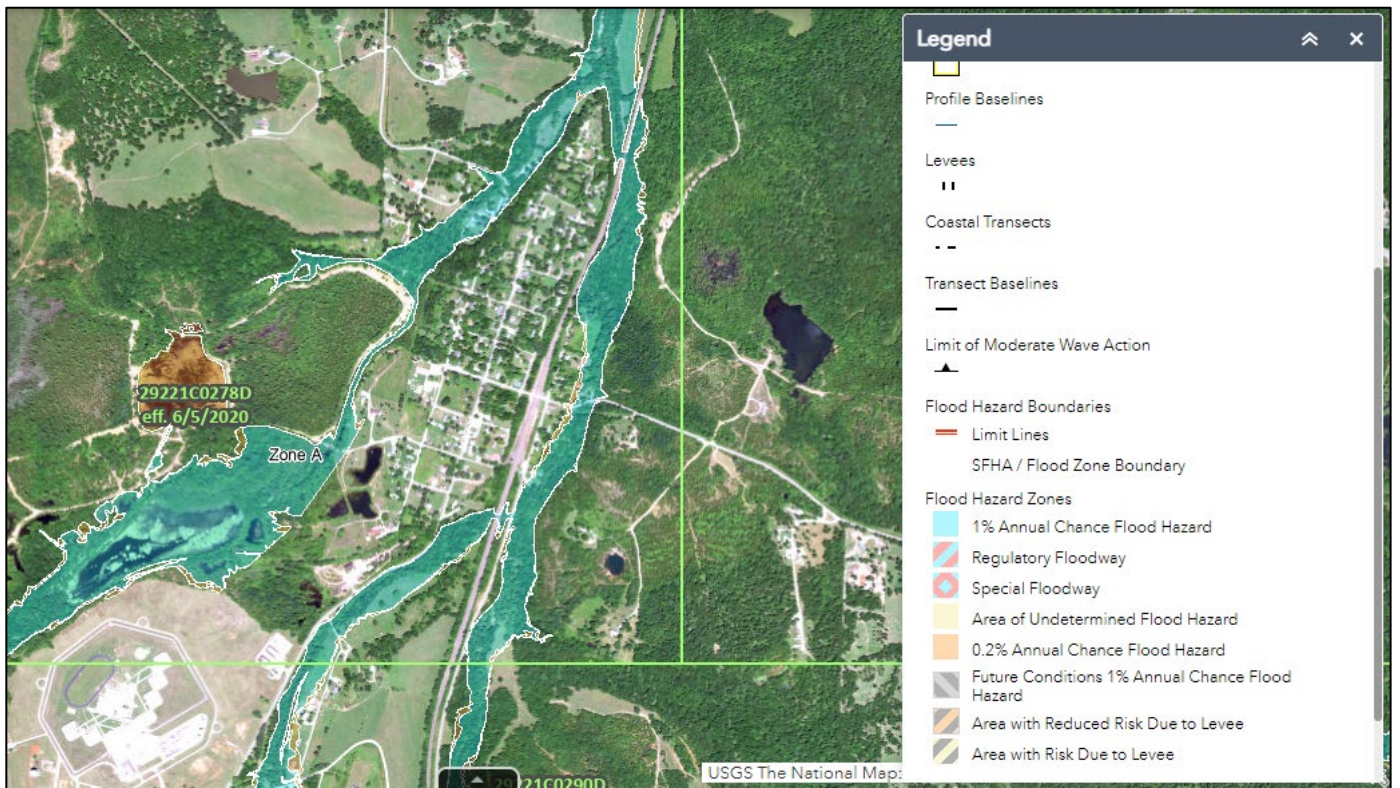
**Figure 3.46. Caledonia, Missouri Special Flood Hazard Areas (SFHAs)**



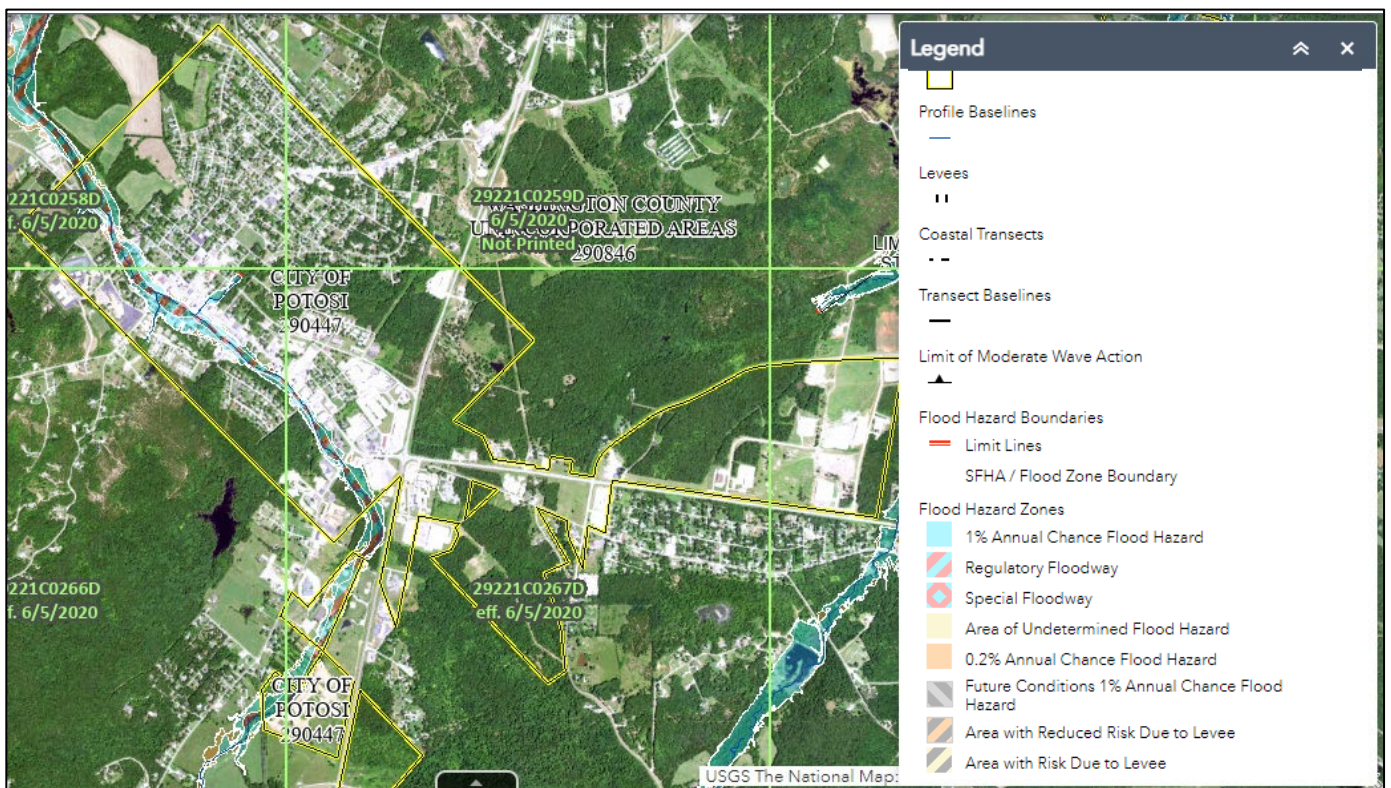
**Figure 3.47. Irondale, Missouri Special Flood Hazard Areas (SFHAs)**



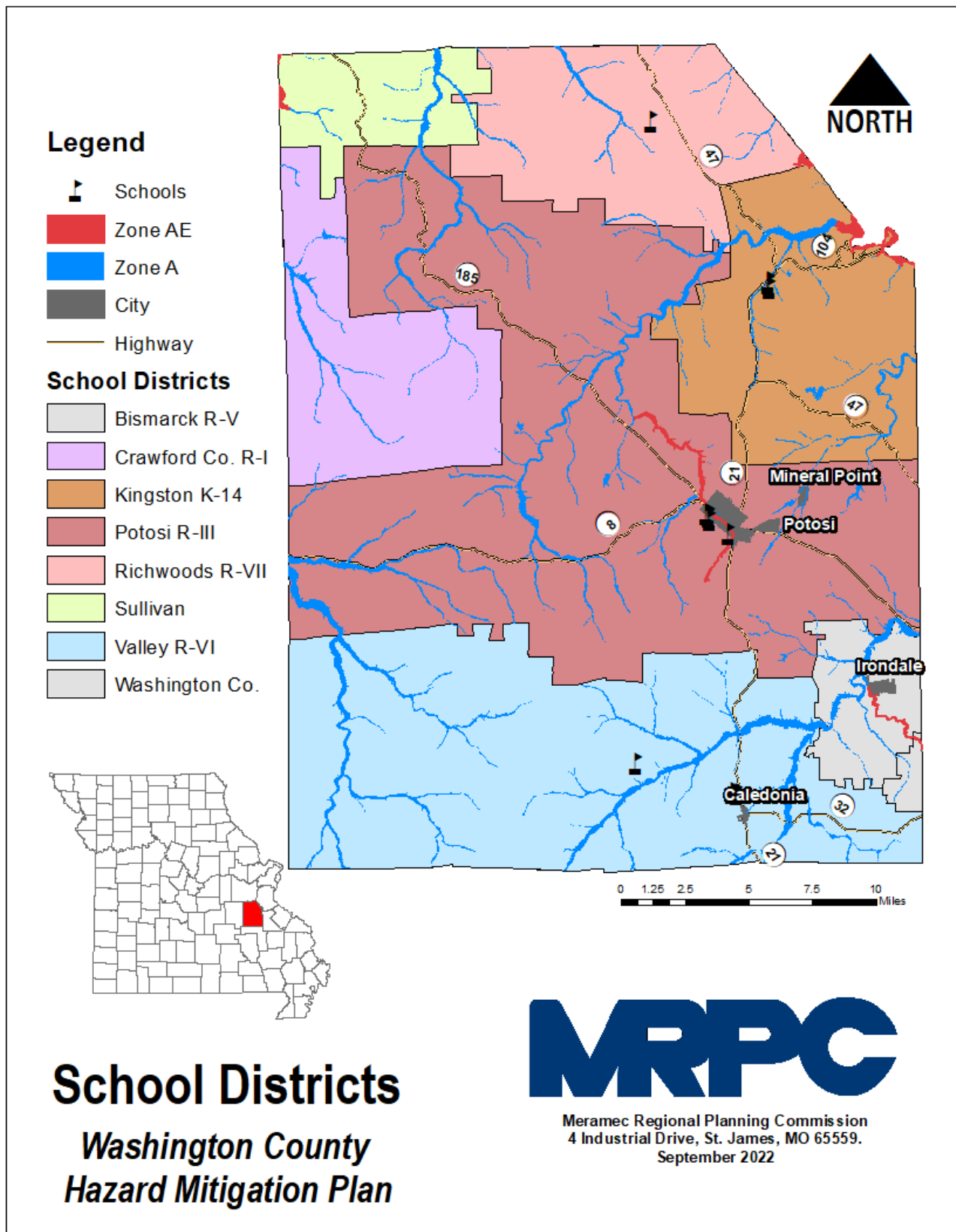
**Figure 3.48. Mineral Point, Missouri Special Flood Hazard Areas (SFHAs)**



**Figure 3.49. Potosi, Missouri Special Flood Hazard Areas (SFHAs)**



**Figure 3.50. Washington County School Districts and Special Flood Hazard Areas (SFHAs)**



**Table 3.40. Summary of Washington County NCEI Flood Events by Location, 2001-2020**

Location	# of Events
Potosi	1
Pea Ridge	1

Source: National Centers for Environmental Information Storm Events Database

Flash flooding occurs in SFHAs and locations in the planning area that are low-lying. They also occur in areas without adequate drainage to carry away the amount of water that falls during intense rainfall events. **Table 3.41** provides information in regards to flash flood events between 2001 and 2020.

**Table 3.41. Washington County NCEI Flash Flood Events by Location, 2001-2020**

Location	# of Events
Washington County - Countywide	3
Springtown	1
Pea Ridge	1
Maryden	2
Baryties	1
Potosi	2
Aptus	1
Trout	2
Richwoods	1
Hopewell	1
Courtois	2
Cruise	1

Source: National Centers for Environmental Information

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

Missouri has a long and active history of flooding over the past century, according to the 2018 State Hazard Mitigation Plan. Flooding along Missouri's major rivers generally results in slow-moving disasters. River crest levels are forecast several days in advance, allowing communities downstream sufficient time to take protective measures, such as sandbagging and evacuations. Nevertheless, floods exact a heavy toll in terms of human suffering and losses to public and private property. By contrast, flash flood events in recent years have caused a higher number of deaths and major property damage in many areas of Missouri.

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

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

When roads and bridges are inundated by water, damage can occur as the water scours materials around bridge abutments and gravel roads. Floodwaters can also cause erosion undermining roadbeds. In some instances, steep slopes that are saturated with water may cause mud or rockslides onto roadways. These damages can cause costly repairs for state, county, and city road and bridge maintenance departments. When sewer back-up occurs, this can result in costly clean-up for home and business owners as well as present a health hazard. Further information regarding scour critical

bridges can be found in **Section 3.2.2**.

Between 2001 and 2020, there were no recorded flood-related crop insurance claims due to flooding within Washington County<sup>29</sup>.

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

**Table 3.42** depicts jurisdictions within the planning area that participate in NFIP. In addition, **Table 3.43** provides the number of policies in force, amount of insurance in force, number of closed losses, and total payments for Washington County.

**Table 3.42. NFIP Participation in Washington County**

Community ID #	Community Name	NFIP Participant (Y/N)	Current Effective Map Date	Regular-Emergency Program Entry Date
290850	Caledonia	Y	06/05/20 (M)	04/15/16
290446	Irondale	Y	06/05/20	07/15/03
290571	Mineral Point	Y	06/05/20 (M)	03/15/93
290447	Potosi	Y	06/05/20 (M)	09/04/85
290646	Washington County	Y	06/05/20 (M)	05/24/10

Source: NFIP Community Status Book, 10/06/2021; BureauNet, <https://www.fema.gov/flood-insurance/work-with-nfip/community-status-book>; M= No elevation determined – all Zone A, C, and X: NSFHA = No Special Flood Hazard Area; E=Emergency Program;

**Table 3.43. NFIP Policy and Claim Statistics as of 06/23/2022**

Community Name	Policies in Force	Insurance in Force	Closed Losses	Total Payments
Washington County	15	\$2,695,000	1	\$0.00
Mineral Point	0	0	3	\$15,338.16
Potosi	8	\$1,026,000	12	\$86,672.46

Source: NFIP Community Status Book, [08/12/2020]; SEMA

\*Closed Losses are those flood insurance claims that resulted in payment.

Washington County has the highest number of policies in the planning area however, Potosi has the highest number of losses and total payments with \$86,672.46 compared to the county's 1 loss with no payment.

### ***RiskMAP***

Risk mapping, assessment, and planning is a FEMA program which provides communities with flood information and tools to enhance their mitigation plan and take action to better protect their citizens. The project kick-off meeting for RiskMAP in Washington County was held in November of 2016 and

<sup>29</sup> <http://www.rma.usda.gov/data/cause.html>

flood study review meeting was held in September of 2017.

### ***Repetitive Loss/Severe Repetitive Loss Properties***

Repetitive Loss Properties (RL) are those properties with at least two flood insurance payments of \$1,000 or more in a 10-year period.

According to SEMA, as of 09/24/2021, there are 2 repetitive loss properties in Washington County that have had 4 losses with total payments of \$51,420.52. The city of Mineral Point has one repetitive loss property which has had two losses with total payments of \$15,338.16. The city of Potosi has one repetitive loss properties which have had two losses with total payments of \$36,082.36. According to SEMA, no repetitive loss properties in the planning area have been mitigated.

**Table 3.44. Repetitive Loss Properties in Washington County\***

Jurisdiction	# of Properties	# Mitigated	Building Payments	Content Payments	Total Payments	# of Losses
Mineral Point	1	0	\$11,014.82	\$4,323.34	\$15,338.16	2
Potosi	1	0	\$31,082.36	\$5,000.00	\$36,082.36	2

\* Due to Federal restrictions on data sharing, the state was unable to provide full Repetitive Loss data or current Severe Repetitive Loss data.

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

There are no Severe Repetitive Loss properties in Washington County.

### ***Previous Occurrences***

**Table 3.45** provides information regarding Presidential Flooding Disaster Declarations between 2001 and 2020 for Washington County.

**Table 3.45. Washington County Presidential Flooding Disaster Declarations 2001 to 2020**

Declaration No.	Date	State	Incident Description
DR-1463	05/06/2003	Missouri	Severe Storms, Tornadoes, and Flooding
DR-1631	03/16/2006	Missouri	Severe Storms, Tornadoes, and Flooding
DR-1749	03/19/2008	Missouri	Severe Storms, and Flooding
DR-1847	06/19/2009	Missouri	Severe Storms, Tornadoes, and Flooding
DR-1980	5/9/2011	Missouri	Severe Storms, Tornadoes, Flooding
DR-4238	08/07/2015	Missouri	Severe Storms, Tornadoes, Straight-line Winds, and Flooding
EM-3374	01/02/2016	Missouri	Severe Storms, Tornadoes, Straight-Line Winds, and Flooding
DR-4250	01/21/2016	Missouri	Heavy Rains, Widespread Flash Flooding, and Flooding

DR-4317	05/24/17	Missouri	Severe Storms, Tornadoes, Straight-line Winds and Flooding
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Source: FEMA, Disaster Declarations for Missouri, Flooding

Data was obtained from the NCEI regarding flash and river flooding over the last 20 years. **Table 3.46** and **Table 3.47** provide this information. Additionally, narratives available for each event are included.

**Table 3.46. NCEI Washington County Riverine Flood Events Summary, 2001 to 2020**

Year	# of Events	# of Deaths	# of Injuries	Property Damages (\$)	Crop Damages (\$)
2007	1	0	0	0	0
2015	1	0	0	0	0

Source: NCEI, data accessed [10/06/2021]

#### Narratives on flood events:

1. **01/13/2007:** Several inches of rain caused flooding of small creeks and streams and low-water crossings mainly across southern Washington County.
2. **06/16/2015:** The Missouri Highway Patrol reported a vehicle attempted to cross a flooded low water crossing. The vehicle was swept into the stream and overturned. The driver was killed.

**Table 3.47. NCEI Washington County Flash Flood Events Summary, 2001 to 2020**

Year	# of Events	# of Deaths	# of Injuries	Property Damages (\$)	Crop Damages (\$)
2002	1	0	0	0	0
2005	1	0	0	0	0
2006	1	0	0	0	0
2008	2	0	0	0	0
2009	1	0	0	0	0
2011	3	0	0	0	0
2013	2	0	0	0	0
2014	1	0	0	0	0
2015	3	0	0	0	0
2016	2	0	4	0	0
2017	1	0	0	0	0
<b>Total</b>	<b>18</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>0</b>

Source: NCEI, data accessed [10/06/2021]

#### Narratives on flash flood events:

1. **05/12/2002:** Some of the worst flash flooding in recent years hit on Sunday, Mother's Day, and continued into early Monday. Around 6 inches of rain fell on ground already saturated by previous rain. For several counties, it was the worst flooding in memory. Iron County was especially hard hit. Virtually every creek and small stream flooded closing roads throughout the county. There were numerous water rescues as people were trapped in their cars. Emergency shelters in the County were opened to help stranded motorists and people who

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were flooded out of homes. The story was similar in Reynolds County as Highways 49 and 21 had to be closed. In Fredericktown, in Madison County, many city streets flooded. Several people were stranded in flooded vehicles and could not be reached for an hour or so. Numerous roads were flooded across Crawford, St. Francois, Ste. Genevieve and Washington Counties as well. The only death that occurred happened in Iron County near Ironton. A 43 year old man was trying to cross Stouts Creek on foot to get to his home to rescue his dogs. He was knocked down, but managed to grab hold of a tree. He was swept away and drowned by the rising water before rescue workers could reach him.

2. **04/21/2005:** Heavy rain from several thunderstorms caused flash flooding in Washington County, mainly in the central part of the county. Some areas around Potosi reported up to 7 inches of rain. Flooding was reported on Highway F 10 miles north of Potosi. Breton Creek in Potosi flooded, closing all the road crossings over the creek. There were reports of some basements flooded, otherwise there was no major damage.
3. **03/12/2006:** Several rounds of thunderstorms moved through the area dumping between 3 and 5 inches of rain in a short amount of time. Numerous county roads were closed. State Highway E was closed near Potosi. Also, Britton Creek in Potosi was out of its banks causing flooding of several streets in town.
4. **02/05/2008:** Two to four inches of rain fell over portions of Washington county causing flash flooding. Old Mines Creek rose quickly and flooded a portion of Highway 21 for a brief time. Also, numerous low water crossings, ditches and creeks in the Potosi area were out of their banks for a time.
5. **03/18/2008:** Two to three inches of rain fell onto already saturated soils in Washington county from the evening hours of March 17th through March 18th. Numerous roads and low water crossings were flooded including streets in Potosi, Highway 47 at Kingston Road northwest of Cruise Mill, and New Diggins Road in Springtown.
6. **05/08/2009:** Up to three inches of rain fell in a short amount of time causing flash flooding. Numerous roads were flooded for a time including Mill and Jefferson streets in Potosi and New Diggins Road southeast of Potosi. Also, the Big River overtopped its banks and flooded portions of Highway M northeast of Caledonia.
7. **04/24/2011:** Between 4 and 6 inches of rain fell over several days causing flash flooding. Numerous roads were flooded including Route E.
8. **06/26/2011:** Up to two inches of rain fell in a short amount of time causing flash flooding. Several roads were flooded including Highway E between Blackwell and Cadet.
9. **07/13/2011:** Up to two inches of rain fell in a short amount of time causing flash flooding. Several roads were flooded including Highway F north northwest of Potosi.
10. **05/31/2013:** Up to five inches of rain fell in a short amount of time causing flash flooding. Highway 135 was flooded in several spots southeast of the intersection with Highway T for about a four mile stretch.
11. **06/01/2013:** Up to five inches of rain fell in a short amount of time causing flash flooding. Highway 135 was flooded in several spots southeast of the intersection with Highway T for about a four mile stretch.

12. **04/03/2014:** Up to five inches of rain fell in a short amount of time causing flash flooding. Several roads were flooded including Highway 185 between Pea Ridge and Caseyville.
13. **04/07/2015:** Up to three inches of rain fell in a short amount of time causing flash flooding. Several roads were flooded including Route U near intersection with John Smith Road.
14. **04/08/2015:** Up to three inches of rain fell in a short amount of time causing flash flooding in Potosi. Mine A Breton Creek overflowed its banks in town onto Jefferson Street. Several water rescues had to be made in this area.
15. **08/10/2015:** Up to five inches of rain fell in a short amount of time causing flash flooding. Numerous roads were flooded. Highway C, three miles east northeast of Courtois, was closed both ways due to Cub Creek well out of its banks.
16. **05/11/2016:** Up to four inches of rain in a short amount of time caused flash flooding across the northern portions of Washington County. Several water rescues had to be performed around the Richwoods area. Numerous roads were closed due to flooding including Highway 47 near Richwoods. Four people were treated for minor injuries.
17. **08/15/2016:** Up to 6 inches of rain fell over already saturated soil causing flash flooding. Numerous roads were flooded across the southeastern and eastern portions of Washington County. Holiday Shores Road was flooded and a water rescue had to be performed in this area. Also, Mounts Road (County Road 511) bridge over the Big River was under about 4 feet of water. The intersection of Highways 21 and 32 in Caledonia was flooded.
18. **04/29/2017:** Between 5 and 7 inches of rain fell causing widespread flash flooding. Numerous roads were flooded including Route CC between Highway 21 and Route E.

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

From the data obtained from the NCEI <sup>30</sup>, there were 2 riverine flood events (**Table 3.46**) over a period of 20 years. This information was utilized to determine the annual average percent probability of riverine flooding (**Table 3.48**). The probability of riverine flooding in Washington County per year is 10% percent (2 events/20 years x 100). Furthermore, data was obtained for flash flooding within the county. Washington County endured 18 flash flooding events (**Table 3.47**) over a 20 year period. The probability of flash flooding in Washington County per year is 90% (18 events/20 years x 100) (**Table 3.49**).

**Table 3.48. Annual Average % Probability of Riverine Flooding in Washington County**

Location	Annual Avg. % P
Washington County	10%

\*P = probability; see page 3.24 for definition.

**Table 3.49. Annual Average % Probability of Flash Flooding in Washington County**

Location	Annual Avg. % P
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<sup>30</sup> <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

Washington County	90%
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\*P = probability; see page 3.24 for definition.

## **Vulnerability**

### ***Vulnerability Overview***

For the vulnerability analysis of flooding for Washington County, data was obtained from the 2018 Missouri State Hazard Mitigation Plan. The 2018 Plan used the most recent release of Hazus, version 4.0, to model flood vulnerability and estimate flood losses due to the depth of flooding. Additional hazard data inputs were utilized, as available, to perform Hazus Level 2 analyses. This included the extensive use of the FEMA special flood hazard area data and RiskMAP flood risk datasets.

For the Hazus analysis, the flood hazard area and depth of flooding was determined for each county using one of three methods – depending on the data available for that county. Washington County does have digital FIRMS, the regulatory special flood hazard area was utilized. Next, depth grids were generated using cross sections from the FIRM database and/or hydraulic models in combination with the terrain elevation data from which the DFIRM was derived.

This method was preferred of the three methods, along with RiskMAP flood risk datasets.

In addition to the DFIRM, SEMA analyzed National Flood Insurance Program (NFIP) flood-loss data to determine areas of Missouri with the greatest flood risk. Missouri flood-loss information was obtained from BureauNet which documents losses from 1978 to the present (November 30, 2017, for the State Plan). With this flood-loss data there are limitations noted, including:

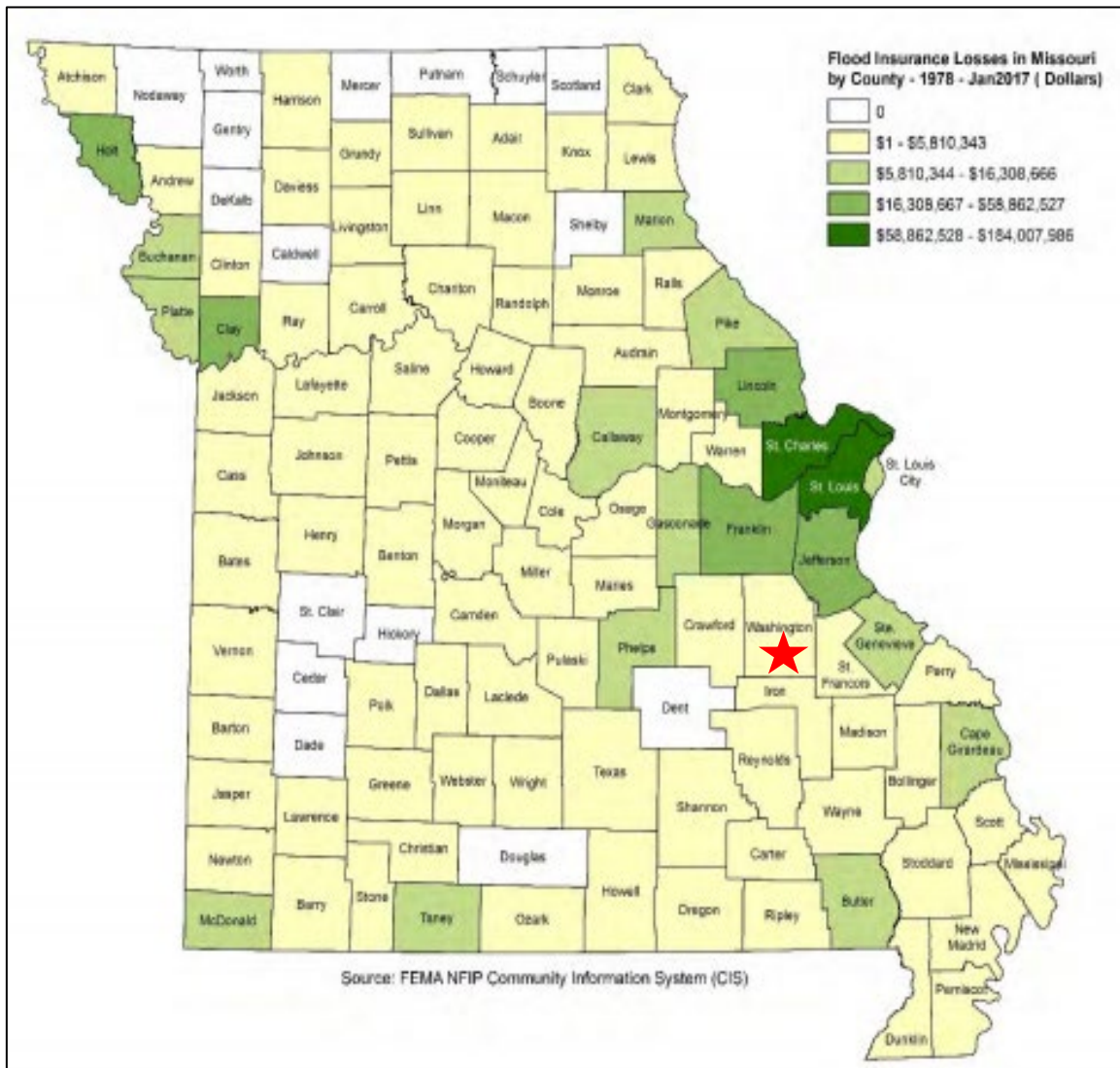
- Only losses to participating NFIP communities are represented
- Communities joined the NFIP at various times since 1978
- The number of flood insurance policies in effect may not include all structures at risk to flooding
- Some of the historic loss areas have been mitigated with property buyouts

**Figure 3.51** depicts the amount of flood insurance losses in Missouri by county for the period 1978-January 2017. Washington County falls in the \$1 - \$5,810,343 range of payments.

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**Figure 3.51. Map of Funds Paid Historically for Flood Insurance Losses in Missouri by**

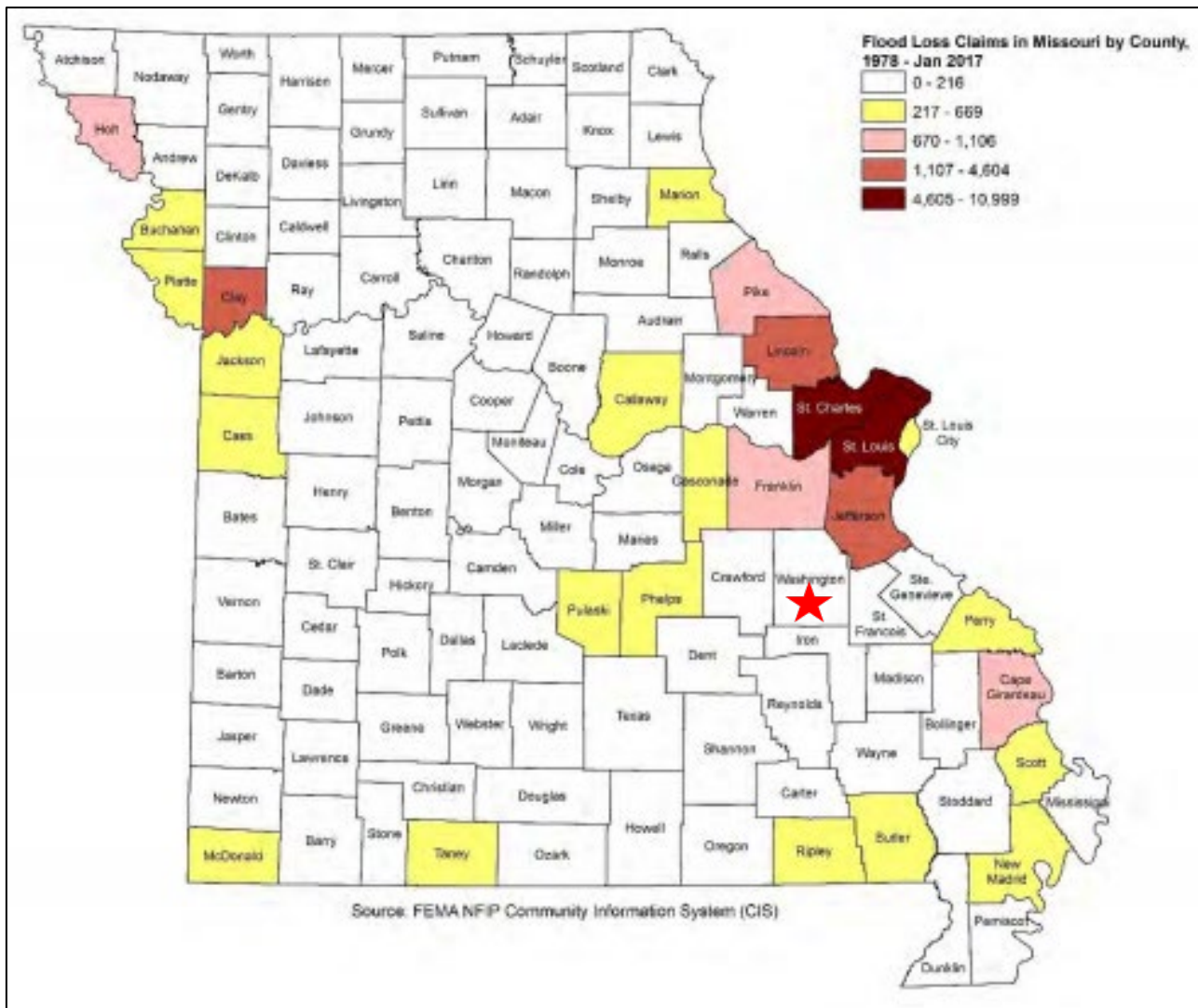
## County 1978 - January 2017



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.52** illustrates the number of flood loss claims made in Missouri during the same time period. Washington County had 0 - 216 claims during that timeframe.

**Figure 3.52. Flood Loss Claims in Missouri by County, 1978 – January 2017**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

Furthermore, the state analyzed potential loss estimates to flooding. The purpose of the analysis is to determine where flood losses can occur and the degree of severity using consistent methodology. These results were generated from DFIRM data and Hazus floodplain data. **Table 3.50** provides information regarding total direct building loss and income loss to Washington County. **Table 3.51** provides information on exposure of buildings. According to the Missouri Spatial Data Information Service (MSDIS) there are 117 residential structures at risk of flood. Hazus shows the number of building exposed to flood damage at 12, with 4 potentially substantially damaged in a one percent annual chance of a flood. This same analysis indicates that 431 people would be displaced in Washington County and 58 would need to be sheltered in the event of a major flood.

**Table 3.50. Total Direct Building Loss and Income Loss to Washington County**

County-wide Building Loss	Structural Damage	Contents Loss	Inventory Loss	Total Direct Loss	Total Income Loss	Total Direct and Income Loss	Calc. Loss Ratio
\$1,730,986,000	\$8,962,000	\$5,033,000	\$122,000	\$14,117,000	\$10,000	\$14,127,000	0.52

Source: 2018 Missouri State Hazard Mitigation Plan

**Table 3.51. Washington County Structures Exposure**

# MSDIS Residential Structures Exposed	# Hazus Buildings Exposed	# Substantially Damaged
117	12	4

Source: 2018 Missouri State Hazard Mitigation Plan

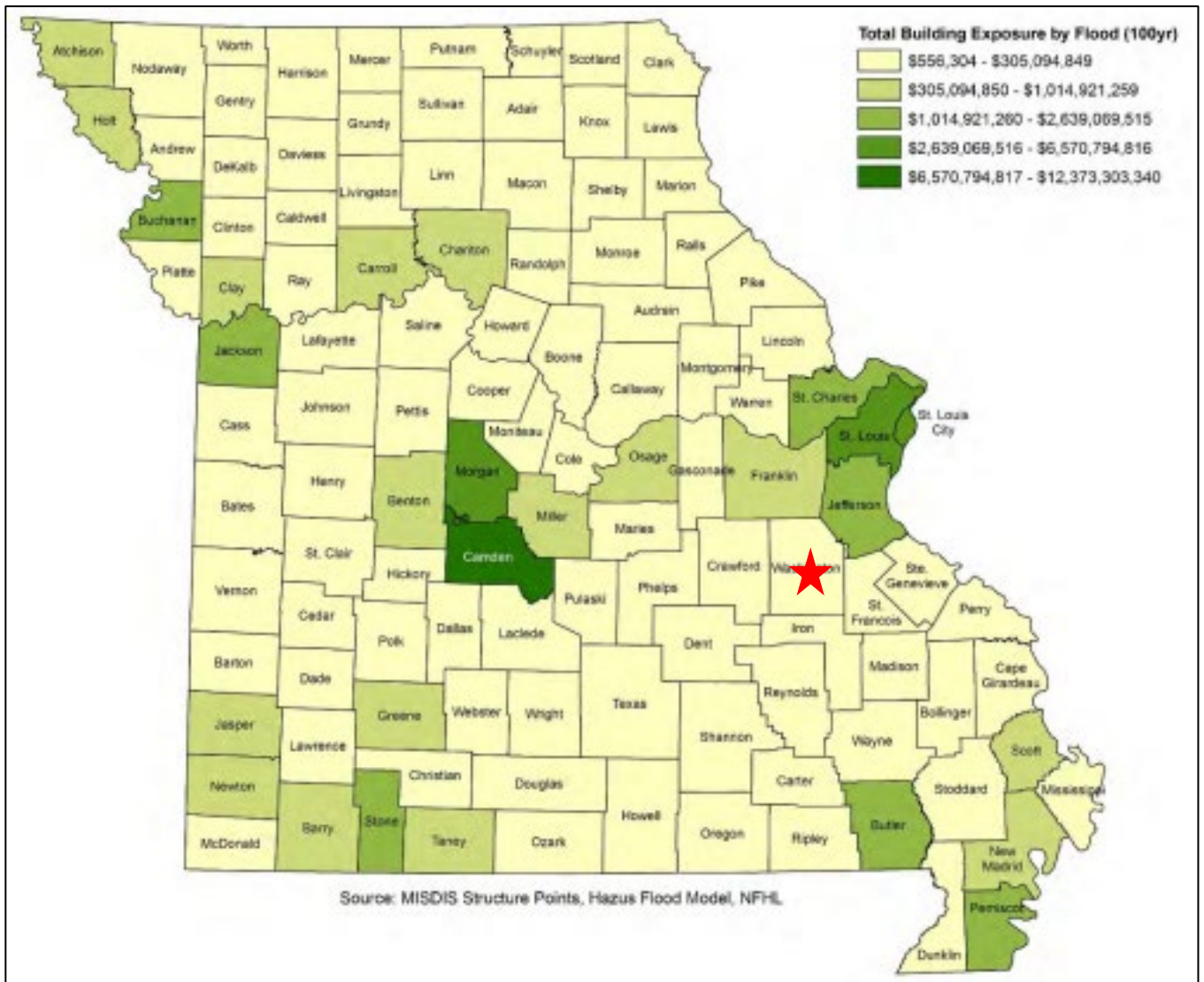
**Table 3.52** presents the results of the primary indicators for Washington County – residential, agricultural, commercial, education, government and industrial. This table illustrates the number of affected structures and estimated losses. **Figure 3.53** shows the building exposure for the Hazus Base-Flood Scenario. **Figure 3.54** illustrates the building impacted ratio for a 100-year flood.

**Table 3.52. Washington County Total Building Loss and Income Loss**

# Residential Structures	Total \$\$ of Loss	# Agriculture Structures	Total \$\$ of Loss	# Commercial Structures	Total \$\$ of Loss	# of Education Structures	Total \$\$ of Loss	# of Government Structures	Total \$\$ of Loss	# of Industrial Structures	Total \$\$ of Loss	Total # Population Affected	Total Loss – Hazus Layer
117	\$18,879,941	221	\$118,756	30	\$6,536,319	0	\$0	4	\$1,044,178	4	\$1,386,173	312	\$27,965,367

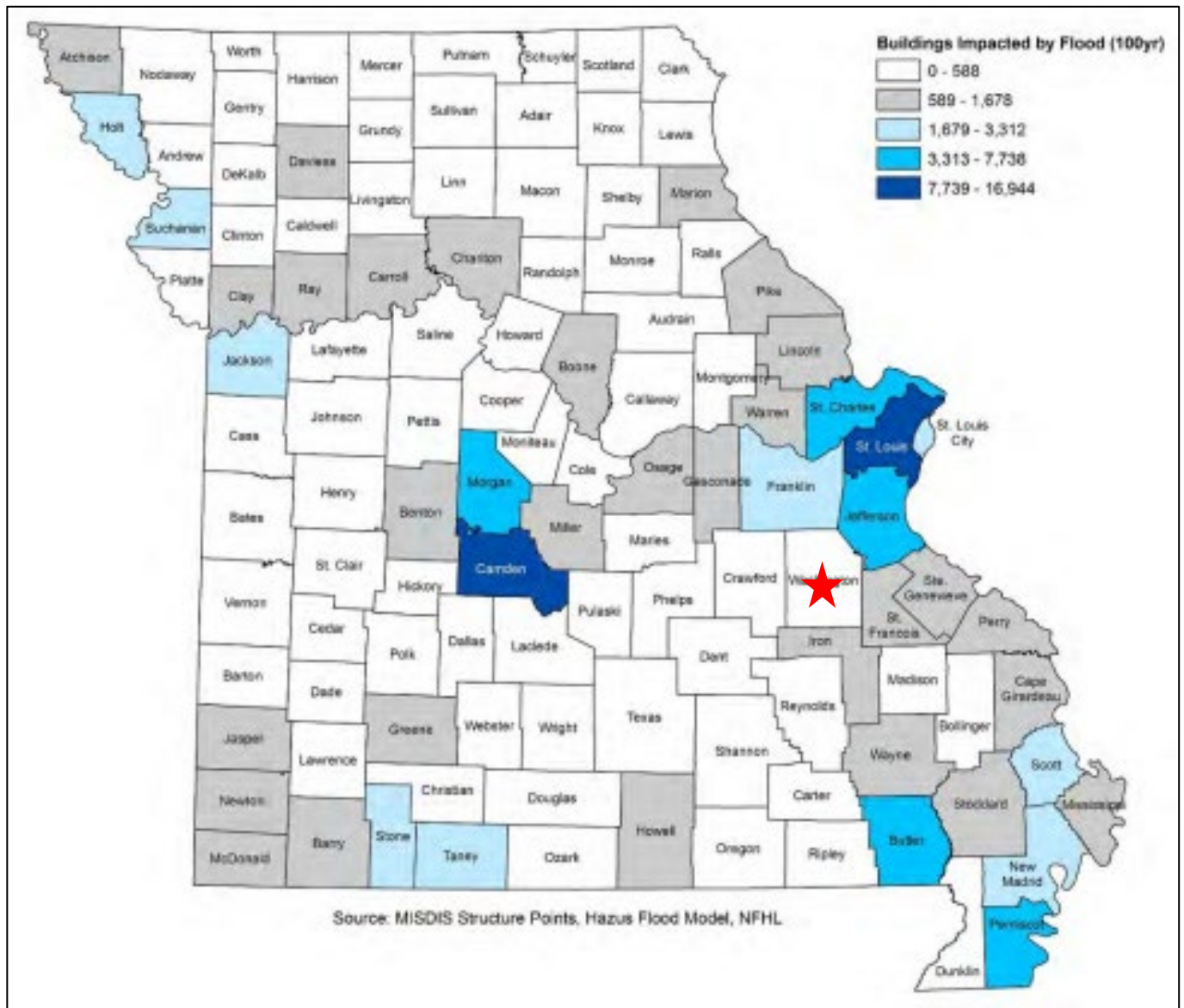
Source: 2018 Missouri State Hazard Mitigation Plan

**Figure 3.53. Hazus Countywide Base-Flood Scenarios: Building Exposure**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.54. Hazus Countywide Base-Flood Scenarios: Building Impacted Ratio**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

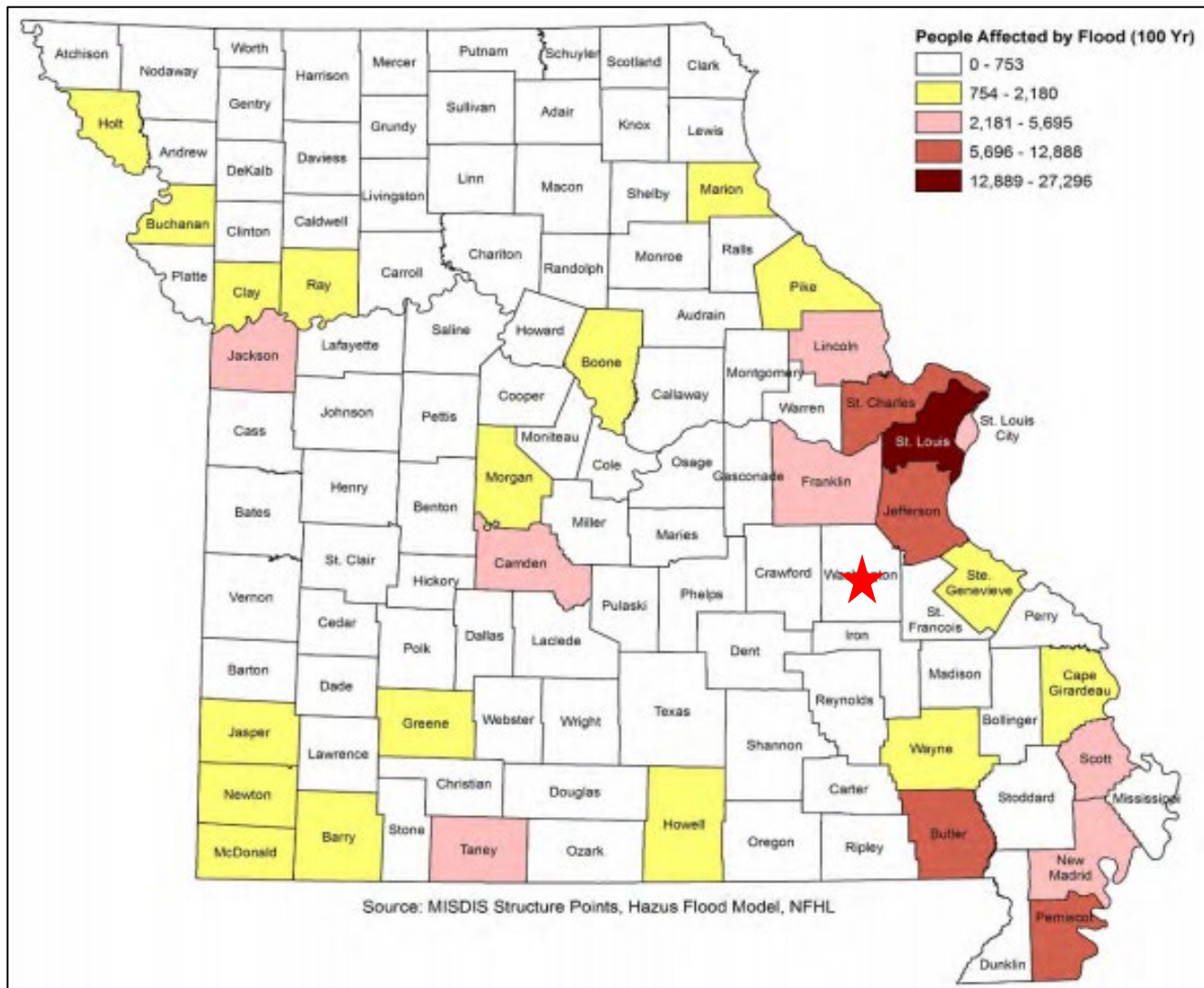
Lastly, the State determined the estimated number of displaced households and need for shelters within Washington County in the event of a 100-year flood. **Table 3.53** and **Figure 3.55** illustrate this information.

**Table 3.53. Estimated Displaced People and Shelter Needs for Washington County**

County	Displaced People	Displaced Population Requiring Shelter
Washington	431	58

Source: 2018 Missouri State Hazard Mitigation Plan

**Figure 3.55. Hazus Countywide Base-Flood Scenarios: Displaced People**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

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

Every jurisdiction in the county contains a portion of the 100 Year Floodplain. According to the HAZUS model, Washington County has a building loss ratio of 0.52 percent for countywide base-flood scenarios. However, the unprecedented flooding in 2013 suggests that future flood events could cause significant disruption in the county. The August 2013 flash flood caused significant damages to property (\$1,000,000). The statewide average building loss ratio is 1.40 which makes Washington County's ratio in the low range. Additionally, the county has 2 repetitive loss properties, Potosi has 1 repetitive loss property, and Mineral Point has one repetitive loss property. With the annual average probability for flooding at 10 percent and 90 percent for flash floods, Washington County's existing development is vulnerable to flood. Especially development located in low-lying areas, near rivers or streams, or where drainage systems are not adequate are prone to flooding.

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

Impact of future development is correlated to floodplain management and regulations set forth by the county and jurisdictions. Future development within low-lying areas near rivers and streams, or where interior drainage systems are not adequate to provide drainage during heavy rainfall events should be avoided. Additionally, future development would also increase impervious surface causing additional water run-off and drainage problems during heavy rainfall events.

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

Vulnerability to flooding slightly varies across the planning area. The jurisdictions most vulnerable to flooding include Unincorporated Washington County and Potosi. Other jurisdictions within the planning area are not as vulnerable; however, some do have a few properties within the floodplain.

### **Problem Statement**

The county has adopted a Floodplain Management Ordinance that regulates construction in the floodplain. Local governments should make a strong effort to further improve emergency warning systems to ensure that future deaths and injuries do not occur. Local governments should consider making improvements to roads and low water crossings that consistently flood by placing them on a hazard mitigation projects list, and actively seek funding to successfully complete the projects.

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### 3.4.6 Land Subsidence/Sinkholes

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.5, Page 3.218  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- <http://www.dnr.mo.gov/geology/geosrv/envgeo/sinkholes.htm>
- <http://www.businessinsider.com/where-youll-be-swallowed-by-a-sinkhole-2013-3>
- <http://water.usgs.gov/edu/sinkholes.html>
- <http://pubs.usgs.gov/fs/2007/3060/>
- Missouri hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<http://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9NOu-oPFWi9hkst/view> - User Guide
  - Total number of sinkholes by County
  - Vulnerability to sinkholes by County
  - Total number of mines by County
  - Vulnerability to mines by County
  - Total value of structures impacted by sinkholes by County
  - Total population impacted by sinkholes by County

#### **Hazard Profile**

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

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

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

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

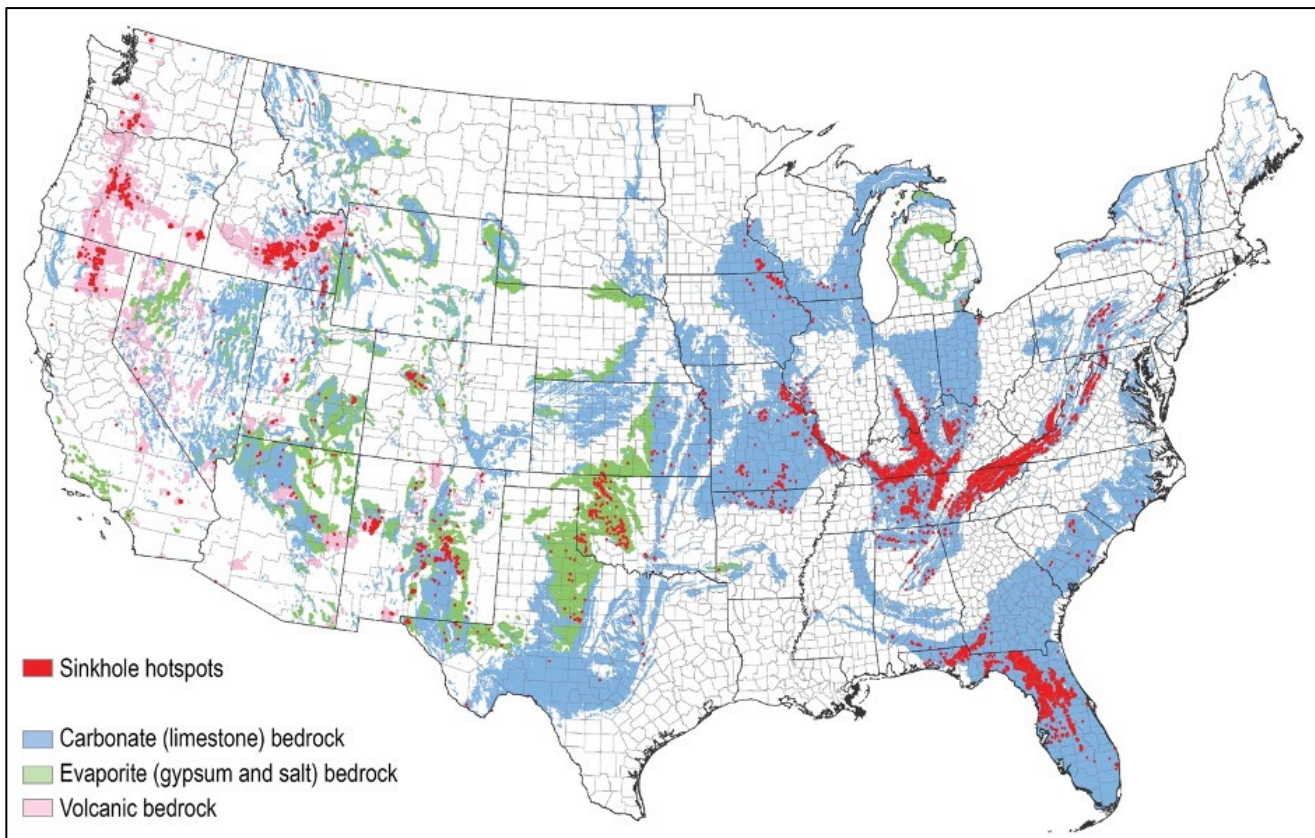
According to the U.S. Geological Survey (USGS), the most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Fifty-nine percent of Missouri is underlain by thick, carbonate rock that makes Missouri vulnerable to sinkholes. Sinkholes occur in Missouri on a fairly frequent basis. Most of Missouri’s sinkholes occur naturally in the State’s karst regions (areas with soluble bedrock). They are a common geologic hazard in southern Missouri, but also occur in the central and northeastern parts of the State. Missouri sinkholes have varied from

a few feet to hundreds of acres and from less than one to more than 100 feet deep. The largest known sinkhole in Missouri encompasses about 700 acres in western Boone County southeast of where Interstate 70 crosses the Missouri River. Sinkholes can also vary in shape like shallow bowls or saucers whereas other have vertical walls. Some hold water and form natural ponds.

### Geographic Location

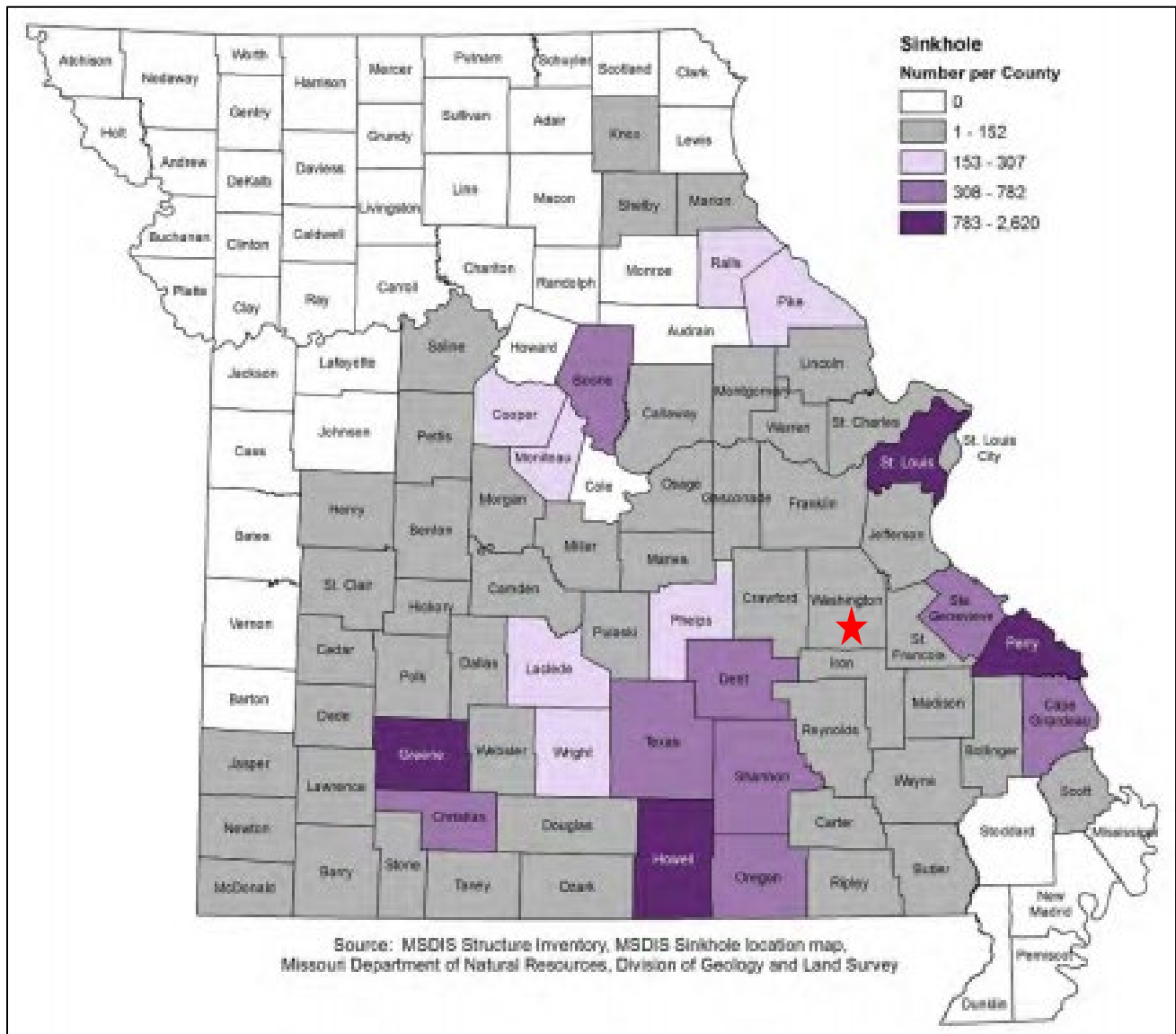
**Figure 3.56** depicts karst topography across the United States. Missouri's karst topography is comprised of carbonate rocks such as limestone, dolomite, and marble. Variability in areas prone to sinkholes does not differ greatly across the county. According to the 2018 Missouri State Hazard Mitigation Plan there are 15 sinkholes that have been recorded within Washington County (**Figure 3.57**). In addition, the Plan states that there are 1,566 mines in Washington County - as shown in **Figure 3.58**. According to the Missouri Department of Natural Resources, Washington County primarily produces refractory clay but has deposits of barite with lead, sedimentary limonite, and hematite. Activities such as mining or drilling are known to be responsible for the formation of sinkholes.

**Figure 3.56. Karst Map of the Conterminous United States - 2020**



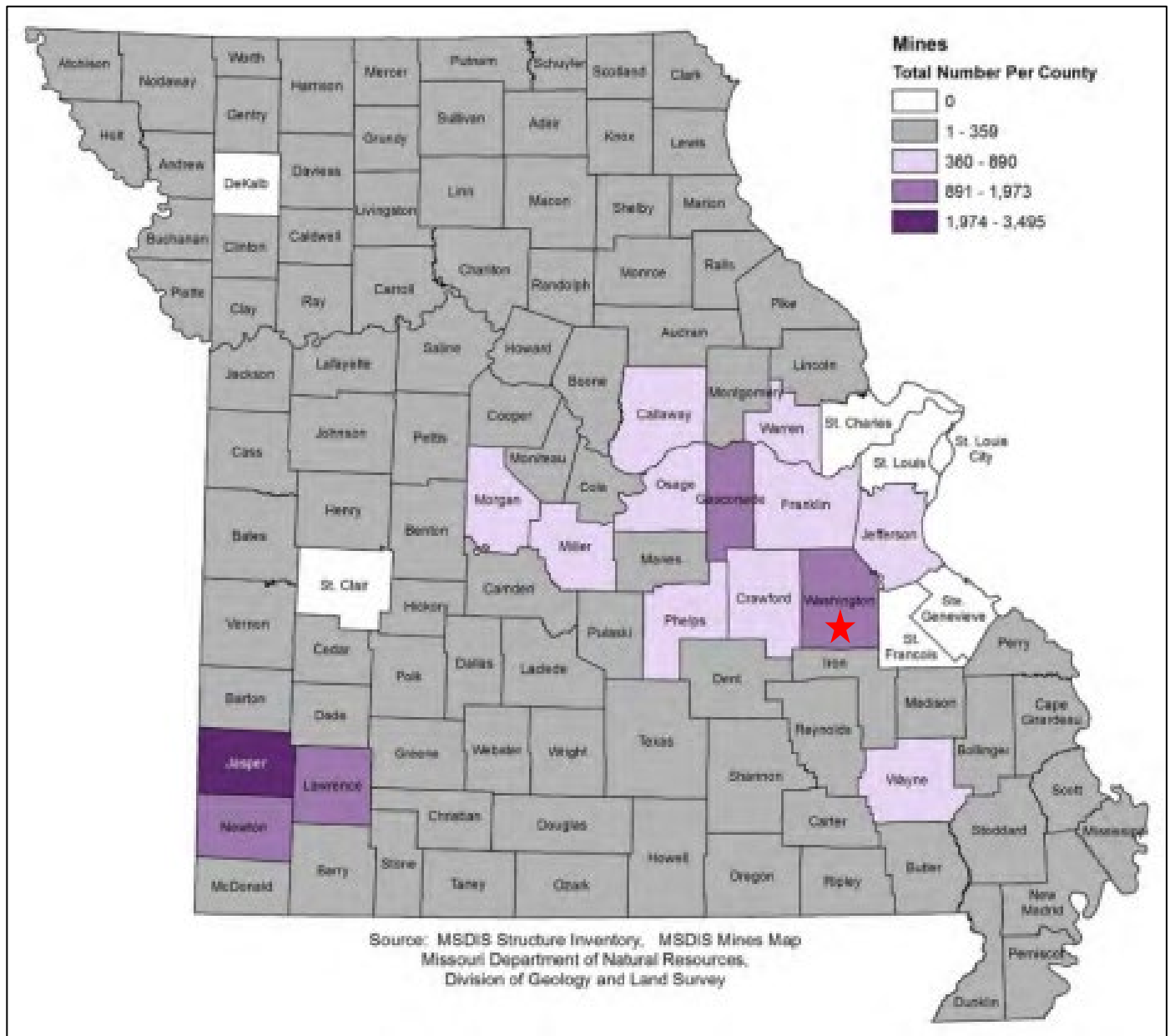
Source: <https://www.usgs.gov/media/images/karst-map-conterminous-united-states-2020>

**Figure 3.57. Sinkholes Counts per County**



Source: 2018 Missouri Hazard Mitigation Plan; \*Red star indicates Washington County

**Figure 3.58. Mines Counts Per County**



Source: 2018 Missouri Hazard Mitigation Plan; \*Red star indicates Washington County

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

Unlike earthquakes or other geologic hazards, there currently is no scale for measuring or determining the severity of sinkholes. However, geological and mining parameters can affect the magnitude and extent of sinkhole subsidence. As previously noted, natural sinkholes develop in areas where the rock below the surface is limestone, carbonate rock, salt beds or any type of rock that can naturally be dissolved by groundwater circulating through it. Artificial sinkholes form due to groundwater pumping, water main and sewer collapses and mine collapses.<sup>31</sup>

<sup>31</sup> 2018 Missouri Hazard Mitigation Plan

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







The 2018 State Plan mentions 18 documented sinkhole "notable events". The plan stated that sinkholes are common to Missouri and the probability is high that they will occur in the future. To date, Missouri sinkholes have rarely had major impacts on development, nor have they caused serious damage.

### ***Previous Occurrences***



Although there are few sinkholes and sinkhole areas in Washington County, incidents have occurred in other parts of southern Missouri. Fortunately, there are no recorded incidents of death due to sinkholes in the county. Historically, it was noted in the 2013 Missouri State Hazard Mitigation Plan that a mine collapse occurred in Washington County; specific information was not available. Based on **Figure 3.57**, recorded sinkholes are rural in nature and reside within unincorporated parts of the county.

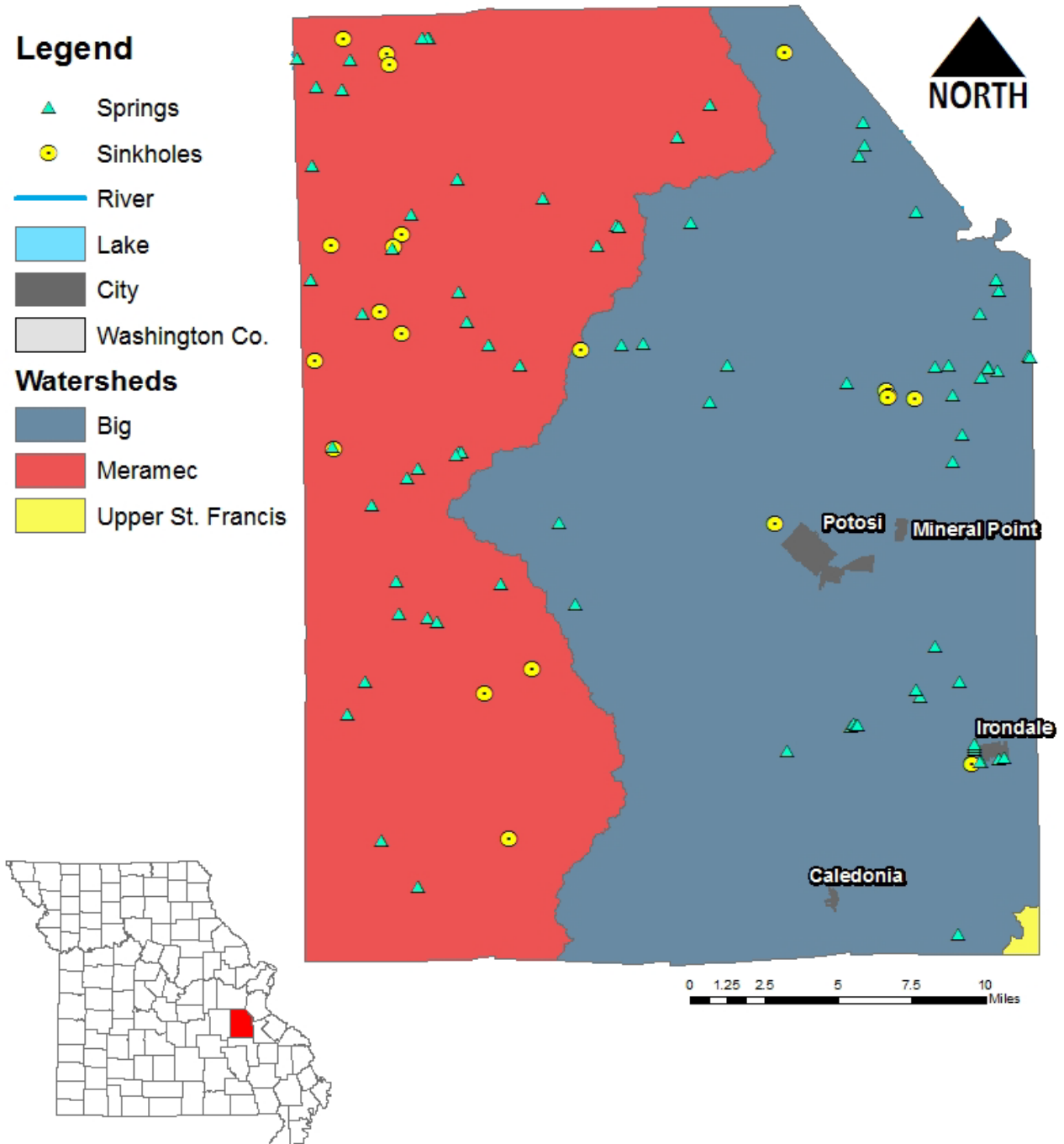
Figure 3.59. Washington County Watershed/Water Resources

### Legend

-  Springs
-  Sinkholes
-  River
-  Lake
-  City
-  Washington Co.

### Watersheds

-  Big
-  Meramec
-  Upper St. Francis



## Water Resources

*Washington County  
Hazard Mitigation Plan*



Meramec Regional Planning Commission  
4 Industrial Drive, St. James, MO 65559.  
February 2018

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

Due to the lack of data for previous sinkhole events in Washington County, a probability could not be calculated.

## **Vulnerability**

### ***Vulnerability Overview***

Unfortunately, no statistics are available for the number of subsurface locations that may potentially collapse in the future, forming a sinkhole. According to the state plan, if a county has 201-400 sinkholes, the risk is considered 2 – low-medium. For mines, the state plan calculates that Washington County's risk is rated as 5 – high. See **Table 3.54**, **Figure 3.60** and **Figure 3.61** further illustrate the sinkhole and mining rating values respectively.

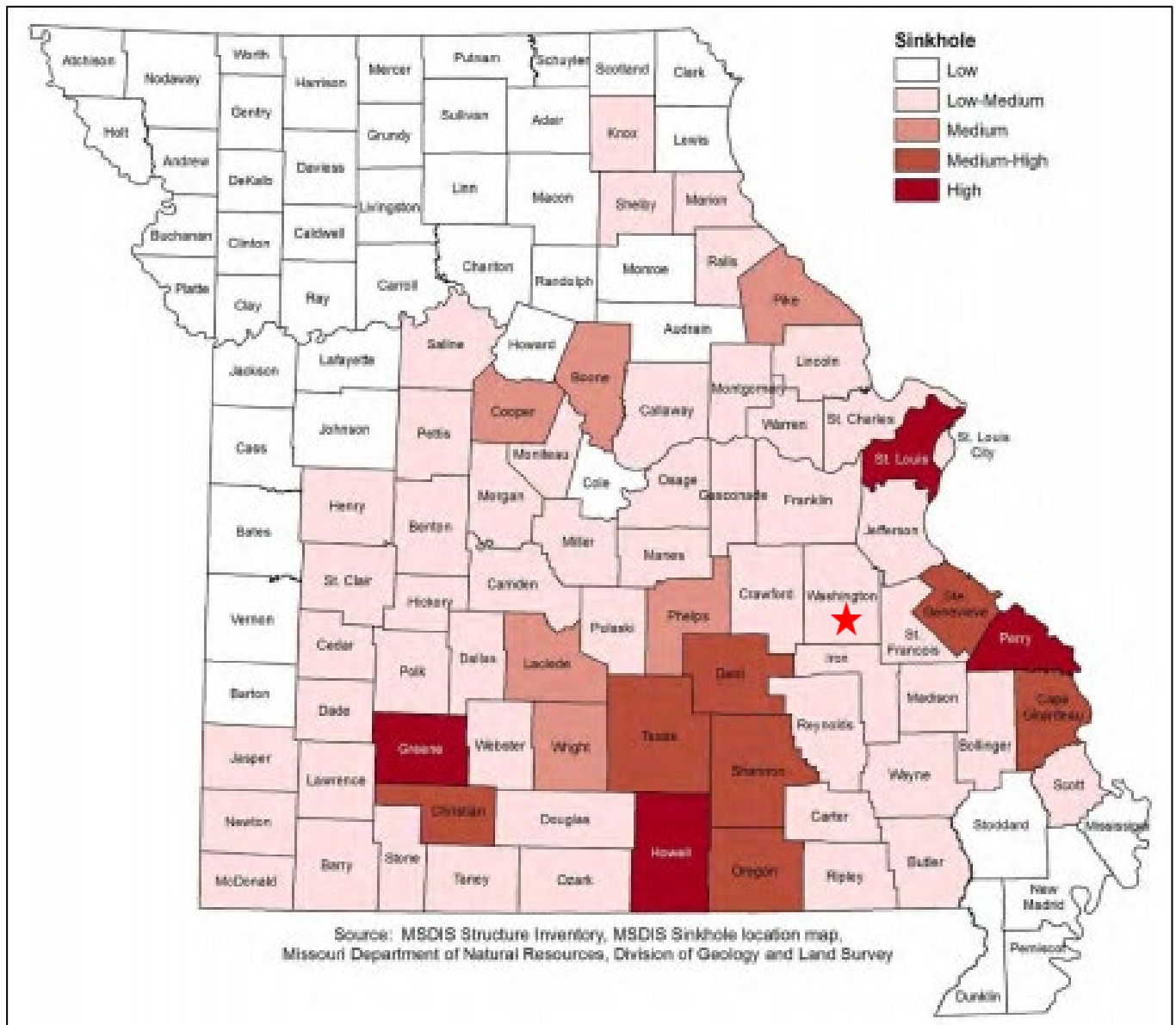
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**Table 3.54. Sinkhole/Mine Rating Values for Washington County**

<b>Factor</b>	<b>1 (Low)</b>	<b>2 (Low-medium)</b>	<b>3(Medium)</b>	<b>4 (Medium-high)</b>	<b>5 (High)</b>
Sinkholes per county	0	1-200	201-400	401-800	801+
Mines per county	0-100	101-250	251-500	501-750	751+

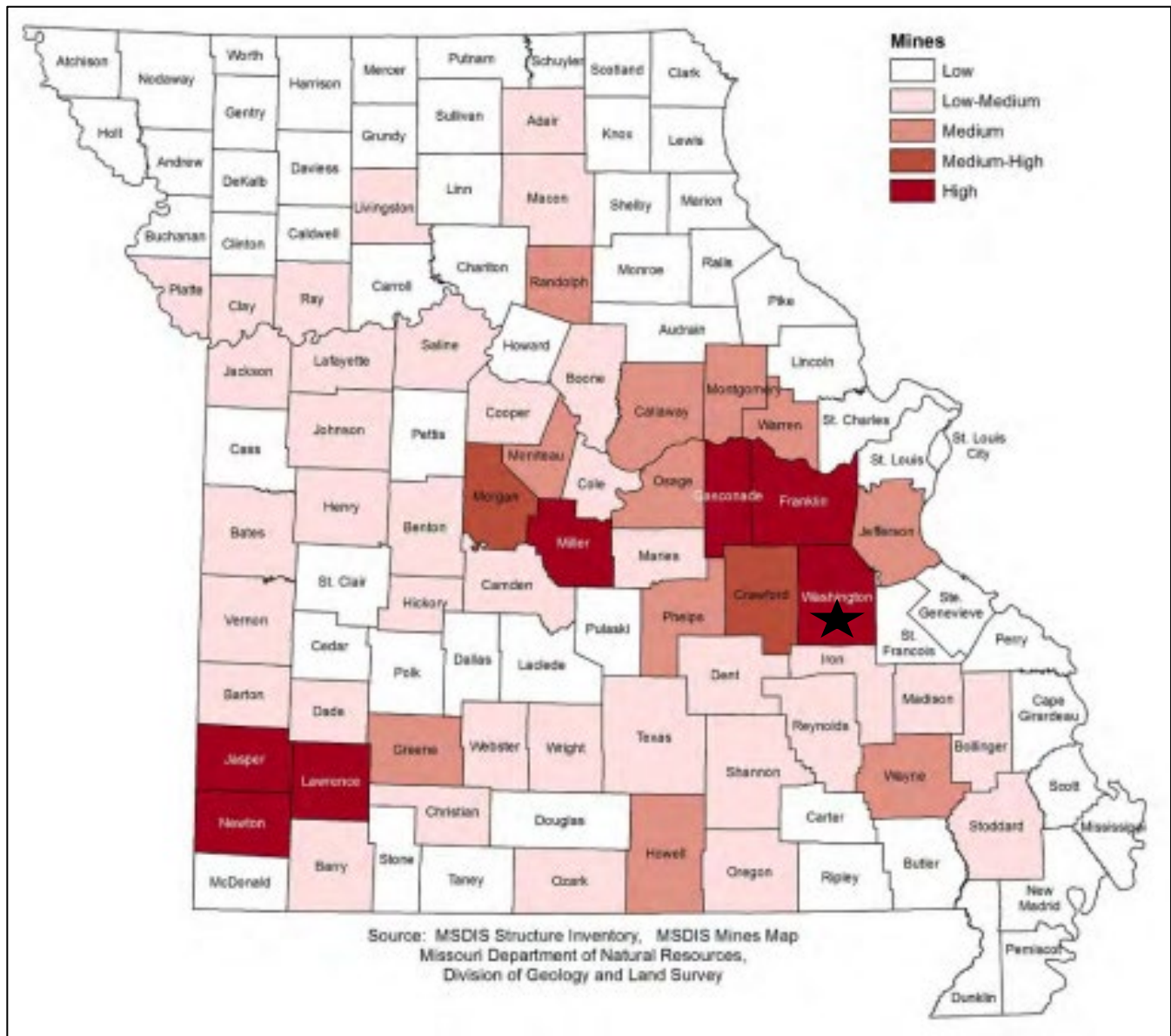
*Source: 2018 Missouri Hazard Mitigation Plan, Yellow highlight shows values for Washington County*

**Figure 3.60. Sinkhole Rating Value by County**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.61. Mine Rating Value by County**



Source: 2018 Missouri Hazard Mitigation Plan, \*Black star indicates Washington County

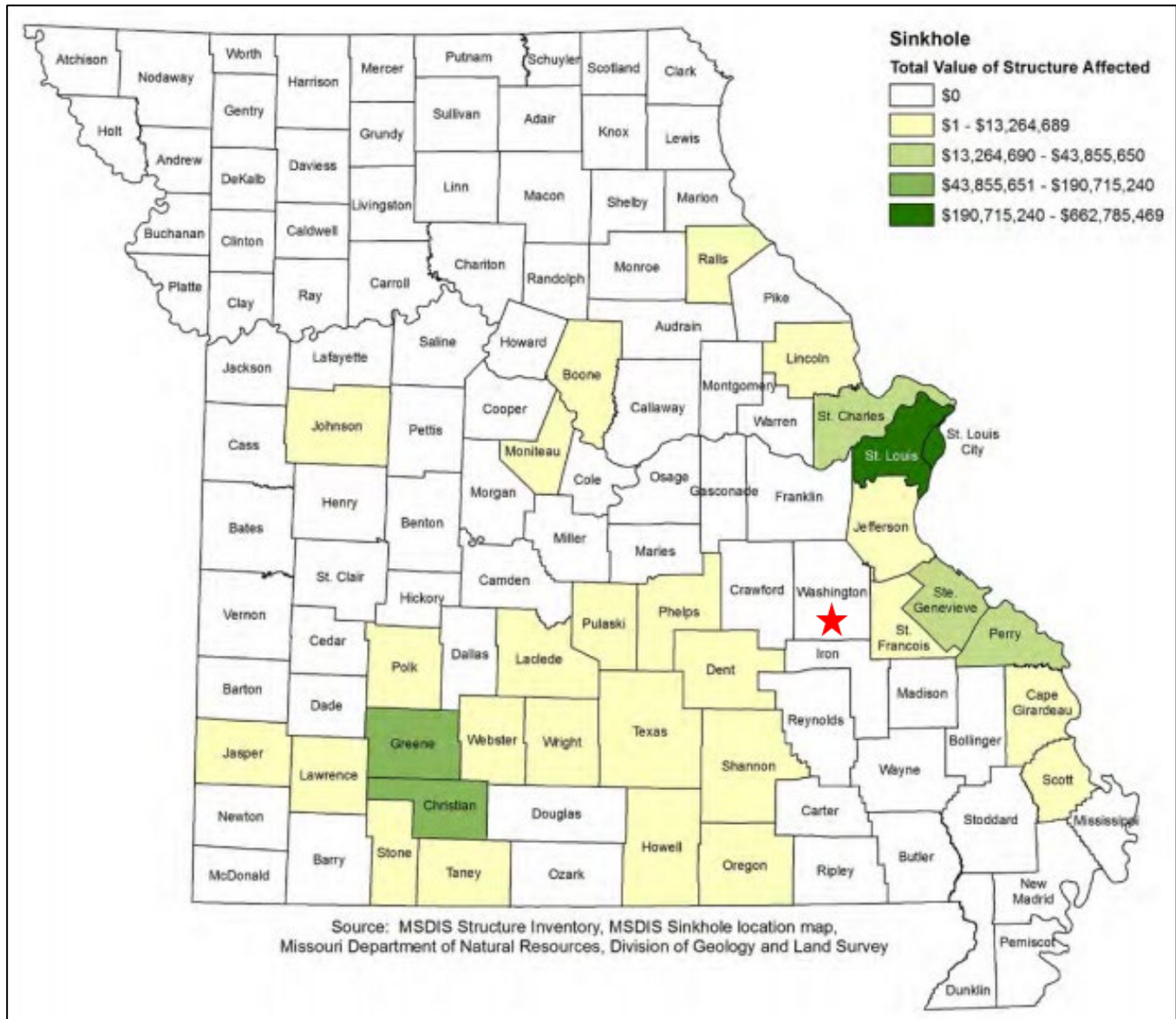
### Potential Losses to Existing Development

The most likely type of damage to occur in conjunction with a sinkhole collapse is property damage related to foundation disturbance. Signs include cracks in interior and exterior walls; doors and windows that no longer sit square or open and close properly; depressions forming in the yard; cracks in the street, sidewalk, foundation or driveway; and turbidity in local well water. All of these can be early indicators that a sinkhole is forming in the vicinity<sup>32</sup>. In the event of a sudden collapse, an open sinkhole can form in a matter of minutes and swallow lawns, automobiles, and homes. This has occurred in some parts of Missouri, particularly in the southwest part of the state, but there have been no dramatic incidents like this in Washington County.

<sup>32</sup> <http://sinkhole.org/commonsigns.php>

The 2018 Missouri Hazard Mitigation Plan devised a method of estimating potential losses using GIS data. **Figure 3.62** shows the ranking of structures that could potentially be impacted by sinkholes by county. This map shows that Washington County has \$0 total value of structures affected.

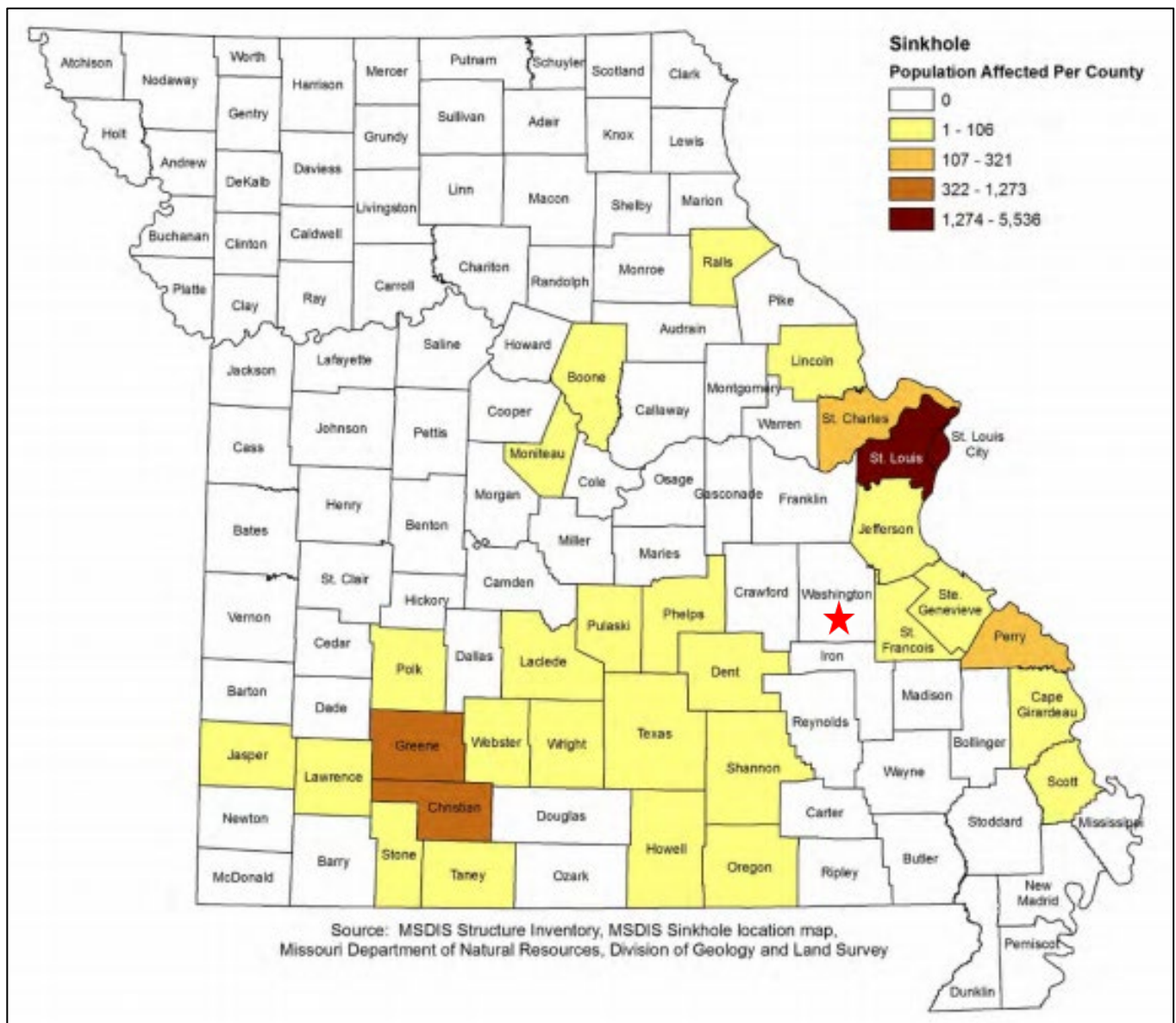
**Figure 3.62. Ranking of Structures Potentially Impacted by Sinkholes by County**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.63** shows the population potentially impacted by sinkholes and again, Washington County shows that zero people will be affected by sinkholes.

**Figure 3.63. Ranking of Population Potentially Impacted by Sinkholes by County**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

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

Future development over or near abandoned mines and in locations at risk of sinkhole formation will increase the hazard vulnerability. Information regarding regulations limiting construction near sinkholes is very limited. According to the state plan, Washington County's risk in regards to these hazards is moderately low.

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

According to the state plan, Washington County's risk is low to moderate. Based on the location of known sinkholes, the communities and school districts have less vulnerability than the unincorporated areas of the county. The jurisdiction most likely to be impacted by sinkholes is the city of Irondale. The other jurisdictions, both cities and school districts, are located in areas of the county where the

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concentration of sinkholes is much lower.

### **Problem Statement**

Sinkholes and sinkhole/mining areas are well documented by both the US Geological Survey and the Missouri Department of Natural Resources Geologic Resources Section. The risk of sinkhole collapse can be lessened by avoiding the construction of structures in these areas and avoiding those activities that significantly alter the local hydrology, such as drilling and mining. In addition, communities should avoid leaking water and sewer lines through appropriate maintenance and monitoring. Local residents should be educated on the risks associated with sinkholes and mines and advised to avoid placing themselves and their property in danger by building in sinkhole/mining areas. Communities with building codes should include prohibitions on building in known sinkhole/mining areas.

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### 3.4.7 Severe Thunderstorms Including High Winds, Hail, and Lightning

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Some Specific Sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.8, Page 3.280  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- FEMA 320, Taking Shelter from the Storm, 3rd edition, \_  
[http://www.weather.gov/media/bis/FEMA\\_SafeRoom.pdf](http://www.weather.gov/media/bis/FEMA_SafeRoom.pdf)
- Lightning Map, National Weather Service,  
<https://www.vaisala.com/sites/default/files/documents/WEA-MET-Annual-Lightning-Report-2020-B212260EN-A.pdf>
- Death and injury statistics from lightning strikes, National Weather Service.
- Wind Zones in the U.S. map, FEMA, [https://www.fema.gov/pdf/library/ism2\\_s1.pdf](https://www.fema.gov/pdf/library/ism2_s1.pdf);
- Annual Windstorm Probability (65+knots) map U.S. 1980-1994, NSSL,  
[http://www.nssl.noaa.gov/users/brooks/public\\_html/bigwind.gif](http://www.nssl.noaa.gov/users/brooks/public_html/bigwind.gif)
- Hailstorm intensity scale, The Tornado and Storm Research Organization (TORRO),  
<https://www.torro.org.uk/research/hail/hscale>;
- NCEI data;
- USDA Risk Management Agency, Insurance Claims, <https://www.rma.usda.gov/Information-Tools/Summary-of-Business/Cause-of-Loss>;
- National Severe Storms Laboratory – hail map,  
[http://www.nssl.noaa.gov/users/brooks/public\\_html/bighail.gif](http://www.nssl.noaa.gov/users/brooks/public_html/bighail.gif)
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<http://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Average annual high wind events by County
  - Average annual hail events by County
  - Average annual lightning events by County
  - Vulnerability to severe thunderstorm event by County
  - Annualized property loss for high wind events by County
  - Annualized property loss for lightning events by County
  - Annualized property loss ratio for high wind events by County
  - Annualized property loss ratio for hail events by County
  - Annualized property loss ratio for lightning events by County

#### **Hazard Profile**

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

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

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, as well as in clusters or lines. The National Weather Service defines a thunderstorm as "severe" if it includes hail that is one inch or more, or wind gusts that are at 58 miles per hour or higher. At any given moment across the

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world, there are about 1,800 thunderstorms occurring. Severe thunderstorms most often occur in Missouri in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms are heavy rains resulting in flooding (**Section 3.4.5**) and tornadoes (**Section 3.4.9**)

### ***High Winds***

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

### ***Lightning***

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

### ***Hail***

According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when thunderstorm updrafts carry raindrops upward into extremely cold atmosphere causing them to freeze. The raindrops form into small frozen droplets. They continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow before it hits the earth.

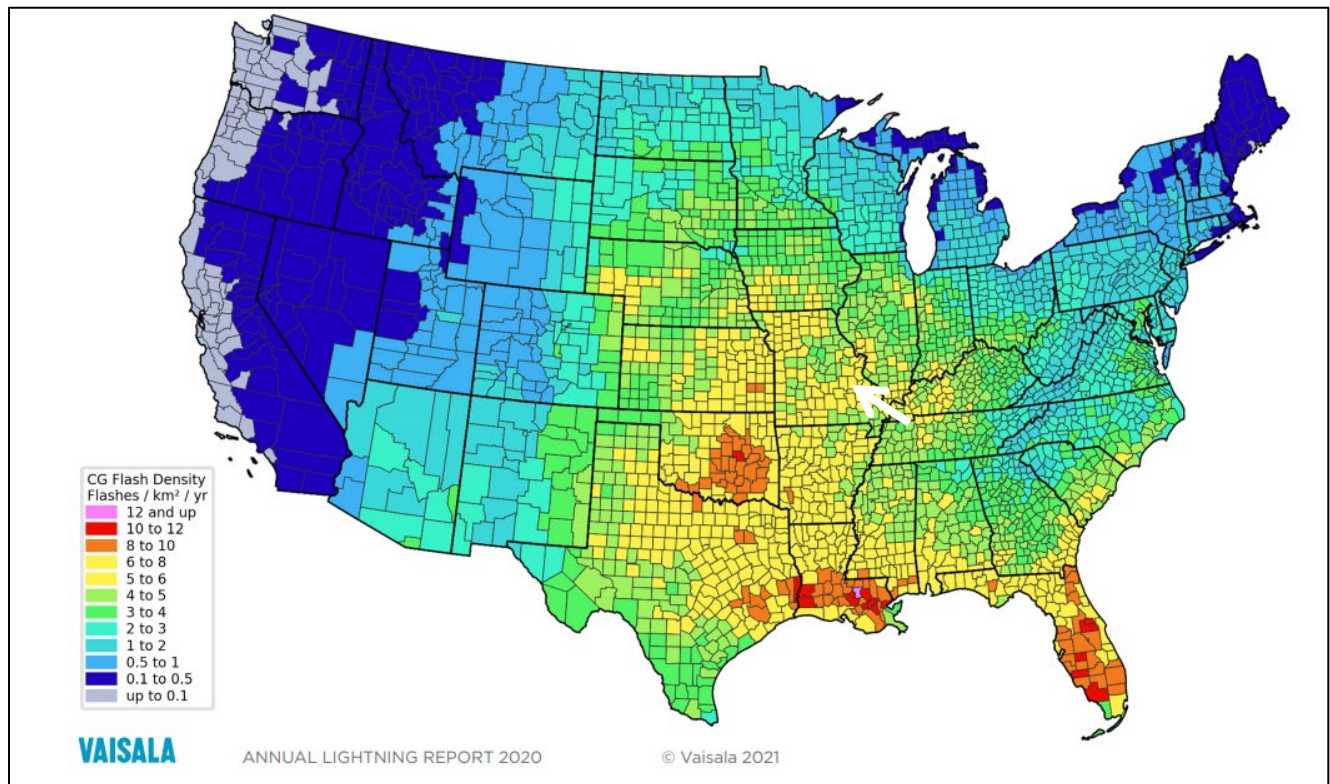
At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest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

### ***Geographic Location***

Thunderstorms, high winds, hail, and lightning events are an area-wide hazard that can take place anywhere across the United States. Furthermore, these events do not vary greatly across the planning area; they are more frequently reported in urbanized areas. Additionally, densely developed urban areas are more likely to experience damaging events.

**Figure 3.64** depicts the location and frequency of lightning in Missouri. Additionally, the map indicates that the flash density of Washington County ranges between 12 and 20 flashes per square kilometer per year.

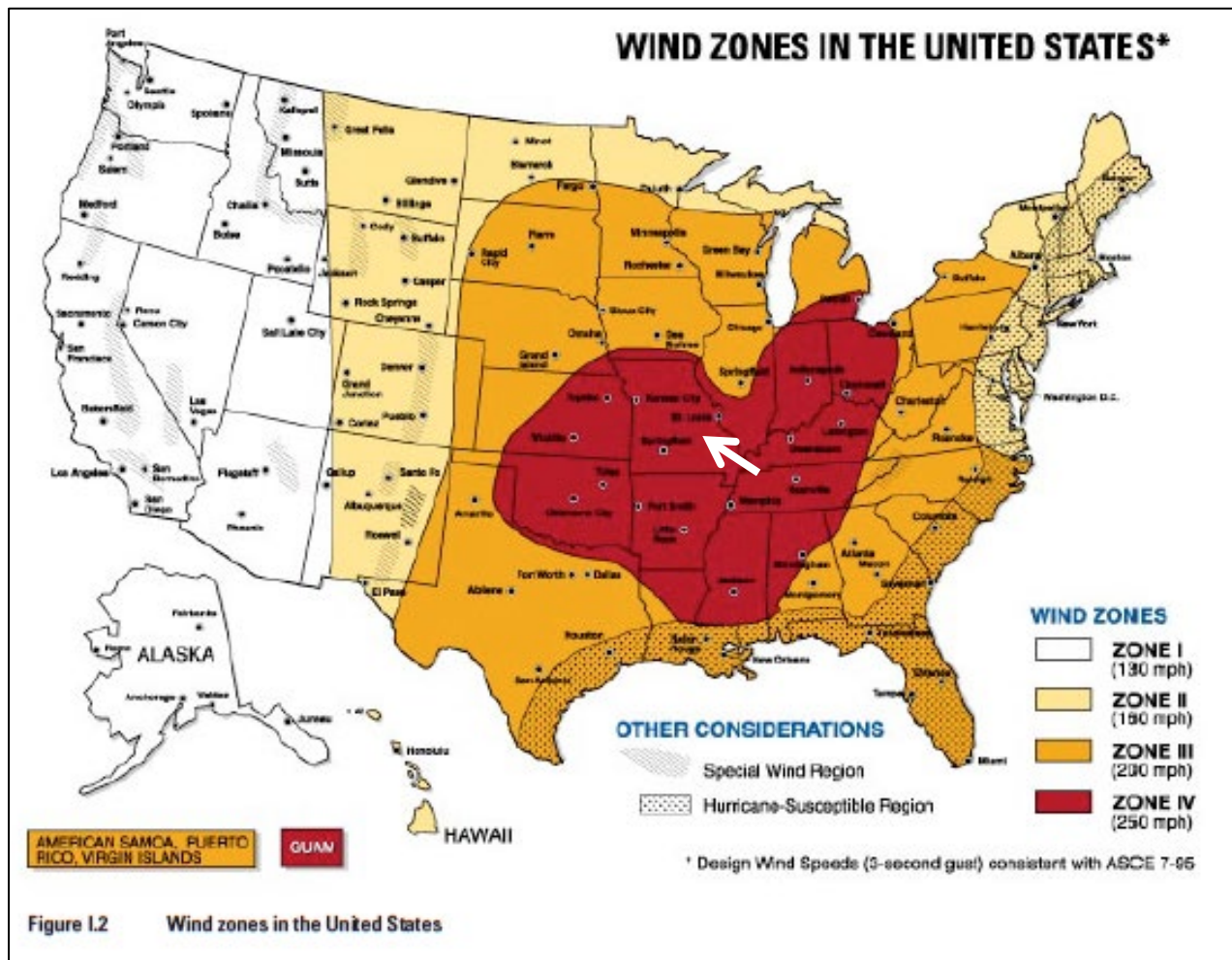
**Figure 3.64. Location and Frequency of Lightning in Missouri**



Source: National Weather Service, <https://www.vaisala.com/sites/default/files/documents/WEA-MET-Annual-Lightning-Report-2020-B212260EN-A.pdf> \*Washington County is indicated by a white arrow.

There are four wind zones that are characterized across the United States. These zones range from Zone I to Zone IV. All of Missouri as well as most of the Midwest fall within Zone IV. Within Zone IV, winds can reach up to 250 mph (**Figure 3.65**).

**Figure 3.65. Wind Zones in the United States**



Source: FEMA 320, *Taking Shelter from the Storm*, 3<sup>rd</sup> edition, [https://www.fema.gov/pdf/library/ism2\\_s1.pdf](https://www.fema.gov/pdf/library/ism2_s1.pdf)

\*Washington County is indicated by a white arrow.

### Severity/Magnitude/Extent

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

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

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

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.55** below describes typical damage impacts of the various sizes of hail.

**Table 3.55. Tornado and Storm Research Organization Hailstorm Intensity Scale**

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

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

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

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

Between 2001 and 2020, there were zero recorded crop insurance claims for Thunderstorms, lightning, high wind, and hail in Washington County.

The onset of thunderstorms with lightning, high wind, and hail is generally rapid. Duration is less than six hours and warning time is generally six to twelve hours. Nationwide, lightning kills 75 to 100 people each year. Lightning strikes can also start structural and wildland fires, as well as damage electrical systems and equipment.

### **Previous Occurrences**

Due to the lack of available parameters, heavy rain is utilized in the place of thunderstorms in **Table 3.56**. Moreover, thunderstorm wind and strong wind was included with high winds. NCEI data was obtained for lightning, and hail events between 2001 and 2020 as well (**Table 3.57** and **Table 3.58**). However, limitations to the use of NCEI reported lightning events include the fact that only lightning events that result in fatality, injury and/or property and crop damage are in the NCEI.

**Table 3.56. NCEI Washington County Heavy Rain Events Summary, 2001 to 2020**

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Rainfall (Inch)
2009	1	0	0	0	4.20
2013	1	0	0	0	4.00
2015	2	0	0	0	5.04
2016	1	0	0	0	4.68
2017	1	0	0	0	1.00
2018	6	0	0	0	3.57
2019	5	0	0	0	5.10
Total	17	0	0	0	-

Source: NCEI, data accessed [10/06/2021]

**Table 3.57. NCEI Washington County High Wind Events Summary, 2001 to 2020 (Thunderstorm)**

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Estimated Gust (kts.)
2001	1	0	0	0	-
2002	3	0	0	0	52
2003	3	0	0	-	65
2004	1	0	0	-	50
2005	4	0	0	7K	55
2006	9	0	0	17K	60
2008	2	0	0	15K	58

2009	2	0	0	1.05M	70
2010	1	0	0	-	52
2011	7	0	0	10K	52
2012	5	0	0	3.5K	52
2013	1	0	0	5K	52
2014	4	0	0	0	52
2017	1	0	0	25K	70
2018	6	0	0	24K	556
2019	5	0	0	26K	52
<b>Total</b>	<b>55</b>	<b>0</b>	<b>0</b>	<b>1.183M</b>	<b>-</b>

Source: NCEI, data accessed [10/06/2021]

**Table 3.58. NCEI Washington County Lightning Events Summary, 2001 to 2020**

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damage
-	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>

Source: NCEI, data accessed [10/06/2021]

**Table 3.59. NCEI Washington County Hail Events Summary, 2001 to 2020**

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Hail Size (inch)
2001	1	0	0	0	1.00
2002	4	0	0	10K	1.75
2003	4	0	0	0	2.75
2004	1	0	0	0	1.75
2005	1	0	0	0	1.00
2006	10	0	0	0	1.75
2007	3	0	0	0	2.00
2008	11	0	0	0	2.50
2009	6	0	0	0	1.75
2011	5	0	0	10K	1.75
2012	1	0	0	0	0.75
2014	1	0	0	0	1.50
2015	1	0	0	0	1.00
2016	7	0	0	0	1.25
2017	6	0	0	0	2.00
2018	5	0	0	0	1.00
2019	1	0	0	0	1.00
2020	3	0	0	0	1.25
<b>Total</b>	<b>71</b>	<b>0</b>	<b>0</b>	<b>20K</b>	<b>-</b>

Source: NCEI, data accessed [10/06/2021]

Agriculture is an important piece of the economy for Washington County. The tables below (**Table 3.60**) summarize past crop damages as indicated by crop insurance claims. The tables illustrate the magnitude of the impact on the planning area's agricultural economy. It should be noted that the USDA Risk Management Agency data does not align directly with the breakdown of hazards listed here. The claims database only listed "Excessive Moisture/Precipitation/ Rain" and "Wind/Excessive Wind" as two causes of loss categories that align with this hazard. Between 2001 and 2020 no insurance claims were paid out for damages due to moisture/precipitation/rain.

For the time period 2001-2020, there were no crop insurance claims made for wind and excessive wind damage.

**Table 3.60. Crop Insurance Claims Paid In Washington County from Excessive Moisture/Precipitation/Rain 2001-2020**

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

Source: USDA Risk Management Agency, Insurance Claims, <https://www.rma.usda.gov/Information-Tools/Summary-of-Business/Cause-of-Loss>

### **Probability of Future Occurrence**

From the data obtained from the NCEI <sup>33</sup>, annual average percent probabilities were calculated for heavy rainfall, high winds, lightning, and hail. Heavy rainfall has an 85 percent annual average percent probability of occurrence (17 events/20 years x 100) (**Table 3.61**). Heavy rainfall events can be found in **Table 3.56**.

The annual average percent probability for high winds within the county is 100 percent (55 event/20 years \* 100) with an average 2.75 events per year (**Table 3.62**). High wind events can be found in **Table 3.57**.

Lightning events have a 0 percent annual average percent probability of occurrence (**Table 3.63**) (0 events/20 years x 100) Lightning events can be found in **Table 3.58**.

Lastly, the annual average percent probability of hail occurrence is 100 percent (71 events/20 years x 100) with an average of 3.55 events per year (**Table 3.64**). Hail events can be found in **Table 3.59**.

**Table 3.61. Annual Average % Probability of Heavy Rain in Washington County**

Location	Annual Avg. % P
<b>Washington County</b>	85%

\*P = probability; see page 3.24 for definition.

<sup>33</sup> <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

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**Table 3.62. Annual Average % Probability of High Winds in Washington County**

Location	Annual Avg. % P	Avg. # of Events
Washington County	100%	2.75

\*P = probability; see page 3.24 for definition.

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**Table 3.63. Annual Average % Probability of Lightning in Washington County**

Location	Annual Avg. % P
Washington County	0%

\*P = probability; see page 3.24 for definition.

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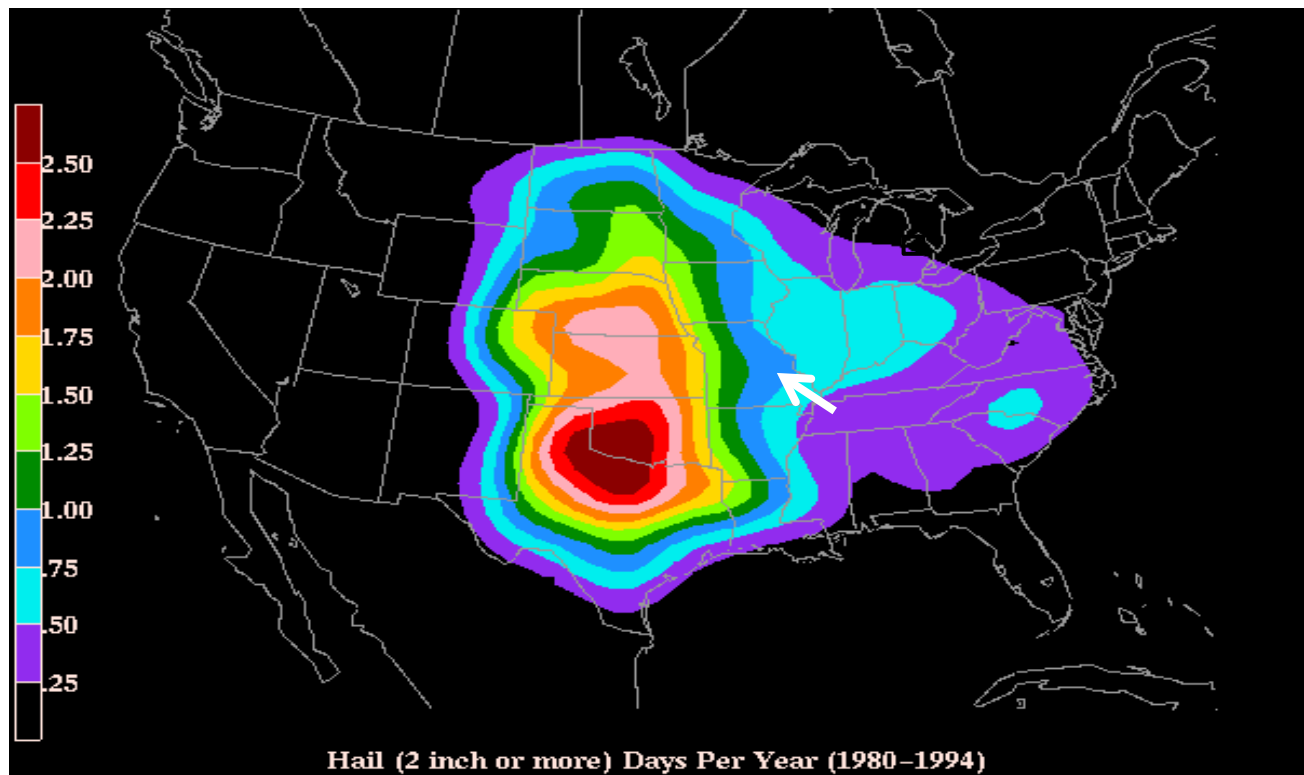
**Table 3.64. Annual Average % Probability of Hail in Washington County**

Location	Annual Avg. % P	Avg. # of Events
Washington County	100%	3.55

\*P = probability; see page 3.24 for definition.

**Figure 3.66** depicts a map based on hailstorm data from 1980-1994. It shows the probability of hailstorm occurrence (2" diameter or larger) based on number of days per year. The location of Washington County is identified with a white arrow.

**Figure 3.66. Annual Hailstorm Probability (2" diameter or larger), 1980 - 1994**



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

\* White arrow indicates Washington County

## **Vulnerability**

### ***Vulnerability Overview***

Data was obtained from the 2018 Missouri State Hazard Mitigation Plan for vulnerability overview and analysis. Since severe thunderstorms occur frequently throughout Missouri, the method used to determine vulnerability to severe thunderstorms was statistical analysis of data from several sources including: National Centers for Environmental Information (NCEI) storm events data (1996 to December 31, 2016 – which will differ slightly from data collected for the Washington County plan which is 2001-2020), HAZUS Building Exposure Value data, housing density and mobile home data from the U.S. Census (2015 ACS), and the calculated Social Vulnerability Index for Missouri Counties from the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina.<sup>34</sup>

From the data collected, six factors were considered in determining vulnerability to lightning as follows: housing density, building exposure, percentage of mobile homes, social vulnerability, likelihood of occurrence and average annual property loss. A rating value of one through five was assigned to each factor. Rating values are as follows:

- 1) Low
- 2) Low-medium
- 3) Medium

<sup>34</sup> 2018 Missouri Hazard Mitigation Plan

- 
- 4) Medium-high
  - 5) High

**Figure 3.65** illustrates the factors considered and ranges for the rating values assigned.

Once the ranges were determined and applied to all factors considered in the analysis for wind, hail, and lightning, they were rated individually and factored together to determine an overall vulnerability rating for thunderstorms. **Table 3.66** provides the calculated ranges applied to determine overall vulnerability of Missouri counties to severe thunderstorms.

**Table 3.65. Ranges for Severe Thunderstorm Vulnerability Factor Ratings**

Factors Considered	Low (1)	Low Medium (2)	Medium (3)	Medium High (4)	High (5)
<b>Common Factors</b>					
Housing Density (# per sq. mile)	4.11-44.23	44.24-134.91	134.92-259.98	259.99-862.69	862.70-2836.23
Building Exposure (\$)	\$269,532-\$3,224,641	\$3,224,642-\$8,792,829	\$8,792,830-\$22,249,768	\$22,249,769-\$46,880,213	\$46,880,214-\$138,887,850
Percent Mobile Homes	0.2-4.5%	4.6-8.8%	8.9-14%	14.1-21.2%	21.3-33.2%
Social Vulnerability	1	2	3	4	5
<b>Wind</b>					
Likelihood of Occurrence (# of events/ yrs. of data)	0.90 - 2.90	2.91 - 4.57	4.58 - 7.00	7.01 - 12.05	12.06 - 20.86
Average Annual Property Loss (annual property loss/ yrs of data)	\$0.00 – \$81,047.62	\$81,047.63 – \$200,428.57	\$200,428.58 – \$363,500.00	\$363,500.01 – \$837,242.86	\$837,242.87 – \$2,481,809.52
<b>Hail</b>					
Likelihood of Occurrence (# of events/ yrs. of data)	1.19 - 2.76	2.77 - 4.86	4.87 - 7.81	7.82 - 12.38	12.39 - 18.10
Average Annual Property Loss (annual property loss/ yrs. of data)	\$0.00 - \$41,547.62	\$41,547.63 – \$171,980.95	\$171,980.96 – \$467,857.14	\$467,857.15 – \$9,714,523.81	\$9,714,523.82 – \$40,594,285.71
<b>Lightning</b>					
Likelihood of Occurrence (# of events/ yrs. of data)	0-.05	.06-0.14	0.15-0.29	0.30-0.43	0.44-0.67
Average Annual Property Loss (annual property loss/ yrs. Of data)	\$0-\$476.19	\$476.20-\$1,904.76	\$1,904.77-\$7,476.19	\$7,476.20-\$13,142.86	\$13,142.87-\$57,000

Source: 2018 Missouri Hazard Mitigation Plan

**Table 3.66. Ranges for Severe Thunderstorm Combined Vulnerability Rating**

	Low (1)	Low Medium (2)	Medium (3)	Medium High(4)	High (5)
Severe Thunderstorm Combined Vulnerability	12-16	17-19	20-23	24-29	30-36

Source: 2018 Missouri Hazard Mitigation Plan

According to the Hazus data included in the 2018 state plan, Washington County has total building exposure to severe thunderstorms of \$1,730,986,000. **Figure 3.67** shows housing density, building exposure, SOVI and mobile home data for Washington County. The county's building exposure and housing density rating is medium, while the percent of mobile homes in the county is rated as high at 33.2 percent of the housing stock. **Table 3.68**, also pulled from the state plan, provides data on the number of events and likelihood of occurrence and occurrence rating for high wind, hail, and lightning.

**Table 3.67. Washington County Housing Density, Building Exposure, SOVI and Mobile Home Data**

Total Building Exposure (Hazes)	Building Exposure Rating	Housing Density	Housing Density Rating	SOVI Ranking	SOVI Ranking Rating	Percent Mobile Homes	Percent Mobile Homes Rating
\$1,730,986,000	1	14.34	1	Medium	3	33.2	5

Source: 2018 Missouri Hazard Mitigation Plan

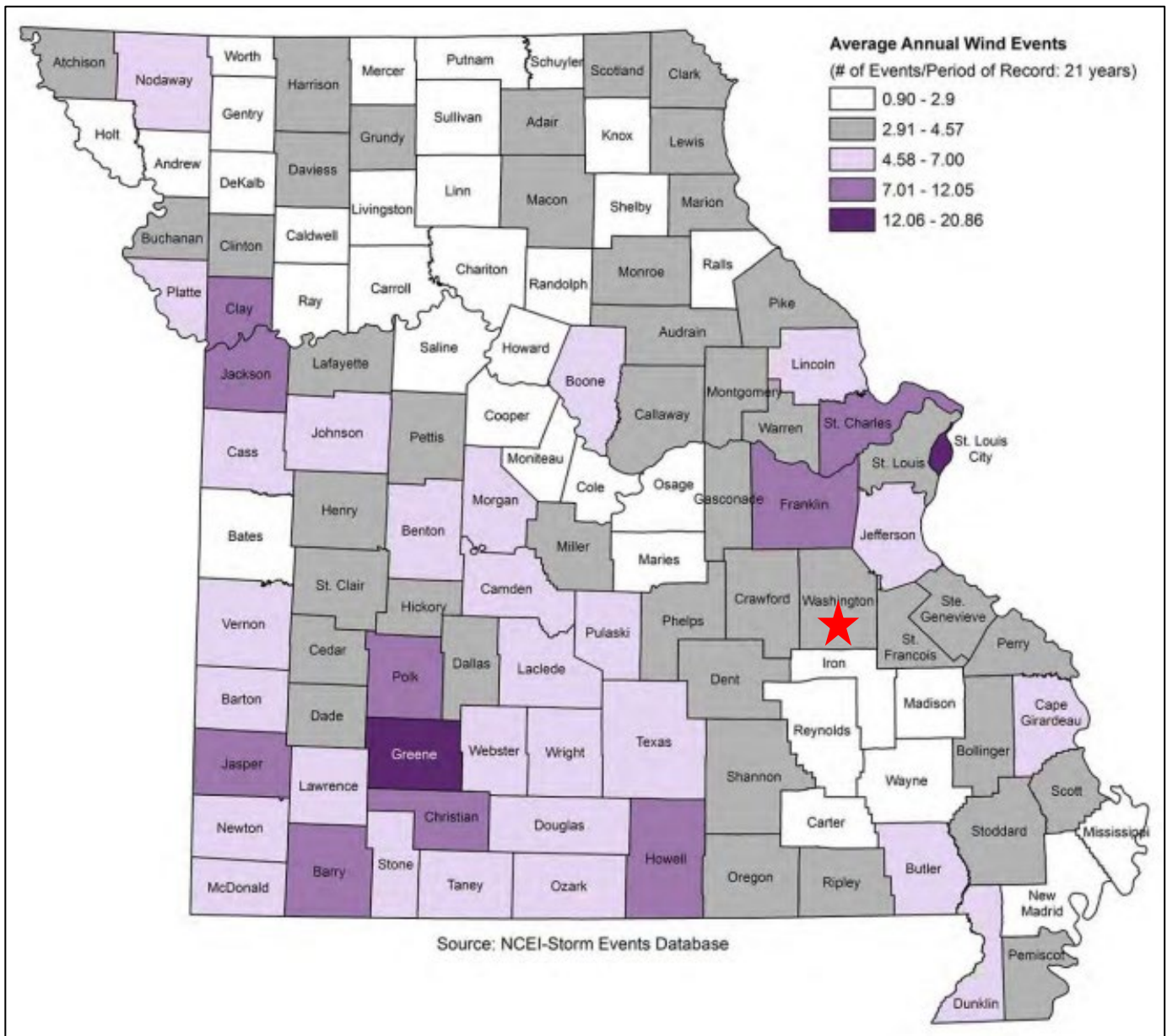
**Table 3.68. Number of High Wind, Hail and Lightning Events, Likelihood of Occurrence and Associated Ratings for Washington County**

High Wind			Hail			Lightning		
Total Number of Events	Likelihood of Occurrence	Likelihood of Occurrence Rating	Total Number of Events	Likelihood of Occurrence	Likelihood of Occurrence Rating	Total Number of Events	Likelihood of Occurrence	Likelihood of Occurrence Rating
70	3.333	2	126	6.000	3	0	0.000	1

Source: 2018 Missouri Hazard Mitigation Plan

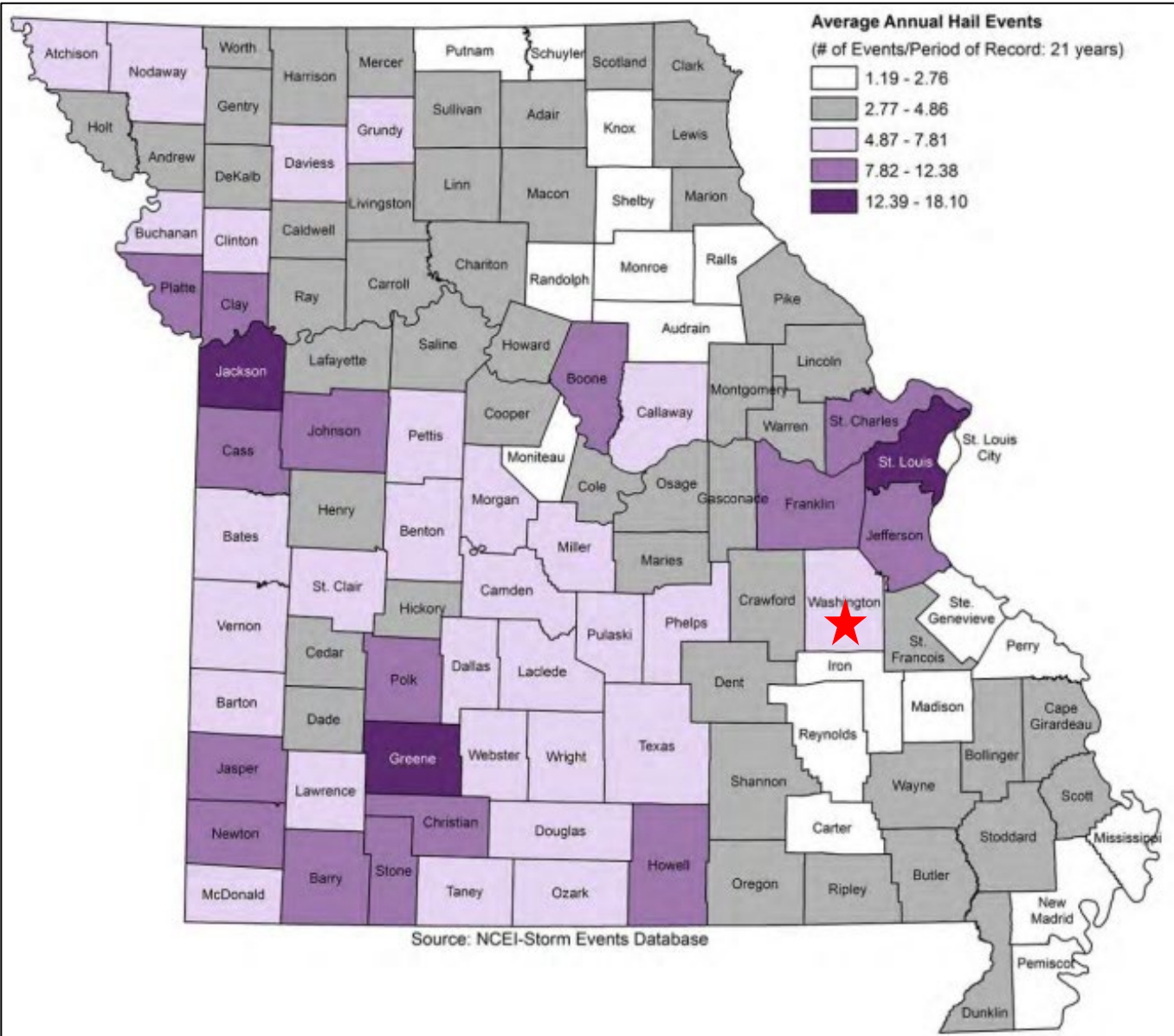
**Figure 3.67** through **Figure 3.69** have been pulled from the 2018 Missouri Hazard Mitigation Plan and further depict the average annual likelihood of occurrence of high winds, hail, and lightning events in Missouri.

**Figure 3.67. Average Annual High Wind Events (40 MPH and Higher)**



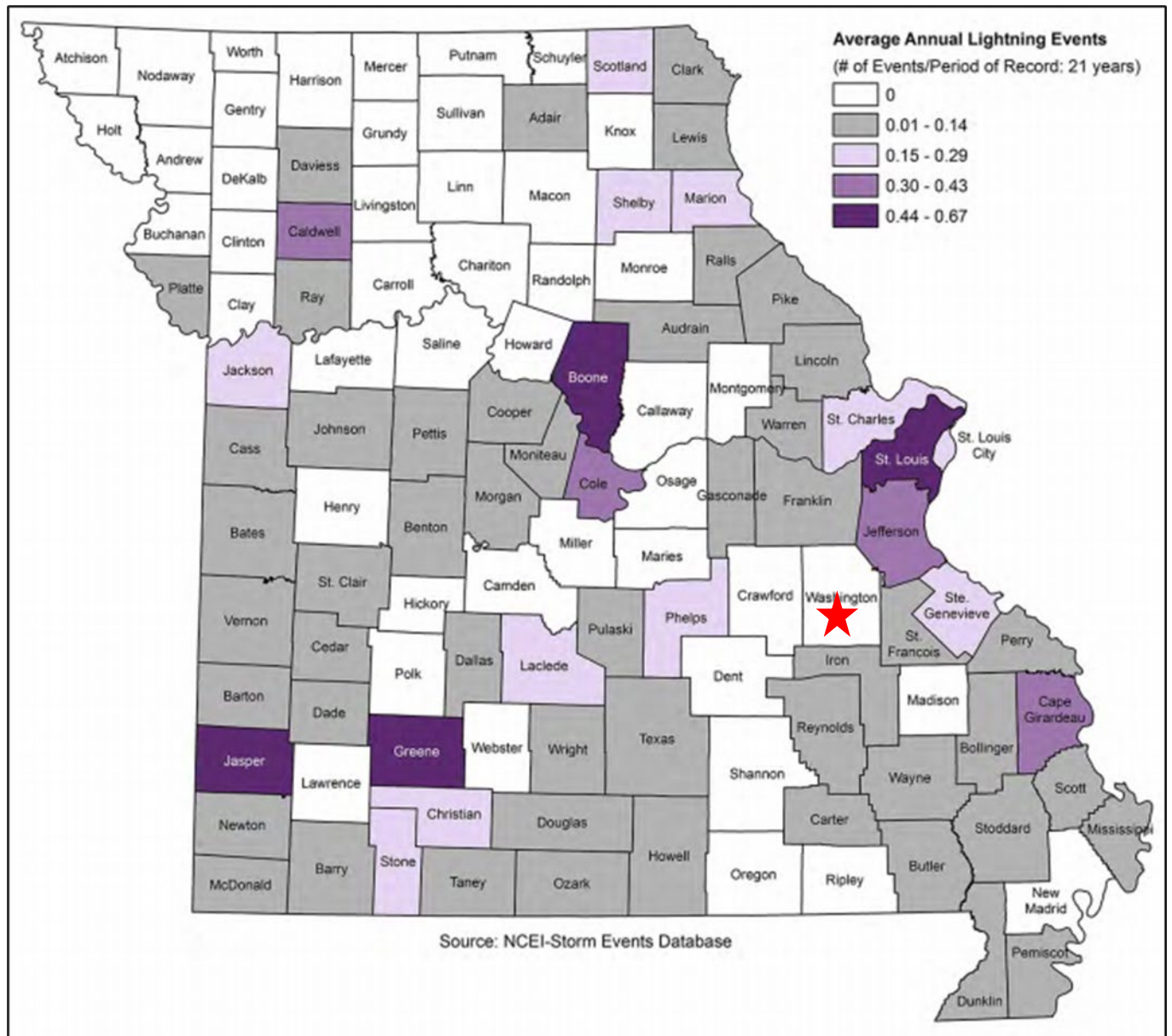
Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.68. Average Annual Occurrence of Damaging Hail Events**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.69. Average Annual Occurrence of Lightning Events**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Table 3.69** provides additional data obtained from the National Centers for Environmental Information for property loss to complete the overall vulnerability analysis.

**Table 3.69. Annualized Property Loss and Associated Ratings for Washington County**

High Wind		Hail		Lightning	
Total Annualized Property Loss	Total Annualized Property Loss Rating	Total Annualized Property Loss	Total Annualized Property Loss Rating	Total Annualized Property Loss	Total Annualized Property Loss Rating
\$0	1	\$0	1	\$0	1

Source: 2018 Missouri State Hazard Mitigation Plan

After ranges were applied to all factors in the analysis for wind, hail, and lightning, they were weighted equally and factored together to determine an overall vulnerability rating. Following, a combined vulnerability rating was calculated. The calculated ranges applied to determine overall vulnerability of Missouri counties to severe thunderstorms. **Table 3.70** provides the calculated vulnerability rating for the severe thunderstorm hazard. **Figure 3.70** that follows provides the mapped results of this analysis by county<sup>35</sup>.

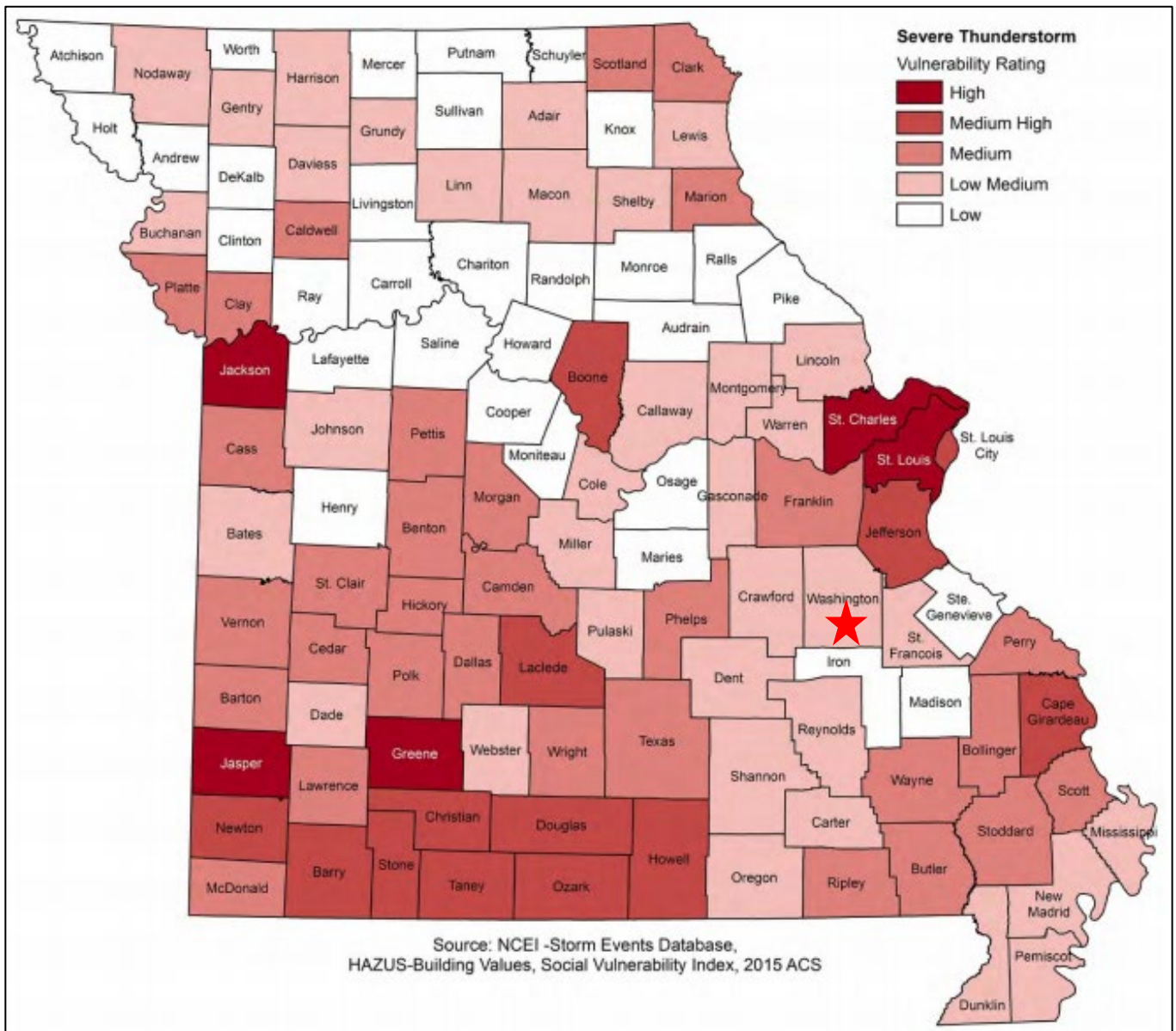
**Table 3.70. Severe Thunderstorm Vulnerability Rating for Washington County**

Total Sum of All Factor Ratings	Overall Vulnerability Rating for Thunderstorms	Overall Vulnerability Rating for Thunderstorms Description
19	2	Low-Medium

Source: 2018 Missouri State Hazard Mitigation Plan

<sup>35</sup> 2018 Missouri State Hazard Mitigation Plan

**Figure 3.70. Vulnerability Summary for Severe Thunderstorms**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

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

According to the NCEI Washington County experienced approximately \$1,203,000 in property damages from severe thunderstorms between 2001 and 2020. This is an average of \$60,150 in losses due to this hazard per year. Most of the property damage caused by storms is covered by private insurance and data is not available. In addition, most damage from severe thunderstorms occurs to vehicles, roofs, siding, and windows. However, there is a variety of impacts from severe thunderstorms. Moreover, secondary effects from hazards, falling trees and debris, can cause destruction within the planning area.

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### ***Previous and Future Development***

Population trends from 2010 to 2020 for Washington County indicate that the population in unincorporated areas has fallen by an estimated 2.17 percent. The city of Potosi's population has increased by a 2.26 percent. The city of Mineral Point has fallen by 34.19 percent. Overall, the county's population has shrunk 6.7 percent. It is difficult to determine future impacts, however, anticipated development in each jurisdiction will result in increased exposure. Likewise, increased development of residential structures will increase jurisdiction's vulnerability to damages from severe thunderstorms/high winds/lightning/hail.

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

Although thunderstorms/high winds/lightning/hail events are area-wide, there are demographics indicating higher losses in one jurisdiction as compared to another. Jurisdictions with high percentages of housing built before 1939 are more prone to damages from severe thunderstorms. The jurisdictions with the highest percent of houses built before 1939 include the city of Caledonia (34.6%) and Irondale (32.9%). Additionally, Unincorporated Washington County has a higher percentage of mobile homes and unsecured buildings, which are more prone to damages.

### **Problem Statement**

The NCEI Storm Events Database notes over 143 thunderstorm and wind events in Washington County since 2001, with over \$1,203,000.00 in property and crop damages reported. Early warnings are possibly the best hope for residents when severe weather strikes. Cities that do not already possess warning systems – whether that is storm sirens or automated email/text/phone call systems - should plan to invest in such a system. Additional public awareness also includes coverage by local media sources. Storm shelters are another important means of mitigating the effects of severe thunderstorms. A community-wide shelter program should be adopted for residents who may not have adequate shelter in their homes. Residents should also be encouraged to build their own storm shelters to prepare for emergencies. Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.

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### 3.4.8 Severe Winter Weather

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.9, Page 3.321  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- Wind chill chart, National Weather Service, <http://www.nws.noaa.gov/om/winter/windchill.shtml>;
- Average Number of House per year with Freezing Rain, American Meteorological Society. "Freezing Rain Events in the United States." <http://ams.confex.com/ams/pdfpapers/71872.pdf>;
- USDA Risk Management Agency, Insurance Claims, <https://www.rma.usda.gov/Information-Tools/Summary-of-Business/Cause-of-Loss/>;
- Any local Road Department data on the cost of winter storm response efforts.
- National Centers for Environmental Information, Storm Events Database, <http://www.ncdc.noaa.gov/stormevents/>
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - o Average annual severe winter weather events by County
  - o Vulnerability to severe winter weather events by County
  - o Annualized property loss for severe winter weather events by County
  - o Annualized property loss for severe winter weather events by County

#### **Hazard Profile**

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

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

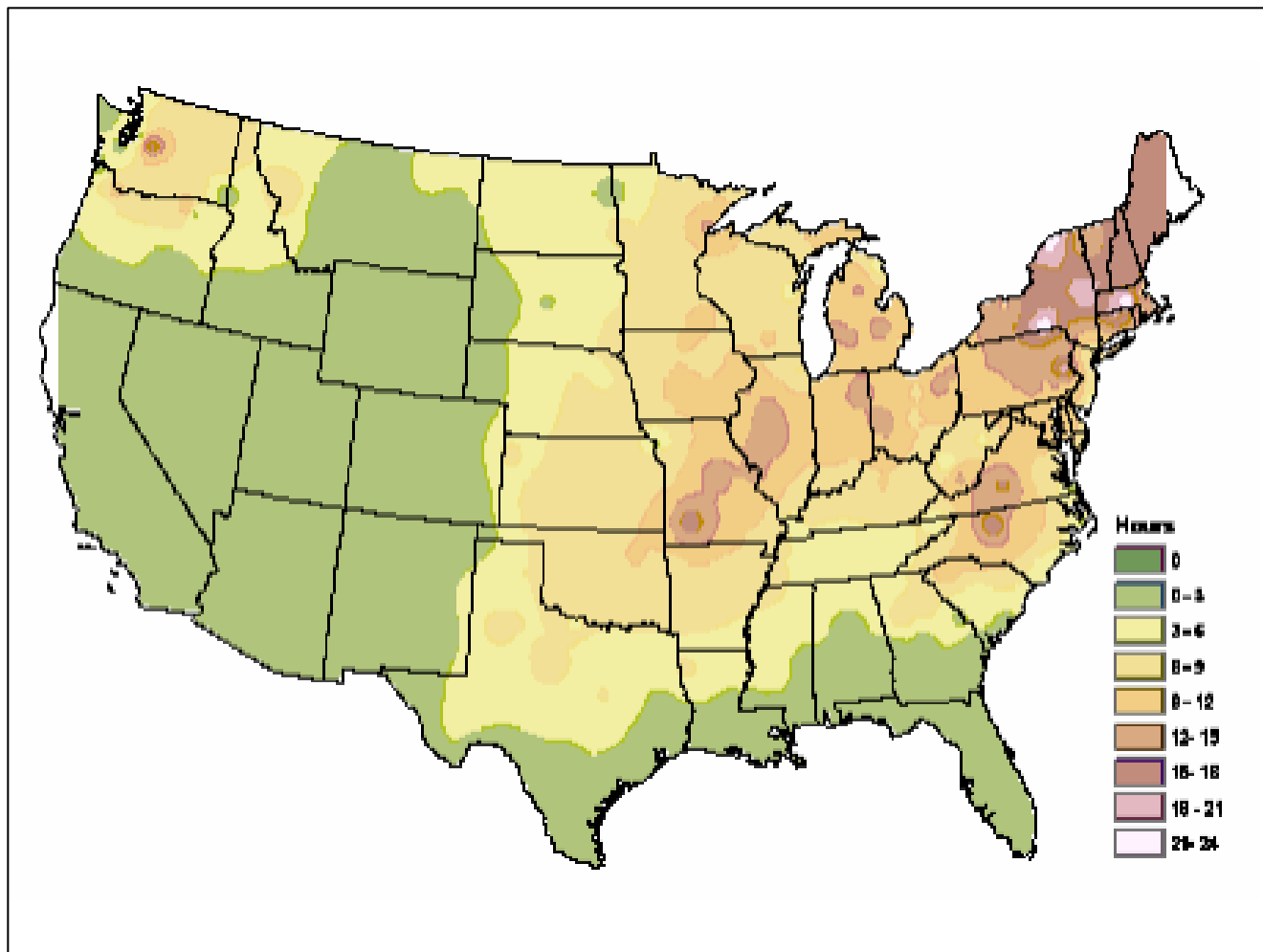
- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, intense snow showers accompanied by strong, gusty winds. Accumulation may be significant.
- **Snow Showers**—Snow falling at varying intensities for brief periods of time. Some accumulation is possible.
- **Freezing Rain**—Measurable rain that falls onto a surface with a temperature below freezing. This causes it to freeze to surfaces, such as trees, cars, and roads, forming a coating or glaze of ice. Most freezing-rain events are short lived and occur near sunrise between the months of December and March.
- **Sleet**—Rain drops that freeze into ice pellets before reaching the ground. Sleet usually bounces when hitting a surface and does not stick to objects.

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

Severe winter weather typically strikes Missouri more than once every year. Washington County receives winter weather events from heavy snows to freezing rain annually. Major snowstorms typically occur once each year, causing multiple school closings, as well as suspending business and

government activity. Washington County is vulnerable to heavy snow, ice, extreme cold temperatures and freezing rain. **Figure 3.71** illustrates statewide average number of hours per year with freezing rain. Washington County receives approximately 9 to 12 hours.

**Figure 3.71. NWS Statewide Average Number of Hours per Year with Freezing Rain**



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

### **Strength/Magnitude/Extent**

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

Extreme cold often accompanies severe winter storms and can lead to hypothermia and frostbite in people without adequate clothing protection. Cold can cause fuel to congeal in storage tanks and

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supply lines, stopping electric generators. Cold temperatures can also overpower a building's heating system and cause water and sewer pipes to freeze and rupture. Extreme cold also increases the likelihood for ice jams on flat rivers or streams. When combined with high winds from winter storms, extreme cold becomes extreme wind chill, which is hazardous to health and safety.

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

Also, at risk are those without shelter, those who are stranded, or who live in a home that is poorly insulated or without heat. Other impacts of extreme cold include asphyxiation (unconsciousness or death from a lack of oxygen) from toxic fumes from emergency heaters; household fires, which can be caused by fireplaces and emergency heaters; and frozen/burst pipes.

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

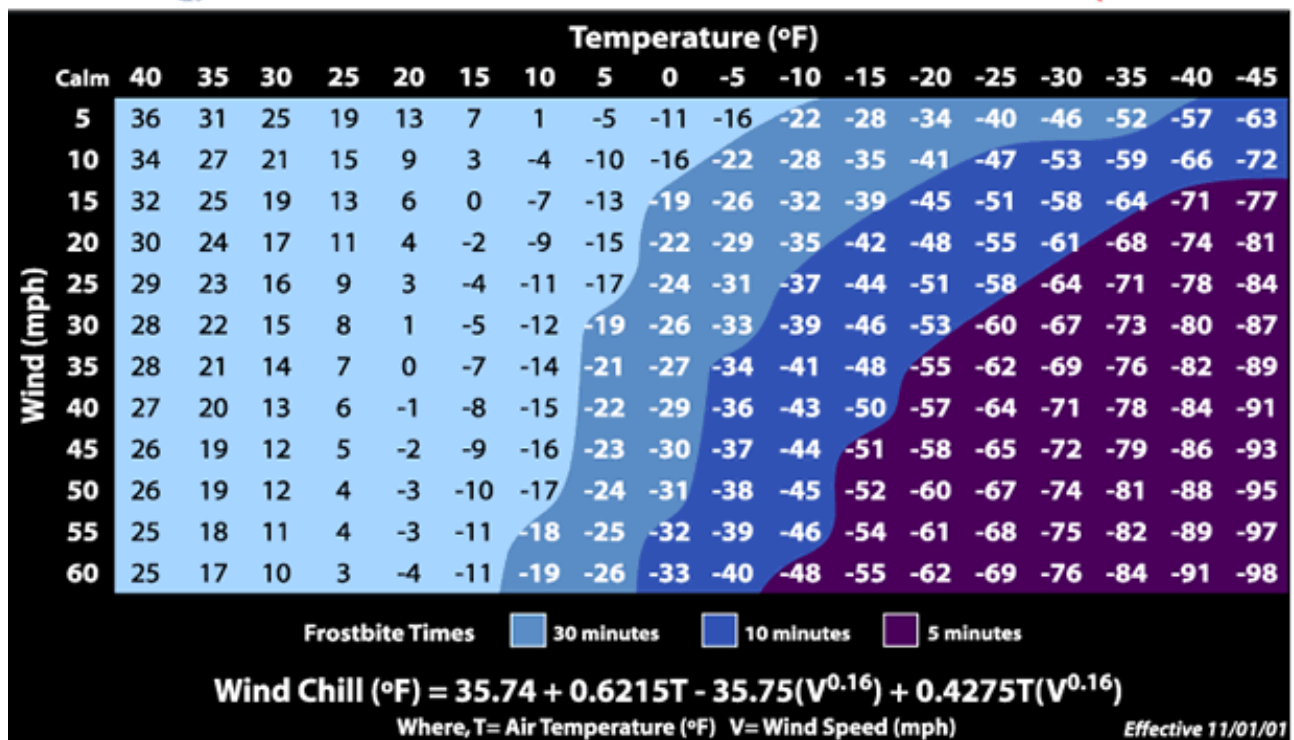
Overhead power lines and infrastructure are also vulnerable to damages from winter storms. In particular, ice accumulation during winter storms can damage power lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could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

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

Wind can greatly amplify the impact of cold ambient air temperatures. Provided by the National Weather Service, **Figure 3.72** below shows the relationship of wind speed to apparent temperature and typical time periods for the onset of frostbite.

Winter storms, cold, frost, and freeze all can influence or negatively impact crop production. However, data obtained from the USDA's Risk Management Agency for insured crop losses indicates that there were no claims paid in Washington County between 2001 and 2020 for severe winter weather.

**Figure 3.72. Wind Chill Chart**



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

### Previous Occurrences

Data was obtained from the NCEI for winter weather reported events and damages between 2001 and 2020 (Table 3.71). This data includes variables such as blizzard, cold/wind chill, extreme cold/wind chill, heavy snow, ice storm, sleet, winter storm, and winter weather. Additionally, narratives for specific events are listed below.

**Table 3.71. NCEI County A Winter Weather Events Summary, 2001 - 2020**

Type of Event	Inclusive Dates	# of Injuries	Property Damages	Crop Damages
Ice Storm	2/21/2001	0	0	0
Winter Storm	2/25/2002	0	0	0
Winter Storm	12/4/2002	0	0	0
Winter Storm	12/24/2002	0	0	0
Winter Storm	2/23/2003	0	0	0
Winter Storm	2/23/2003	0	0	0
Winter Storm	12/13/2003	0	0	0
Winter Storm	1/25/2004	0	0	0
Winter Storm	12/8/2005	0	0	0

Type of Event	Inclusive Dates	# of Injuries	Property Damages	Crop Damages
Winter Storm	11/30/2006	0	100000	0
Winter Storm	12/1/2006	0	215000	0
Winter Weather	12/8/2007	0	0	0
Heavy Snow	12/15/2007	0	0	0
Sleet	2/21/2008	0	0	0
Winter Weather	2/23/2008	0	0	0
Winter Storm	3/3/2008	0	0	0
Winter Storm	1/26/2009	0	0	0
Cold/Wind Chill	1/1/2010	0	0	0
Winter Storm	1/31/2011	0	0	0
Winter Storm	2/1/2011	0	0	0
Winter Storm	2/21/2013	0	0	0
Winter Storm	12/5/2013	0	0	0
Winter Storm	1/5/2014	0	0	0
Cold/Wind Chill	1/6/2014	0	0	0
Winter Storm	3/1/2014	0	0	0
Heavy Snow	2/20/2015	0	0	0
Ice Storm	1/13/2017	0	0	0
Heavy Snow	1/11/2019	0	0	0
Winter Storm	12/15/2019	0	0	0
<b>Total</b>	<b>29</b>	<b>0</b>	<b>\$315K</b>	<b>0</b>

Source: NCEI, data accessed [10/06/2021]

### Notable Winter Narratives:

1. **02/21/2001:** A fast moving winter storm put a coating of ice on a portion of southeast Missouri. The freezing rain changed over to sleet and snow leaving 2 to 3 inches of snow on top of the ice. Trees and power lines were down throughout the area. Transportation was brought to a halt from the evening of the 21st through the 22<sup>nd</sup>.
2. **02/25/2002:** Snowfall of 1 to 4 inches hit portions of Central and Eastern Missouri from late night on February 25 to the early morning hours of February 26. In addition, strong winds developed during the morning hours of the 26th causing some drifting snow. The heaviest snow, 3 to 4 inches, primarily fell from just south and west of St. Louis to the St. Louis area. Many schools across the region were closed on the 26th. Numerous auto accidents occurred during the event.
3. **12/04/2002:** The first winter storm of the season dropped from between 3 to 6 inches of snow across parts of South Central and Southeast Missouri. Virtually all area schools were closed

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through Thursday as many rural roads remained very hazardous to travel.

4. **12/24/2002:** A Christmas Eve snowstorm hit parts of Southeast Missouri dropping from between 7 to 12 inches of snow across the area
5. **02/23/2003:** Yet another winter storm struck Southeast Missouri on the 23rd - 24th. Snowfall amounts ranged from between 6 - 8 inches across the area. Virtually all schools were closed on Monday the 24th. Due to all the school closings over the winter, many schools in the area were going to have to remain in session well into June.
6. **12/13/2003:** The first snow of the season hit much of East Central and parts of Southeast Missouri on the 13th. Snowfall was mostly in the 2-to-3-inch range.
7. **01/25/2004:** A combination of freezing rain, sleet and snow fell bringing the region to a standstill. The event started with a period of freezing rain early Sunday morning. Some places received 1/4 to 1/2 inch of freezing rain. The freezing rain changed to sleet by mid-morning with some locations in Central and East Central Missouri receiving between 1 to 2 inches of sleet. By afternoon, the sleet changed to snow and accumulated another 1 to 2 inches. Luckily it was a Sunday, as transportation was brought to a halt across the region. Some power outages were also reported in Central Missouri. Many schools across the region were closed into mid-week as another fast-moving storm brought another inch or two of snow Monday night and early Tuesday.
8. **12/08/2005:** The first significant winter storm of the season hit the area dropping between 2 to around 6 inches of snow. Most of Central Missouri picked up about 2 inches, East Central and Southeast Missouri saw 2 - 4 inches, and Northeast Missouri received from 2 to near 6 inches.
9. **11/30/2006:** A major winter storm hit Central, Northeast, East Central and parts of Southeast Missouri from November 30 through December 1. Over a foot of snow fell across parts of Central Missouri while a major ice storm hit parts of East Central and Southeast Missouri, including the St. Louis area. Ice accumulations of 1 inch or more downed trees and power lines resulting in at least 300,000 electric customers losing service for up to a week. Downed limbs and trees damaged homes and automobiles across the area as well. Many rural schools were closed for several days due to slick roads and power outages. The National Guard was called out to several counties to assist with debris removal and other emergency services. Officials reported seven people suffered from carbon monoxide poisoning. The City of Potosi lost water service for a couple of days due to the power outage.
10. **12/08/2007:** Light freezing rain and sleet fell across southeast Missouri the weekend of December 8th into the early part of the next week. From between 1/8 to 1/4 inch of ice accumulated along with light amounts of sleet. Travel was disrupted across the area, but overall, the region fared well with little damage and few power outages reported.
11. **12/15/2007:** Snowfall up to 8 inches fell across east central Missouri. Travel was disrupted through the weekend.
12. **02/21/2008:** Another winter storm dropped freezing rain, sleet and some light snow across Central, Southeast, and East Central Missouri starting during the early morning hours on the 21st and finally ending shortly after midnight on the 22nd.
13. **02/23/2008:** Between two to four inches of snow fell across Central and Southeast Missouri from the evening of the 23rd into the early morning of the 24th. The heaviest band which

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produced three to four inches of snow fell from Moniteau, Cole and Osage counties and then curved southeast into Gasconade, Crawford, Washington, Iron, and Reynolds counties.

14. **03/03/2008:** An early March winter storm dropped between 6 to 13 inches of snow across eastern and parts of southeast Missouri. Parts of southeast Missouri also received a quarter inch of ice from freezing rain and close to 1 inch of sleet. Transportation was brought to a halt in most areas and schools in rural areas of southeast Missouri were closed once again for several days. The event started overnight on March 3rd with freezing rain and sleet across southeast Missouri and light snow across east central counties. By midday on the 4th, a band of heavy snow developed from south central Missouri in Crawford County northeast across the St. Louis Metro area into southwest Illinois. This band of snow brought snowfall at the rate of two to three inches per hour at times.
15. **01/26/2009:** A winter storm dropped between 6 to 8 inches of mainly snow across Eastern and Southeast Missouri. The precipitation started with a mix of freezing rain and sleet. An average of 6 to 7 inches mainly snow fell across Washington County.
16. **01/01/2010:** The first twelve days of January 2010 was one of the coldest outbreaks in many years. For some locations, it was the first time the temperature dropped below zero in about 10 years.
17. **01/31/2011:** The first true blizzard in many years hit from Central to Northeast Missouri. Up to 20 inches of snow fell along with winds gusting over 40 mph. For many counties it was a record snowfall event. I-70 was shut down from Warren County to just east of Kansas City. The National Guard was called out to help clear County roads and assist with emergency transportation. The region was brought to a standstill for several days. 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.
18. **02/21/2013:** A combination of freezing rain, sleet, and snow hit Southeast Missouri causing very hazardous conditions. Up to 4 - 5 inches of snow, mixed with sleet, fell across the northern part of the area. The southern part received 1 - 3 inches along with an inch of sleet and some freezing rain.
19. **01/05/2014:** A very strong winter storm dropped 6 - 12 inches of snow across East Central Missouri. Strong northerly winds produced snow drifts of 2 to 5 feet. All schools and most businesses were closed on the 5th and 6th, with many schools remaining closed for several days due to very cold temperatures and wind chills. The winter storm that brought heavy snow to much of the area followed that up with the coldest temperatures in 20 years. Wind Chill values the morning of the 6th ranged from -25 to -33.
20. **03/01/2014:** An early March winter storm dropped between .5 to 2 inches of sleet across East Central and Southeast Missouri. Some locations also picked up a couple of inches of snow.
21. **02/20/2015:** A winter storm brought a mix of winter weather to the region. One inch of sleet and some light freezing rain created hazardous winter weather conditions.
22. **01/13/2017:** An Ice Storm hit parts of Northeast, East Central and Southeast Missouri on Martin Luther King Weekend. The areas hardest hit were across Washington, Jefferson and the

northern half of St. Francois County. Numerous power outages were reported. There were also transportation issues, however they were minimized due to almost all schools and businesses closing on Friday, the first day of the event.

23. **01/11/2019:** Several rounds of heavy snow fell across Washington County beginning during the afternoon hours of January 11th through the early morning hours of January 13th. The co-op observer 4 southwest of Potosi reported 5.9 inches of snow with this event. A trained spotter 3.2 miles west of Potosi reported a storm total of 6.9 inches with this event.

24. **12/15/2019:** A winter storm moved into the region on Sunday, December 15th with snow moving into central Missouri by mid-morning. The snow spread west to east through the day and into the evening hours before tapering off. Snowfall rates during this period were between 1 to 2 inches an hour in some locations, especially along the I-70 corridor. Then most of the area saw some light freezing drizzle through Monday morning, December 16th before a second round of snow developed by mid-morning and persisted through Monday evening. The snow came to an end by midnight. Overall, a widespread 4 to 6 inches of snow fell during this event. Between 4 and 8 inches of snow fell across the county over a two-day period, with the majority of the snow falling in a two hour period on the 16th.

Washington County has been included in two federal disaster declarations for winter weather since 2007.<sup>36</sup>

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

From the data obtained from the NCEI<sup>37</sup>, annual average percent probabilities were calculated for winter weather within Washington County (**Table 3.72**). There were 29 recorded events (**Table 3.71**) over a 20-year period. There is 100 percent annual average probability of winter weather occurrence (29 events/20 years), with an average of 1.45 events per year.

**Table 3.72. Annual Average % Probability of Winter Weather in Washington County**

Location	Annual Avg. % P	Avg. # of Events
Washington County	100%	1.45

\*P = probability; see page 3.24 for definition.

## **Vulnerability**

### ***Vulnerability Overview***

Data was obtained from the 2018 Missouri State Hazard Mitigation Plan for vulnerability information regarding Washington County. Various data sources were utilized for statistical analysis including the following:

- National Centers for Environmental Information (NCEI) storm event data (1999 to December 31, 2019)
- HAZUS Building Exposure Value data

<sup>36</sup> <https://www.fema.gov/data-visualization-summary-disaster-declarations-and-grants>

<sup>37</sup> <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

- Housing density data from the U.S. Census (2015 ACS)
- Calculated Social Vulnerability Index for Missouri Counties from the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina

From the statistical data collected, five factors were considered in determining overall vulnerability to severe winter weather as follows: housing density, building exposure, social vulnerability, likelihood of occurrence and average annual property loss. A rating value of one through five was assigned to each factor:

- 1) Low
- 2) Low-medium
- 3) Medium
- 4) Medium-high
- 5) High

**Table 3.73** provides the factors considered and the ranges for the rating values assigned. After the individual ratings were determined for the common factors, a combined vulnerability rating was computed for severe winter weather. Those can be seen in **Table 3.74**. The housing density, building exposure and SOVI data for Washington County can be found in **Table 3.75**.

**Table 3.73. Ranges for Severe Winter Weather Vulnerability Factor Ratings**

Factors Considered	Low (1)	Low Medium (2)	Medium (3)	Medium High (4)	High (5)
<b>Common Factors</b>					
Housing Density (# per sq. mile)	4.11-44.23	44.24-134.91	134.92-259.98	259.99-862.69	862.70-2836.23
Building Exposure (\$)	\$269,532-\$3,224,641	\$3,224,642-\$8,792,829	\$8,792,830-\$22,249,768	\$22,249,769-\$46,880,213	\$46,880,214-\$138,887,850
Social Vulnerability	1	2	3	4	5
Likelihood of Occurrence (# of events/ yrs. of data)	1.05-1.43	1.44-1.76	1.77-2.10	2.11-2.67	2.68-4.57
Average Annual Property Loss (annual property loss/ yrs. Of data)	\$0-\$143,095.24	\$143,095.25-\$406,666.67	\$406,666.68-\$1,191,000.95	\$1,191,000.96-\$3,184,761.90	\$3,184,761.91-\$5,861,666.67

Source: 2018 Missouri Hazard Mitigation Plan

**Table 3.74. Ranges for Severe Winter Weather Combined Vulnerability Rating**

	Low (1)	Low-medium (2)	Medium (3)	Medium-high-4	High (5)
Severe Winter Weather Combined Vulnerability	7-8	8-10	10-12	12-15	15-22

Source: 2018 Missouri Hazard Mitigation Plan

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**Table 3.75. Housing Density, Building Exposure and SOVI Data for Washington County**

Total Building Exposure (Hazus)	Building Exposure Rating	Housing Density	Housing Density Rating	SOVI Ranking	SOVI Rating
\$1,730,96,000	1	14.34	1	Medium	3

Source: 2018 Missouri Hazard Mitigation Plan

**Table 3.71** provides the last piece of the data gathered from NCEI to complete the overall vulnerability analysis and the total overall vulnerability rating for severe winter weather. The total number of winter weather events includes blizzard, heavy snow, ice storm winter storm and winter weather events. The likelihood of occurrence is 1.8571 or 100 percent per year. The total annualized property loss is \$15,000, which provides a total annualized property loss rating of two and an overall vulnerability rating of ten – which translates to an overall Low Medium vulnerability rating for the county for severe winter weather.

**Table 3.76. Additional Statistical Data Compiled for Vulnerability Analysis for Washington County**

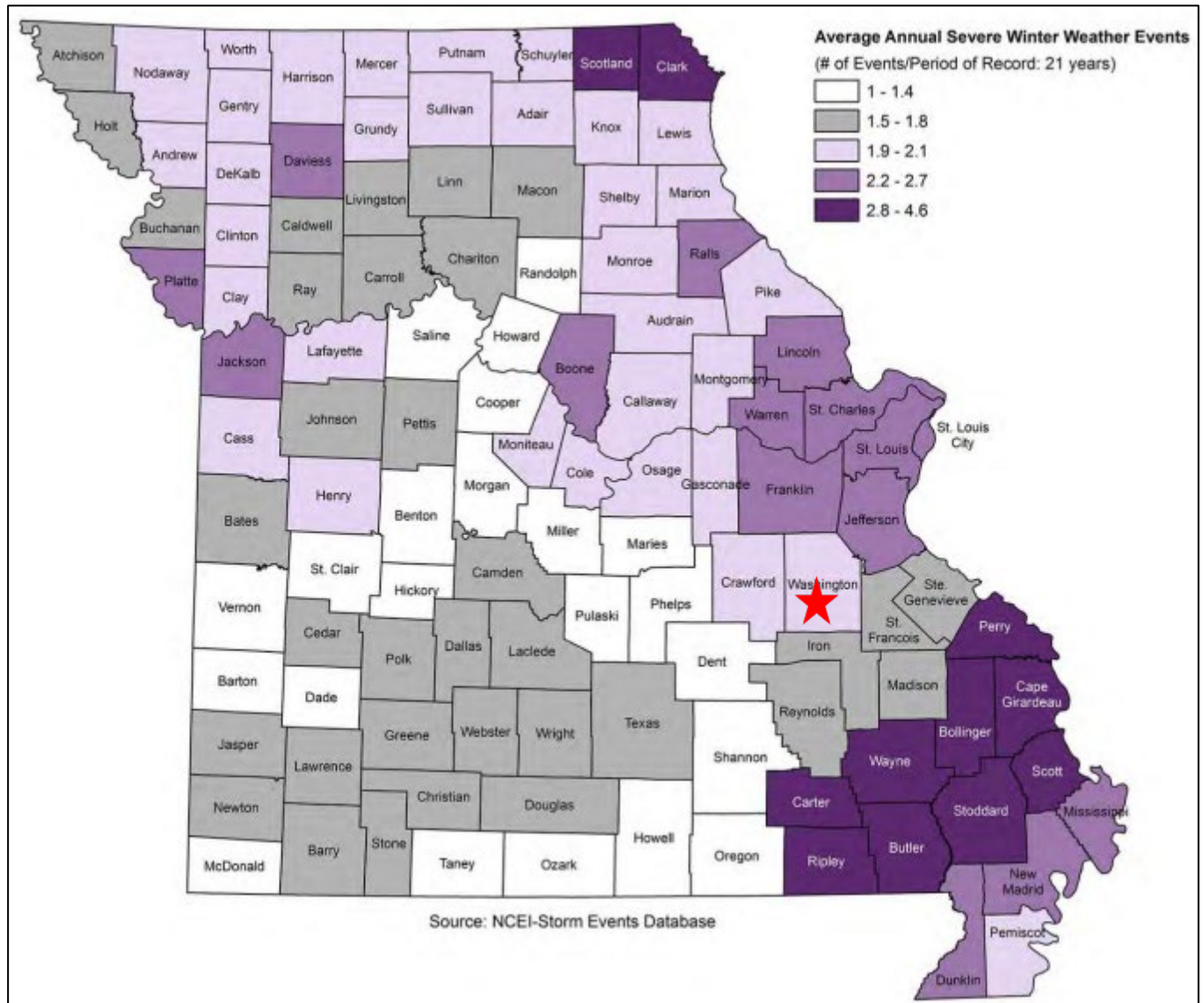
Total number of Winter Weather Events	Likelihood of Occurrence	Likelihood of Occurrence Rating	Total Annualized Property Loss	Total Annualized Property Loss Rating	Overall Vulnerability Rating	Overall Vulnerability Rating Description
39	1.8571	3	\$15,000	2	10	Low Medium

Source: 2018 Missouri Hazard Mitigation Plan

**Figure 3.73** illustrates the average annual occurrence of severe winter weather statewide. Washington County falls into the Low category of 1.9 to 2.1 events per year.

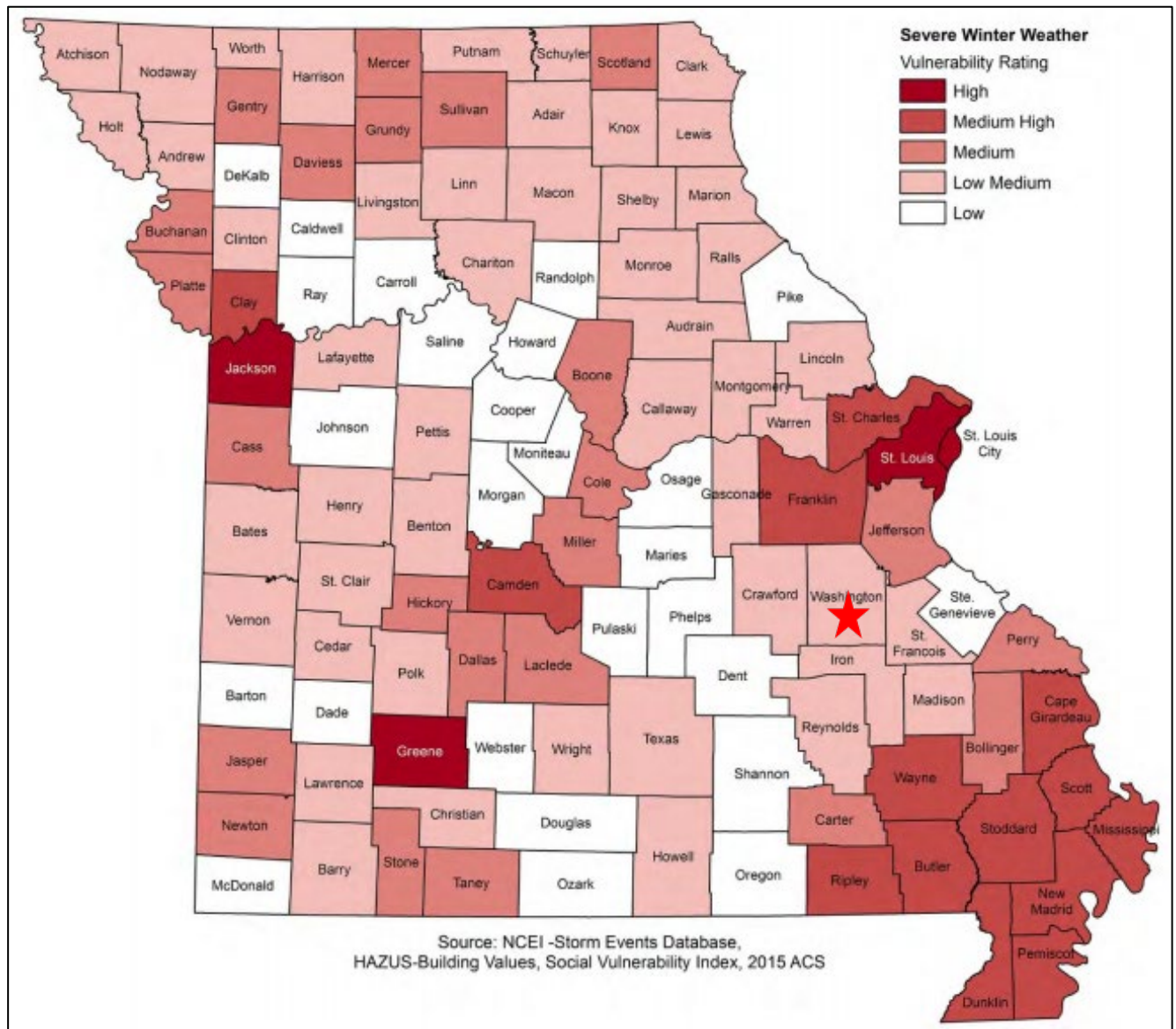
**Figure 3.74** provides an illustration of the vulnerability summary of all Missouri counties for severe winter weather. Again, Washington County falls into the Low Medium rating for overall vulnerability.

**Figure 3.73. Average Annual Occurrence of Severe Winter Weather Events**



Source: 2018 Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.74. Vulnerability Summary for Severe Winter Weather**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

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

The next severe winter storm will most likely close schools and businesses for multiple days and make roadways hazardous for travel. Heavy ice accumulation may damage electrical infrastructures, causing prolonged power outages for large portions of the region. In addition, freezing temperatures make water lines vulnerable to freeze/thaw. Fallen tree limbs also pose a threat to various structures/infrastructures across the county. According to the 2018 state plan, Washington County can expect annual property losses of \$15,000 due to severe winter storms.

### **Future Development**

Data for future development for the planning area is sparse. However, winter weather will affect the county as a whole. Any future development is at risk to damages and increased exposure. In addition,

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the county's population within the cities is anticipated to increase, which would increase the number of individuals at risk during a winter weather event.

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

Variations in impacts are not anticipated for severe winter weather across the planning area. Yet, areas with high number of mobile homes tend to experience increased damages. Unincorporated Washington County has the highest abundance of mobile homes, making the area more prone to increase exposure to damage. In addition, rural areas of the county may be more susceptible to power outages due to more power infrastructure being exposed to the risk of damage from winter storms.

### **Problem Statement**

In summary, Washington County is expected to experience at least one severe winter weather event annually; however, the county has a low vulnerability rating. Jurisdictions should enhance their weather monitoring to be better prepared for severe weather hazards. If jurisdictions monitor winter weather, they can dispatch road crews to prepare for the hazard. County and city crews can also trim trees along power lines to minimize the potential for outages due to snow and ice. Citizens should also be educated about the benefits of being proactive to alleviate property damage as well preparing for power outages.

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### 3.4.9 Tornado

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Some specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.10, Page 3.355  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- NWS Enhanced F Scale for Tornado Damage including damage indicators and degrees of damage [www.spc.noaa.gov/faq/tornado/ef-scale.html](http://www.spc.noaa.gov/faq/tornado/ef-scale.html);
- Tornado Activity in the U.S. map (1950-2006), FEMA 320, Taking Shelter from the Storm, 3rd edition;
- Tornado Alley in the U.S. map, <http://tornadochaser.com/education/tornado-alley/>
- National Centers for Environmental Information, <https://www.ncdc.noaa.gov/stormevents/>;
- Midwest Regional Climate Center, <https://mrcc.purdue.edu/gismaps/cntytnr.htm>;
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Number of Tornadoes by County
  - Percentage of Mobile Homes in 2015 by County
  - Average annual tornado events by County
  - Vulnerability to tornado events by County
  - Annualized property loss for tornado events by County
  - Annualized property loss for tornado events by County

## **Hazard Profile**

### ***Hazard Description***

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

High winds not associated with tornadoes are profiled separately in this document in **Section 3.4.7, Severe Thunderstorms Including High Winds, Hail, and Lightning.**

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

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

A typical tornado can be described as a funnel-shaped cloud in contact with the earth's surface that is “anchored” to a cloud, usually a cumulonimbus. This contact on average lasts 30 minutes and covers

an average distance of 15 miles. The width of the tornado (and its path of destruction) is usually about 300 yards. However, tornadoes can stay on the ground for upward of 300 miles and can be up to a mile wide. The National Weather Service, in reviewing tornadoes occurring in Missouri between 1950 and 1996, calculated the mean path length at 2.27 miles and the mean path area at 0.14 square mile.

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

### **Geographic Location**

In Missouri, tornadoes occur most frequently between April and June, with April and May usually producing the most tornadoes. However, tornadoes can arise at any time of the year. While tornadoes can happen at any time of the day or night, they are most likely to occur between 3 p.m. and 9 p.m. Furthermore, tornadoes can occur anywhere across the state of Missouri, including Washington County.

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

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

Tornado magnitude is classified according to the EF- Scale (or the Enhanced Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF- Scale (**Table 3.77**) attempts to rank tornadoes according to wind speed based on the damage caused. This update to the original F Scale was implemented in the U.S. on February 1, 2007.

**Table 3.77. Enhanced F Scale for Tornado Damage**

Fujita Scale			Derived EF Scale		Operational Scale	
F #	Fastest 1/4 - Mile (mph)	3 Second Gust (mph)	EF #	3 Second Gust (mph)	EF #	3 Second Gust (mph)
0	40 - 72	45 - 78	0	65 - 85	0	65 - 85
1	73 - 112	79 - 117	1	86 - 109	1	86 - 110
2	113 - 157	118 - 161	2	110 - 137	2	111 - 135
3	158 - 207	162 - 209	3	138 - 167	3	136 - 165
4	208 - 260	210 - 261	4	168 - 199	4	166 - 200
5	261 - 318	262 - 317	5	200 - 234	5	Over 200

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

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.78**. The damage descriptions are summaries. For the

actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator.

**Table 3.78. Enhanced Fujita Scale with Potential Damage**

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

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

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

### **Previous Occurrences**

**Table 3.79** illustrates NCEI data reported for tornado events and damages from 2001 to 2020 in the planning area.

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

lifts off the ground for greater than 5 minutes or 2.5 miles, it is considered a separate tornado. Tornadoes reported in Storm Data and the Storm Events Database are in segments.

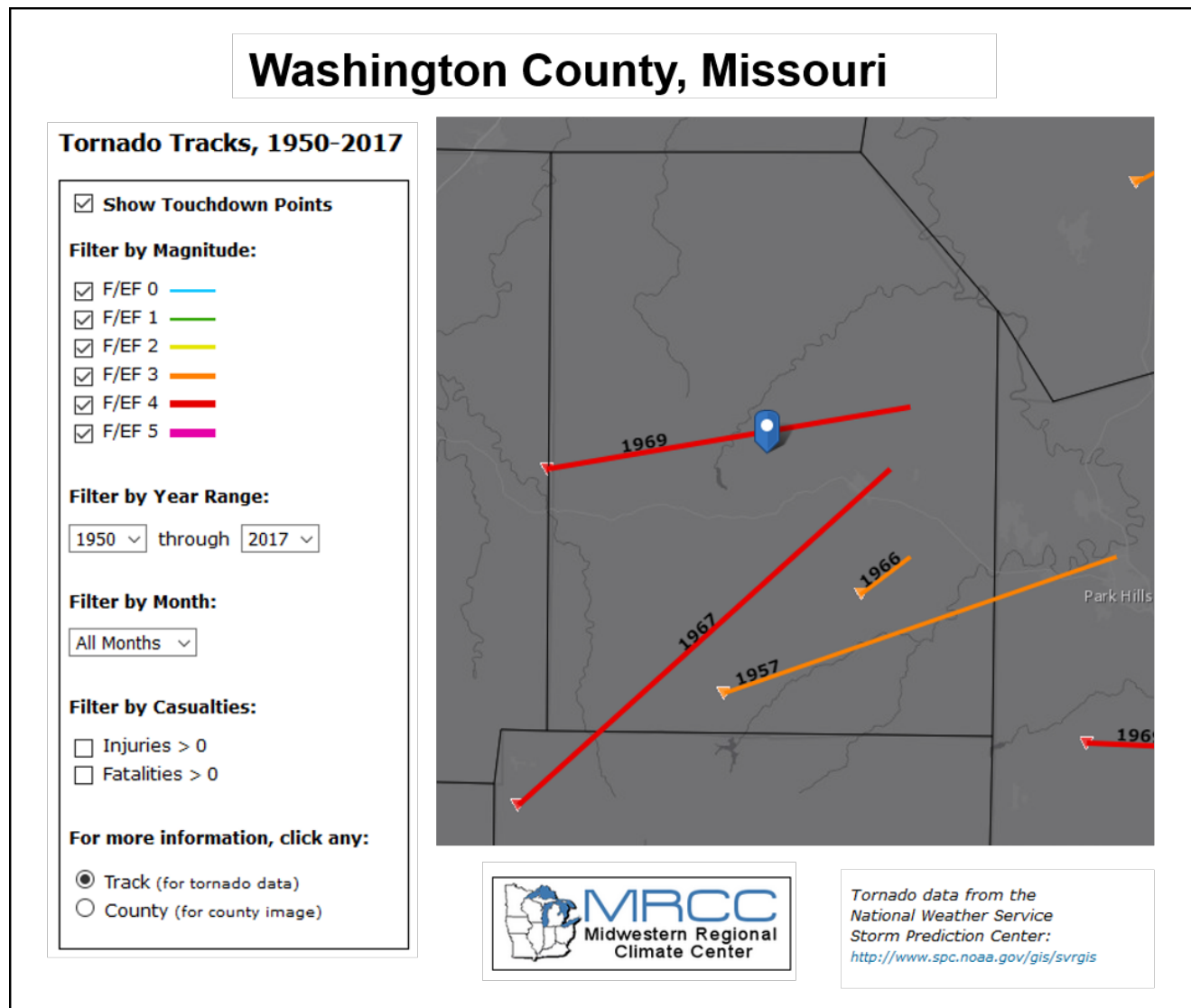
**Table 3.79. Recorded Tornadoes in Washington County, 2001– 2020**

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
4/24/2002	1S Caledonia	1S Caledonia	1	75	F1	0	0	0	0
5/12/2002	37.88/-90.72	Hopewell	0.1	30	F0	0	0	0	0
10/18/2004	1NE Potosi	1NE Potosi	0.2	80	F1	0	7	0	0
10/18/2004	1NE Potosi	2NE Potosi	0.8	50	F0	0	0	0	0
10/18/2004	2ENE Potosi	3ENE Potosi	0.8	40	F0	0	0	0	0
10/18/2004	37.95/-90.73	Mineral Point	0.8	40	F0	0	0	0	0
10/18/2004	37.95/-90.73	1NE Mineral Point	0.8	40	F0	0	0	0	0
9/22/2006	1SW Richwoods	2ENE Richwoods	3.1	150	F1	0	0	0	0
9/22/2006	4E Richwoods	5E Rishwoods	1.4	100	F1	0	0	0	0
4/30/2010	3ENE Richwoods	4ENE Richwoods	0.73	100	EF0	0	0	0	0
4/8/2015	0S Potosi	1S Potosi Washington County AR	4.1	300	EF1	0	0	0	0
7/8/2015	2ENE Caledonia	2ENE Caledonia	0.18	100	EF0	0	0	0	0
3/24/2019	1NNW Cadet	1NNW Cadet	0.01	20	EF0	0	0	0	0
<b>Total</b>	<b>-</b>	<b>-</b>	<b>14.02</b>	<b>1,125</b>	<b>-</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>0</b>

Source: National Centers for Environmental Information, <http://www.ncdc.noaa.gov/stormevents/>

**Figure 3.75** depicts historic tornado paths across Washington County.

**Figure 3.75. Washington County Map of Historic Tornado Paths (1950 – 2017)**



Source: <https://mrcc.purdue.edu/gismaps/cntyorn.htm>

According to the USDA Risk Management Agency's record, there were no insurance payments in Washington County for crop damages as a result of tornadoes between 2001 and 2020.

### **Probability of Future Occurrence**

From the data obtained from the NCEI<sup>38</sup>, an annual average percent probability was calculated for tornadoes within Washington County (**Table 3.81**). There is a 65.0 percent annual average probability of a tornado occurrence (13 events/20 years x 100). Tornado events can be found in **Table 3.79**. In addition, **Figure 3.76**, obtained from the 2018 Missouri State Hazard Mitigation Plan, also illustrates tornado probabilities across the United States and further shows Washington County's average probability of 21-41 percent.

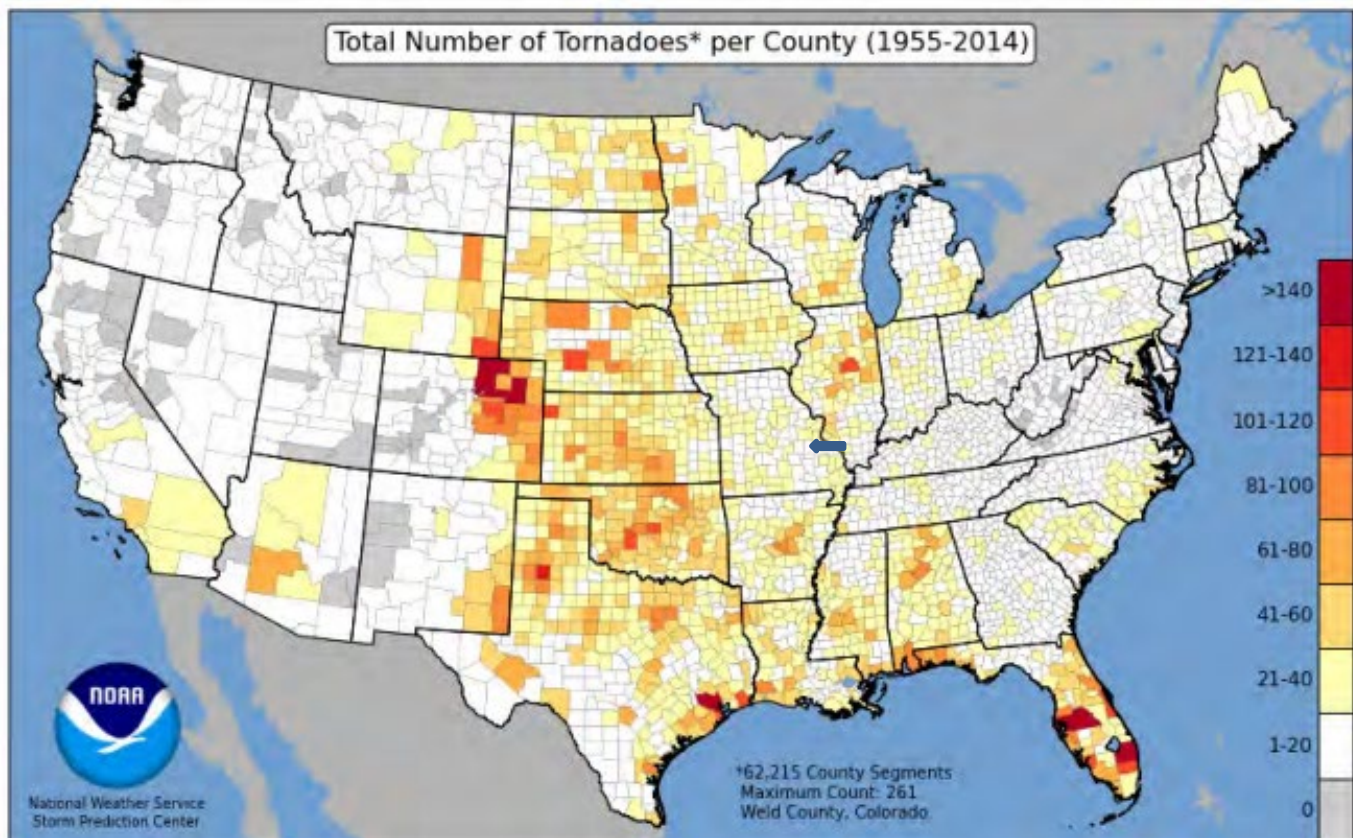
<sup>38</sup> <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

**Table 3.80. Annual Average % Probability of Tornadoes in Washington County**

Location	Annual Avg. % P
Washington County	65.0%

\*P = probability; see page 3.24 for definition.

**Figure 3.76. Tornado Activity in the United States**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Blue arrow indicates Washington County

## **Vulnerability**

### ***Vulnerability Overview***

Many tornadoes are capable of great destruction and every tornado is a potential killer. Tornadoes can topple buildings, destroy mobile homes, uproot trees, hurl people and animals through the air for hundreds of yards and fill the air with lethal, windblown debris. Sticks, glass, roofing material and lawn furniture all become deadly missiles when driven by tornado winds.<sup>39</sup> Washington County resides in a region of the United States that has a high frequency of dangerous and destructive tornadoes. This region seen in **Figure 3.77** is referred to as “Tornado Alley”.

<sup>39</sup> 2018 Missouri Hazard Mitigation Plan

The 2018 Missouri Hazard Mitigation Plan used statistical analysis of data from several sources to determine vulnerability to tornadoes across the state. HAZUS building exposure value data, population density and mobile home data from the U.S. Census (2015 ACS), the calculated Social Vulnerability Index for Missouri Counties from the Hazards and Vulnerability Research Institute in the Department of Geography at the University of South Carolina, and storm events data (1950 to December 31, 2016) from the National Centers for Environmental Information (NCEI). One limitation to the NCEI data is that many tornadoes that may have occurred in uninhabited areas and some in inhabited areas, may not have been reported. In addition, NOAA data cannot show a realistic frequency distribution of different Fujita scale tornado events, except for recent years. For these reasons a parametric model based on a combination of many physical aspects of the tornado to predict future expected losses was not used. The statistical model used for this analysis was probabilistic based purely on tornado frequency and historic losses.

**Figure 3.77. Tornado Alley in the U.S.**



Source: <http://tornadochaser.net/>

Six factors were considered in determining overall vulnerability to tornadoes as follows: building exposure, population density, social vulnerability, percentage of mobile homes, likelihood of occurrence and annual property loss. Based on natural breaks in the statistical data, a rating value of one through five was assigned to each factor. These rating values correspond to the following descriptive terms:

- 1) Low
- 2) Low-medium
- 3) Medium

- 4) Medium-high
- 5) High

**Table 3.81** provides the factors used and ranges for the rating values assigned. Once the ranges were established and applied to all factors, the ratings were combined to determine overall vulnerability. **Table 3.82** illustrates the ranges for tornado combined vulnerability rating.

**Table 3.81. Ranges for Tornado Vulnerability Factor Ratings**

Factors Considered	Low (1)	Low-medium (2)	Medium (3)	Medium-High (4)	High (5)
<b>Common Factors</b>					
Building Exposure (\$)	\$269,532- \$3,224,641	\$3,224,642- \$8,792,829	\$8,792,830- \$22,249,768	\$22,249,769- \$46,880,213	\$46,880,214- \$138,887,850
Population Density (#per sq. mile)	4.11-44.23	44.24-134.91	134.92-259.98	259.99-862.69	862.70-2,836.23
Social Vulnerability	1	2	3	4	5
Percent Mobile Homes	0.2-4.5%	4.51-8.8%	8.81-14%	14.01-21.2%	21.21-33.2%
Likelihood of Occurrence (# of events/ yrs. of data)	0.119 - 0.208	0.209 - 0.313	0.314 - 0.417	0.418 - 0.552	0.553 - 0.791
Total Annualized Property Loss (\$ / yrs. of data)	\$974 - \$281,874	\$281,875 - \$991,825	\$991,826 - \$2,099,000	\$2,099,001 - \$5,047,474	\$5,047,475 - \$42,467,109

Source: 2018 Missouri Hazard Mitigation Plan

**Table 3.82. Ranges for Tornado Combined vulnerability Rating**

	Low (1)	Low-medium (2)	Medium (3)	Medium-High (4)	High (5)
Tornado Combined Vulnerability	7-10	11-12	13-14	15-16	17-21

Source: 2018 Missouri Hazard Mitigation Plan

**Table 3.83** provides data on building exposure, population density, SOVI and mobile home data for Washington County that is used to determine overall vulnerability.

**Table 3.83. Building Exposure, Population Density, SOVI and Mobile Home Data for Washington County**

Total Building Exposure (Hazus)	Exposure Rating	Population Density	Population Rating	SOVI Ranking	SOVI Rating	Percent Mobile Homes	Mobile Home Rating
\$1,730,986,000	1	32.62	1	Medium	3	33.2	5

Source: 2018 Missouri Hazard Mitigation Plan

**Table 3.84** provides additional data, obtained from the National Centers for Environmental Information to complete the overall vulnerability analysis and the total overall vulnerability rating for tornadoes. **Figure 3.78** shows the percent of mobile homes per county throughout the state with Washington

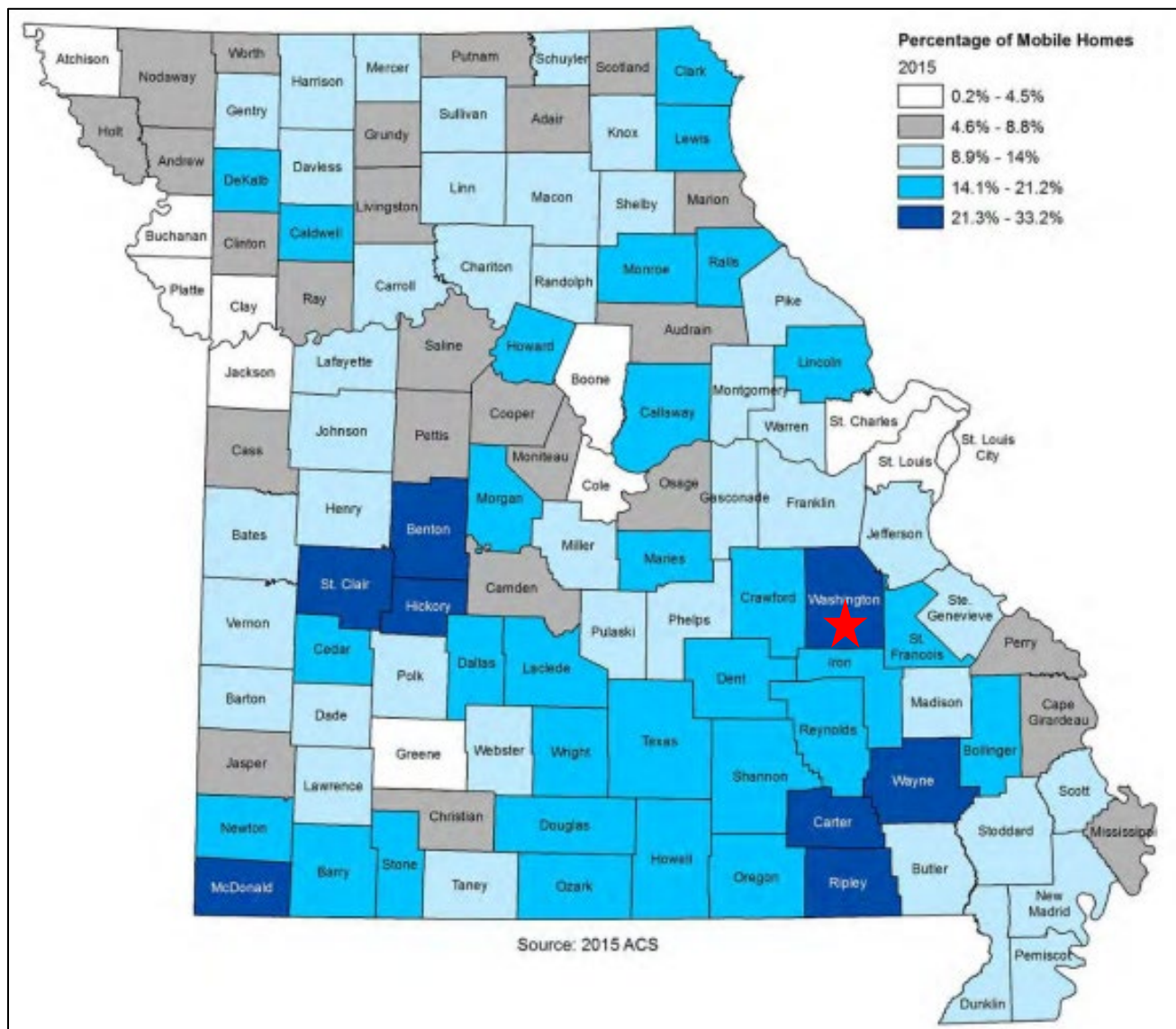
County determined to have high mobile home density at 21.3 percent to 33.2 percent. **Figure 3.79** provides the average annual occurrence of tornadoes in Missouri and illustrates that Washington County falls into the middle quadrant for historical events – 31 to 41 percentiles. Finally, **Figure 3.80** shows the county’s overall vulnerability to tornadoes – Medium-High.

**Table 3.84. Likelihood of Occurrence, Annual Property Loss and Overall Vulnerability Rating for Tornadoes for Washington County**

Total Number of Tornadoes	Likelihood of Occurrence	Likelihood of occurrence Rating	Total Annualized Property Loss	Total Annualized Property Loss Rating	Overall Vulnerability Rating	Overall Vulnerability Rating Description
25	0.373	3	\$840,299	2	15	Medium High

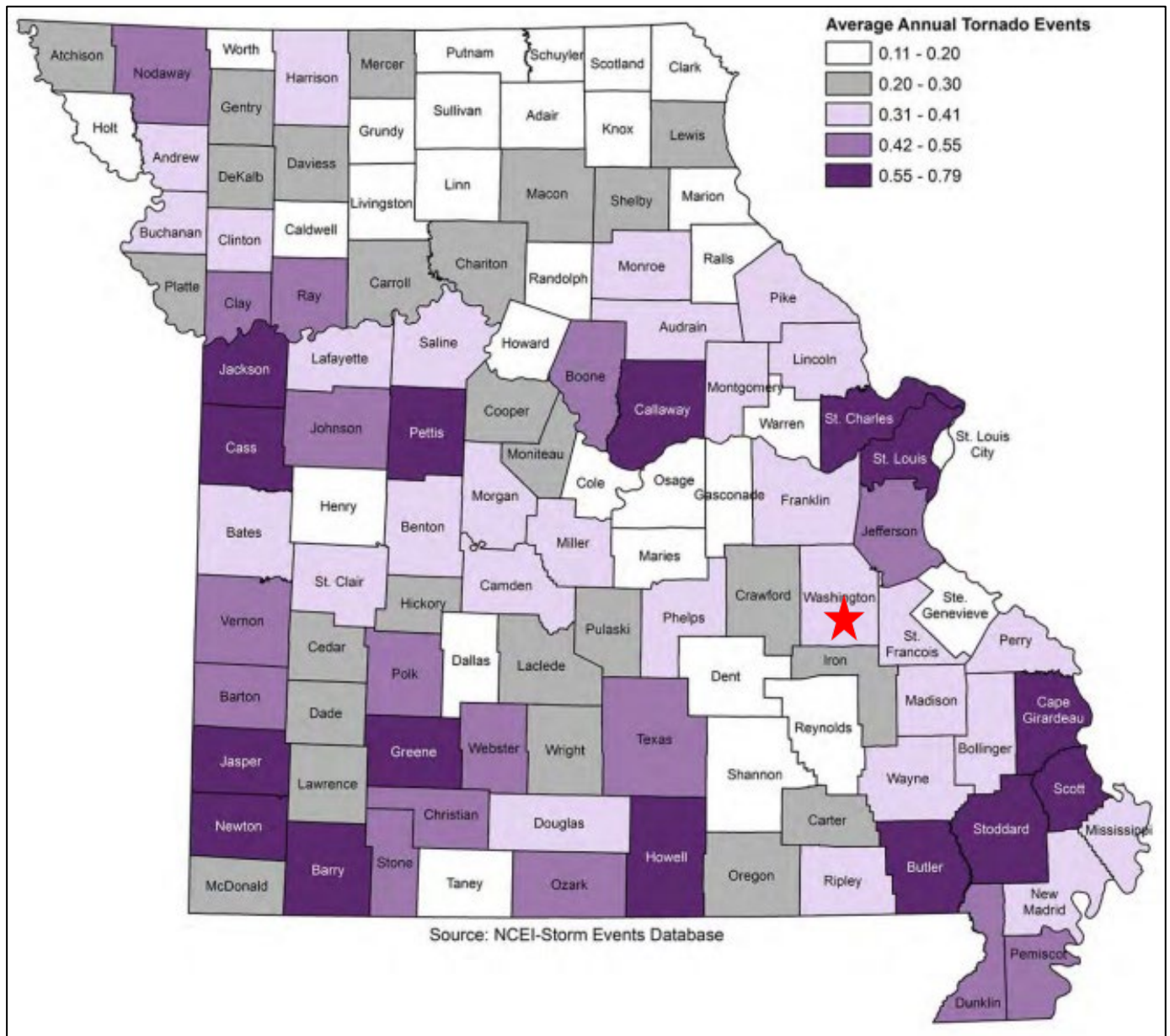
Source: 2018 Missouri Hazard Mitigation Plan

**Figure 3.78. Missouri – Percent of Mobile Homes Per County**



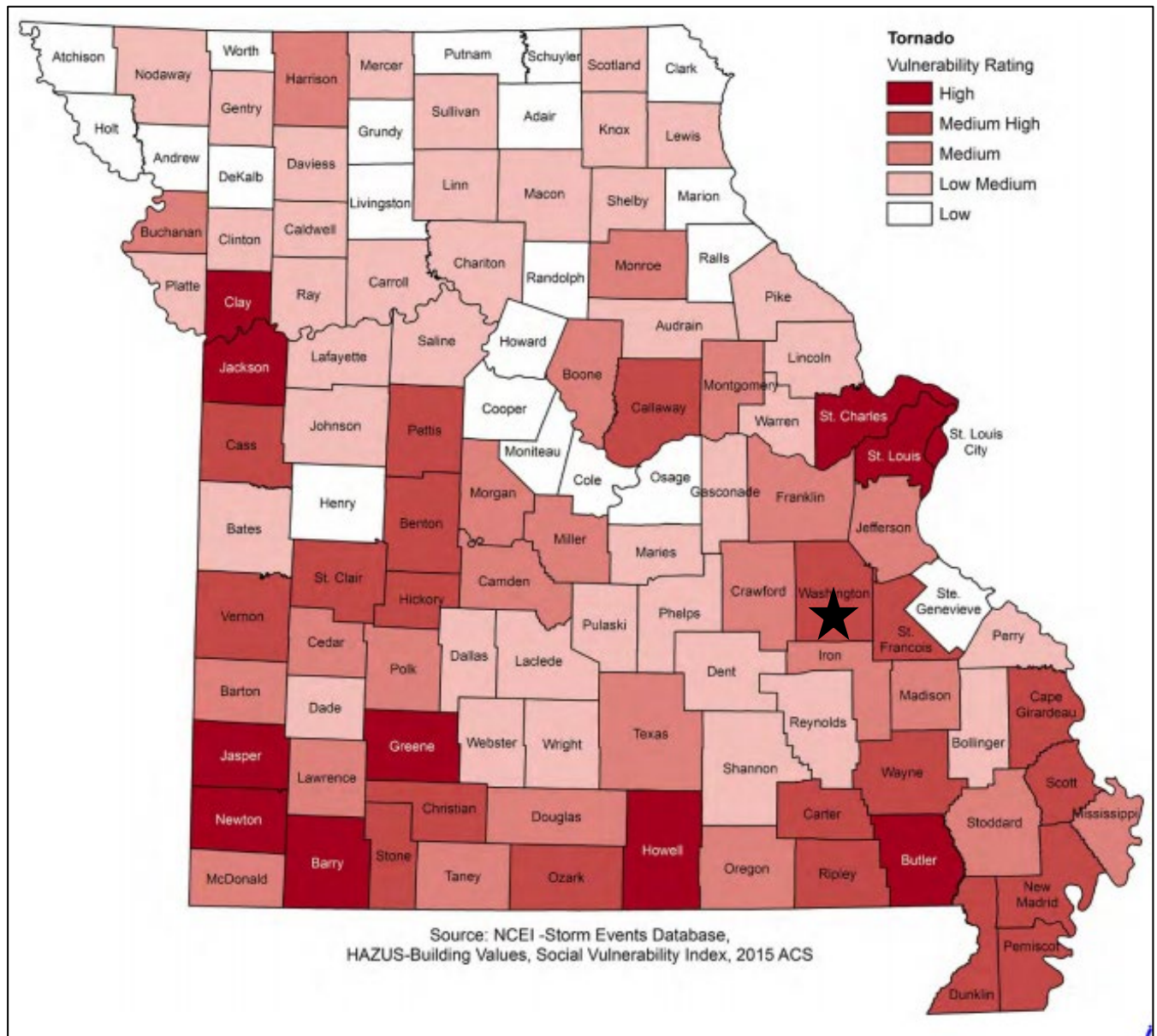
Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.79. Average Annual Occurrence for Tornadoes**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.80. Overall Vulnerability to Tornadoes**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Black star indicates Washington County

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

The total annualized building losses for Washington County is \$840,299. Additionally, the largest recorded tornado in the planning area has been an EF1. Utilizing this information, we can infer that there is potential for another tornado of equivalence.

### **Future Development**

As populations and development increases across the county, the vulnerability will increase as well. In order to protect jurisdictions from increased tornado vulnerabilities, future analysis, training, and implementation should be considered at the planning, engineering, and architectural design stages.

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## **Hazard Summary by Jurisdiction**

As previously stated, a tornado event could occur anywhere in the planning area. However, some jurisdictions would suffer heavier damages because of the age of housing or high concentration of mobile homes. See **Table 3.33** for jurisdictions most vulnerable to damage due to the age of the structure. Based on structure age, the city of Caledonia would have higher vulnerability due to 34.6 percent of its housing stock being built prior to 1939. Furthermore, data was obtained from the U.S. Census Bureau for the number of mobile homes in Washington County and its jurisdictions. From the information provided in **Table 3.85**, Unincorporated Washington County, with 2,629 mobile homes – 33.8 percent of housing in the count, is most vulnerable to losses due to the number of mobile homes residing within the jurisdiction.

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**Table 3.85. Percentage of Mobile Homes in Washington County, 2019**

<b>Jurisdiction</b>	<b>Number of Mobile Homes</b>	<b>Percentage of Mobile Homes*</b>
Unincorporated Washington County	2,629	33.8
Caledonia	18	19.8
Irondale	38	17.4
Mineral Point	40	32.8
Potosi	5	0.5

Source: U.S. Census Bureau, 2016-2020 5-Year American Community Survey

\*Number of mobile homes per jurisdiction/total occupied housing units per jurisdiction

\*\*Total housing units for all jurisdictions = 9,278

## **Problem Statement**

Early warnings are possibly the best hope for residents when severe weather strikes. While more than two hours warning is not possible for tornadoes, citizens must immediately be aware when a city will be facing a severe weather incident. Jurisdictions that do not already possess warning systems should plan to purchase a system. Storm shelters are another important means of mitigating the effects of tornadoes. Additional public awareness also includes coverage by local media sources. A community-wide shelter program should be adopted for residents who may not have adequate shelter in their homes. Residents should also be encouraged to build their own storm shelters to prepare for emergencies. Local governments should encourage residents to purchase weather radios to ensure that everyone has sufficient access to information in times of severe weather.

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### 3.4.10 Wildfires

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The specific sources for this hazard are:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.11, Page 3.390  
[https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO\\_Hazard\\_Mitigation\\_Plan2018.pdf](https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf)
- Missouri Department of Conservation Wildfire Data Search at  
<http://mdc4.mdc.mo.gov/applications/FireReporting/Report.aspx>
- Statistics, Missouri Division of Fire Safety at <https://dfs.dps.mo.gov/>;
- National Statistics, US Fire Administration at <https://www.usfa.fema.gov/statistics/>;
- Fire/Rescue Mutual Aid Regions in Missouri at  
<https://dfs.dps.mo.gov/programs/resources/mutual-aid.php>;
- Forestry Division of the Missouri Dept. of Conservation at <https://mdc.mo.gov/your-property/fire-management>;
- National Fire Incident Reporting System (NFIRS),  
<http://www.dfs.dps.mo.gov/programs/resources/fire-incident-reporting-system.php>
- Firewise, [www.firewise.org](http://www.firewise.org)
- University of Wisconsin Slivis Lab, [http://silvis.forest.wisc.edu/maps/wui\\_main](http://silvis.forest.wisc.edu/maps/wui_main)
- Missouri Hazard Mitigation Viewer  
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website  
<https://drive.google.com/file/d/1bPkcojgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
  - Likelihood of Occurrence of wildfire by County
  - Average annual land burned (acres) by County
  - Number of structures within the WUI Interface/Intermix Area
  - Potential loss, average annual land burned by County

#### **Hazard Profile**

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

The fire incident types for wildfires include: 1) natural vegetation fire, 2) outside rubbish fire, 3) special outside fire, and 4) cultivated vegetation, crop fire.

The Missouri Division of Fire Safety (MDFS) indicates that approximately 80 percent of the fire departments in Missouri are staffed with volunteers. Whether paid or volunteer, these departments are often limited by lack of resources and financial assistance.

The Forestry Division of the Missouri Department of Conservation (MDC) is responsible for protecting privately owned and state-owned forests and grasslands from wildfires. To accomplish this task, eight forestry regions have been established in Missouri for fire suppression. The Forestry Division works closely with volunteer fire departments and federal partners to assist with fire suppression activities. Currently, approximately 700 rural fire departments in Missouri have mutual aid agreements with the Forestry Division to obtain assistance in wildfire protection if needed. Over 300 have mutual aid agreements with the State to obtain assistance in wildfire protection if needed. A cooperative agreement with the Mark Twain National Forest is renewed annually.

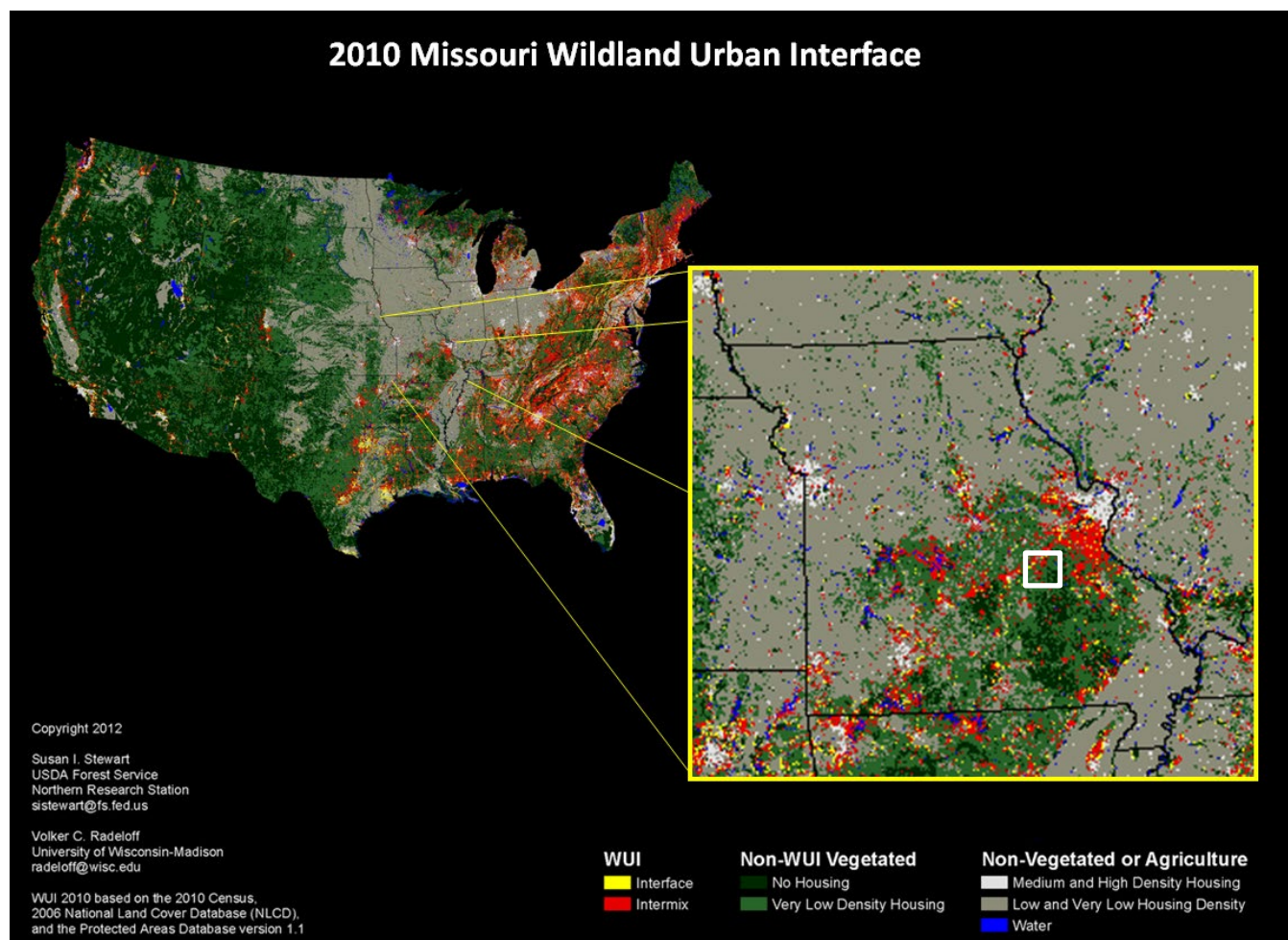
Most of Missouri fires occur during the spring season between February and May. The length and severity of both structural and wildland fires depend largely on weather conditions. Each year, an average of about 3,200 wildfires burn more than 52,000 acres of forest and grassland in Missouri. Spring in Missouri is usually characterized by low humidity and high winds. These conditions result in

higher fire danger. Drought conditions can also hamper firefighting efforts, as decreasing water supplies may not prove adequate for firefighting. It is common for rural residents to burn their garden spots, brush piles, and other areas in the spring. Some landowners also believe it is necessary to burn their forests in the spring to promote grass growth, kill ticks, and reduce brush. Therefore, spring months are the most dangerous for wildfires. The second most critical period of the year is fall. Depending on the weather conditions, a sizeable number of fires may occur between mid-October and late November.

### Geographic Location

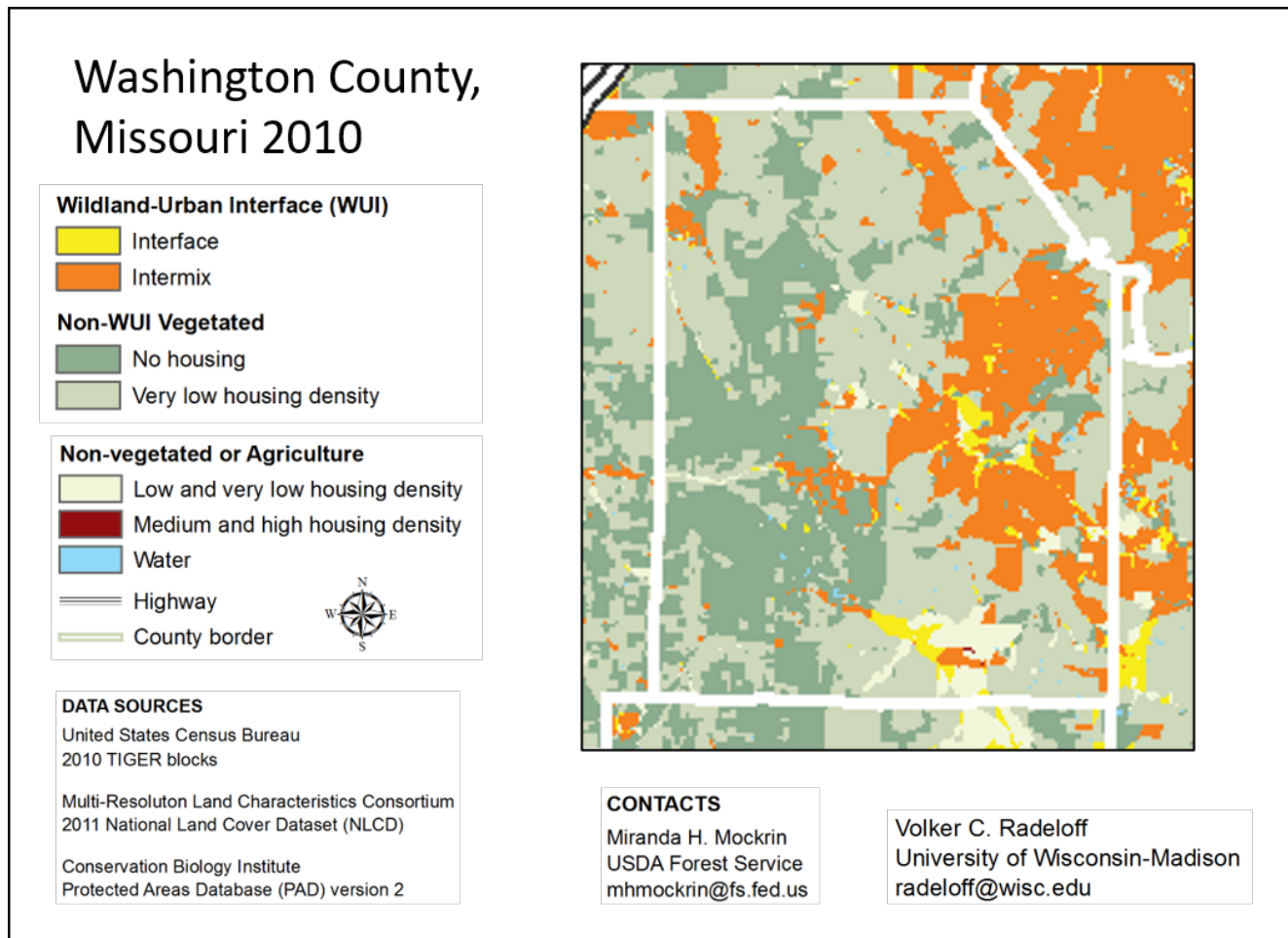
The risk of wildfire does not vary widely across the planning area. However, damages due to wildfires are expected to be higher in communities with more wildland–urban interface (WUI) areas. WUI refers to the zone of transition between unoccupied land and human development and needs to be defined in the plan. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the Intermix areas are those areas that intermingle with wildland areas (**Figure 3.81**). To determine specific WUI areas and variations, data was obtained from ArcGIS, Streets and SILVIS (**Figure 3.82**). According to the WUI area map of Washington County, all cities partially reside in a WUI area.

**Figure 3.81. 2010 Missouri Wildland Urban Interface (WUI)**



Source: <http://silvis.forest.wisc.edu/maps/wui/>; White square roughly estimates Washington County's location

**Figure 3.82. Washington County Wildlife Urban Interface**



Source: [http://silvis.forest.wisc.edu/GeoData/WUI\\_cp12/maps/gifs/white/Missouri\\_WUI\\_cp12\\_white\\_2010.gif](http://silvis.forest.wisc.edu/GeoData/WUI_cp12/maps/gifs/white/Missouri_WUI_cp12_white_2010.gif)

### ***Strength/Magnitude/Extent***

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

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

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

The severity of wildfires in Missouri is considered low to moderate, and wildfires in Missouri often go unnoticed by the general public because the sensational fire behavior that captures the attention of television viewers is rare in the state. Yet, from the standpoint of destroying homes and other property, Missouri wildfires can be quite destructive. Large fires have the potential to kill people, livestock, fish, and wildlife as well as destroy crops and pastures. Wildfires can destroy not only natural areas, but homes, businesses, and other facilities. Loss of life due to wildfires is not common in Missouri, but injuries to residents and firefighters can include falls, sprains, abrasions, or heat-related injuries such as dehydration.

### ***Previous Occurrences***

Between 2001 and 2020 there were 1,780 wildfires reported in Washington County, according to wildfire reporting to the Missouri Department of Conservation<sup>40</sup>. This is an average of 89 wildfires per year. The size of the fires varied from as small as .01 acre to as large as 10,142.16 acres. **Table 3.86** shows the cause of wildfires, number of wildfires and acres burned for the period 2001-2020. Fires of unknown cause account for the largest number of fires and the greatest number of acres burned.

**Table 3.86. 2001-2020 Washington County Wildfires by Cause**

<b>Cause</b>	<b>Number</b>	<b>Acres</b>	<b>% Number</b>	<b>% Acres</b>
<b>Arson</b>	34	958.2	1.91%	2.45%
<b>Campfire</b>	9	31.15	0.51%	0.08%
<b>Children</b>	3	3	0.17%	0.01%
<b>Debris</b>	523	5,254	29.38%	13.46%
<b>Equipment</b>	53	490.45	2.98%	1.26%
<b>Fireworks</b>	1	21.55	0.06%	0.06%
<b>Lightning</b>	5	25.1	0.28%	0.06%
<b>Miscellaneous</b>	71	1,858.12	3.99%	4.76%
<b>Not Reported</b>	56	236.93	3.15%	0.61%
<b>Powerline</b>	1	26.68	0.06%	0.07%
<b>Railroad</b>	2	1	0.11%	0.00%
<b>Smoking</b>	21	180.87	1.18%	0.46%
<b>Unknown</b>	1,002	29,942.27	56.29%	76.71%
<b>Totals</b>	<b>1,780</b>	<b>39,031.32</b>	<b>100.00%</b>	<b>100.00%</b>

Records for school and special districts are not available at this time.

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

From the data obtained from the Missouri Department of Conservation<sup>41</sup> (Appendix: F), 1,780 wildfire events occurred in Washington County between 2001 and 2020. This information was utilized to determine the annual average percent probabilities of wildfires. Since multiple occurrences are anticipated per year (1,780 events/20 years), the probability of wildfires per year is 100% with an average of 89 events per year **Table 3.88**.

<sup>40</sup> <http://mdc7.mdc.mo.gov/applications/FireReporting/Report.aspx>

<sup>41</sup> <http://mdc7.mdc.mo.gov/applications/FireReporting/Report.aspx>

**Table 3.87. Annual Average Percentage Probability of Wildfires in Washington County**

Location	Annual Avg. % P	Avg. Number of Events
Washington County	100%	89

\*P = probability; see page 3.24 for definition.

### ***Changing Future Conditions Considerations***

Higher temperatures and changes in rainfall are unlikely to substantially reduce forest cover in Missouri, although the composition of trees in the forests may change. More droughts would reduce forest productivity and changing future conditions are also likely to increase the damage from insects and diseases. But longer growing seasons and increased carbon dioxide concentrations could offset the losses from those factors. Forests cover about one-third of the state, dominated by oak and hickory trees. As the climate changes, the abundance of pines in Missouri's forests are likely to increase, while the population of hickory trees is likely to decrease.<sup>42</sup>

Higher temperatures will also reduce the number of days prescribed burning can be performed. Reduction of prescribed burning will allow for growth of understory vegetation – providing fuel for destructive wildfires. Drought is also anticipated to increase in frequency and intensity during summer months under projected future scenarios. Drought can lead to dead or dying vegetation and landscaping material close to structures which creates fodder for wildfires.<sup>43</sup>

## **Vulnerability**

### ***Vulnerability Overview***

According to the 2018 Missouri State Hazard Mitigation Plan, the Department of Conservation historical wildfire data was the best resource for data on wildfires. The Missouri State Hazard Mitigation Plan used data from 2004-2016 and determined that Washington County should expect to have 114.77 wildfires per year, impacting 1,821 acres (**Table 3.88**).

The state plan also indicates that Washington County is at a high likelihood for building damage from wildfires – likely from the high likelihood of wildfires and the number of structures in WUI interface areas. **Figure 3.83** illustrates the likelihood of wildfire events based on data from 2004-2016. **Figure 3.84** provides a map that illustrates the average annual acreage burned.

**Table 3.88. Statistical Data for Wildfire Vulnerability in Washington County**

Number of Wildfires 2004-2016	Likelihood of Occurrence (#/year)	Total Acres Burned	Average Annual Acreage Burned
1,492	114.77	23,679.13	1,821

Source: 2018 Missouri State Hazard Mitigation Plan

<sup>42</sup> 2018 Missouri Hazard Mitigation Plan

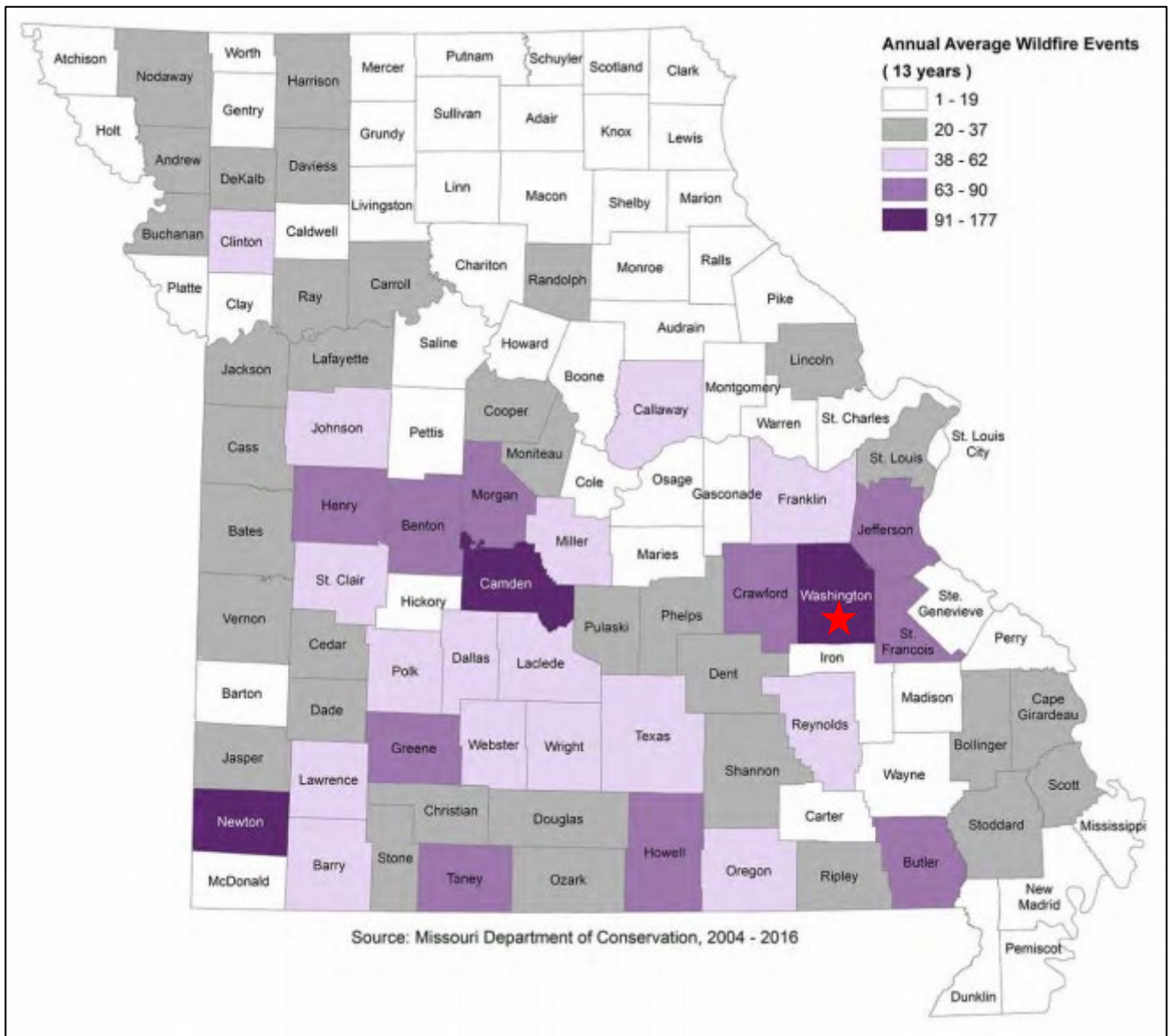
<sup>43</sup> 2018 Missouri Hazard Mitigation Plan

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The method used to determine vulnerability to wildfires in the 2018 Missouri Hazard Mitigation plan was a GIS comparative analysis of wildland urban interface and intermix (WUI) areas against building exposure data to determine the types, numbers, and estimated values of buildings at risk to wildfire. This GIS-based analysis utilized data from several sources: the Missouri Spatial Data Inventory Service (MSDIS), HAZUS building exposure value data and wildland urban interface and intermix area data from the University of Wisconsin-Madison SILVIS Lab.

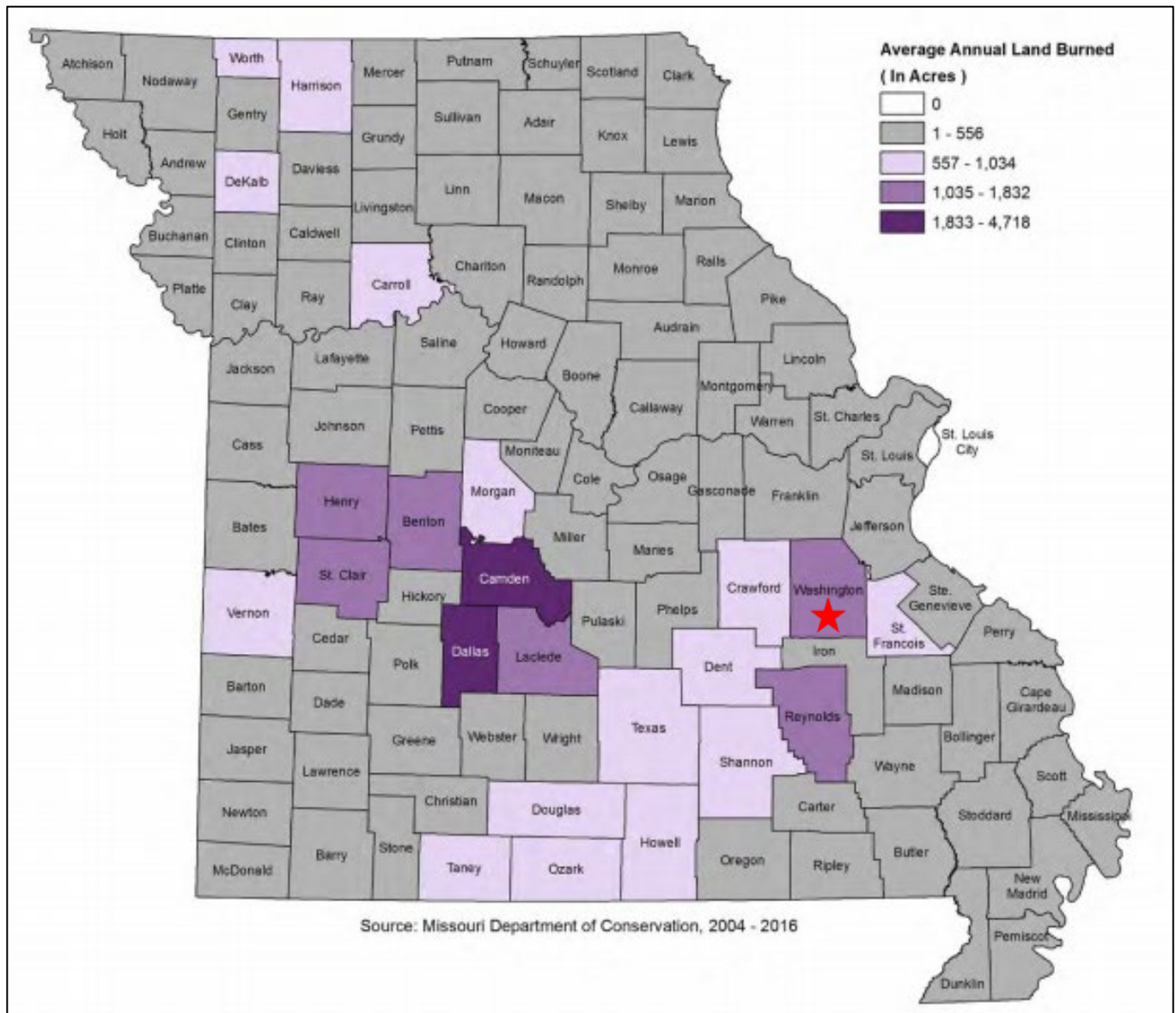
The results of that analysis, including estimated number of structures, value of structures and population are illustrated in **Table 3.89**. The total estimated number of structures vulnerable to wildfires is 9,827. The overall value of structures vulnerable to wildfire in Washington County is estimated at \$2,247,109,858. To further illustrate vulnerability in Washington County, maps from the 2018 Missouri Hazard Mitigation plan illustrating these numbers and comparing them statewide are included. The number of structures in the WUI interface and intermix areas statewide are shown in **Figure 3.85**. **Figure 3.86** shows the estimated value of structures in the WUI interface and intermix areas. **Figure 3.87** illustrates the number of people at risk to wildfire in the WUI interface and intermix areas.

**Figure 3.83. Likelihood of Wildfire Events, 2004-2016**



Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.84. Average Annual Acreage Burned**



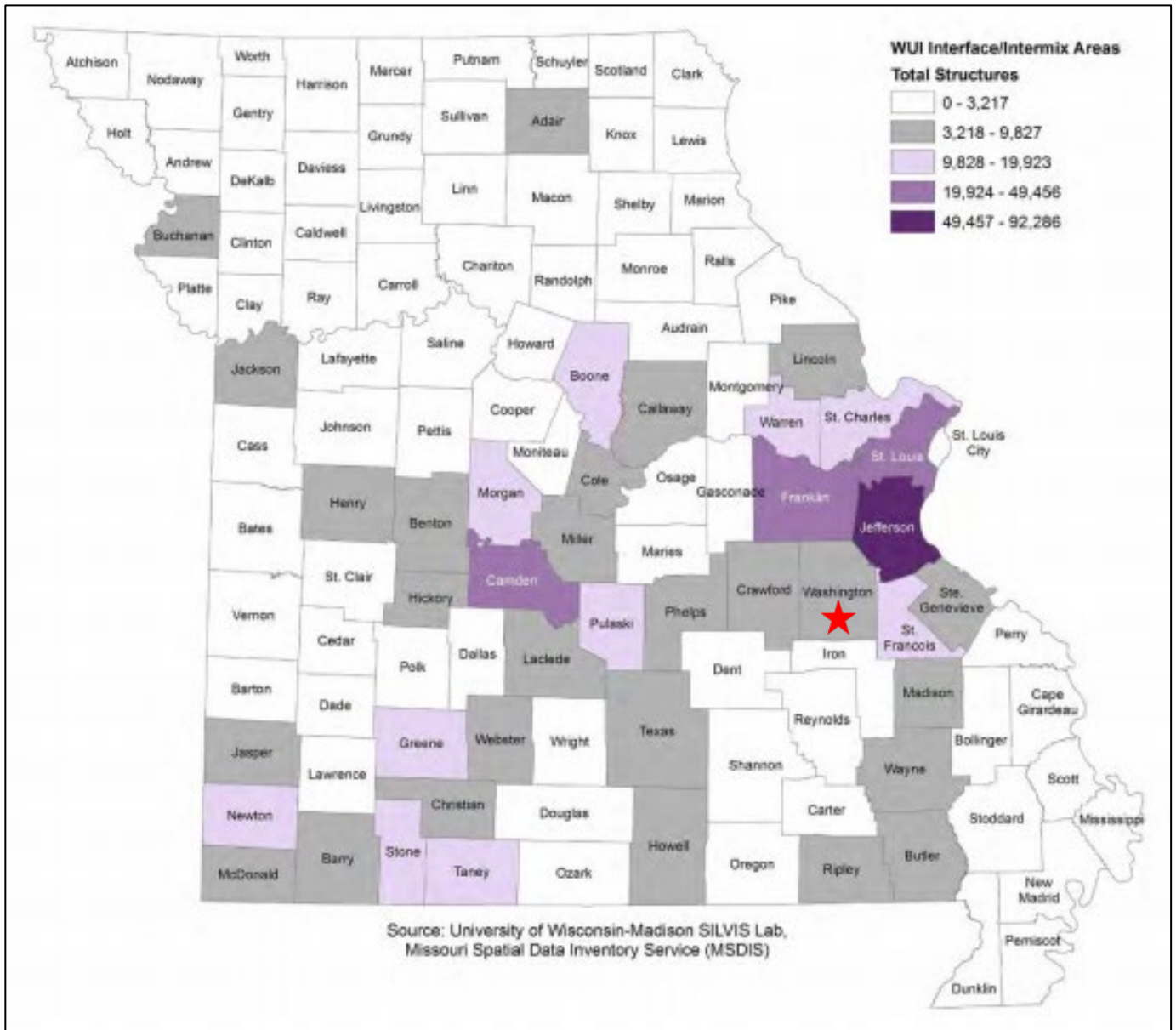
Source: 2018 Missouri State Hazard Mitigation Plan, \*Red star indicates Washington County

**Table 3.89. Estimated Numbers and Values of Structures and Population Vulnerable to Wildfire in Washington County**

Washington County	Number of Structures	Value of Structures	Population
<b>Agriculture</b>	2,697	\$1,019,466,000	
<b>Commercial</b>	387	\$251,030,466	
<b>Education</b>	12	\$17,448,000	
<b>Government</b>	19	\$14,879,533	
<b>Industrial</b>	29	\$18,089,556	
<b>Residential</b>	6,683	\$926,196,304	
<b>Totals</b>	<b>9,827</b>	<b>\$2,247,109,858</b>	<b>17,443</b>

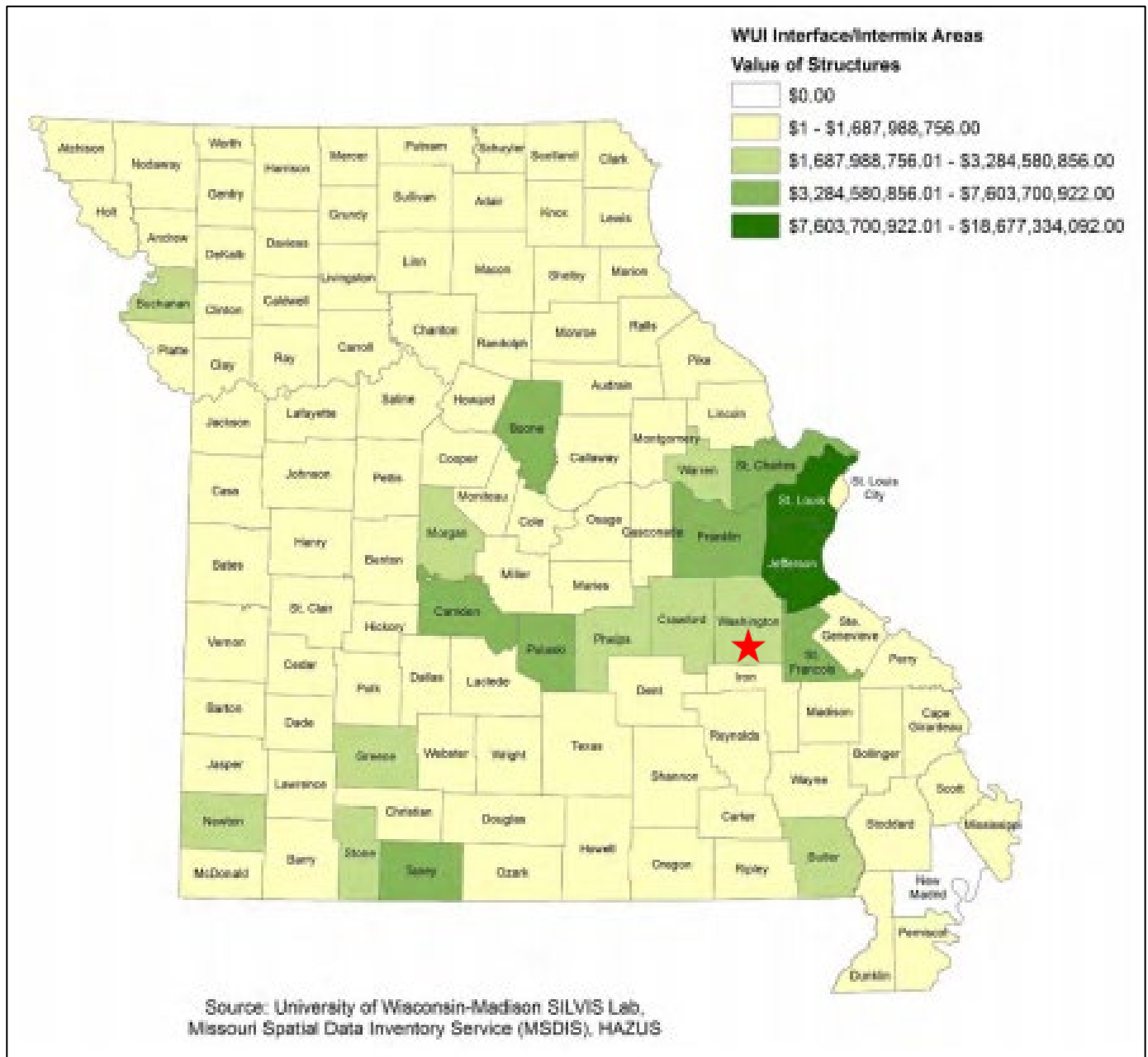
Source: 2018 Missouri State Hazard Mitigation Plan

**Figure 3.85. Number of Structures in WUI Interface and Intermix Areas**



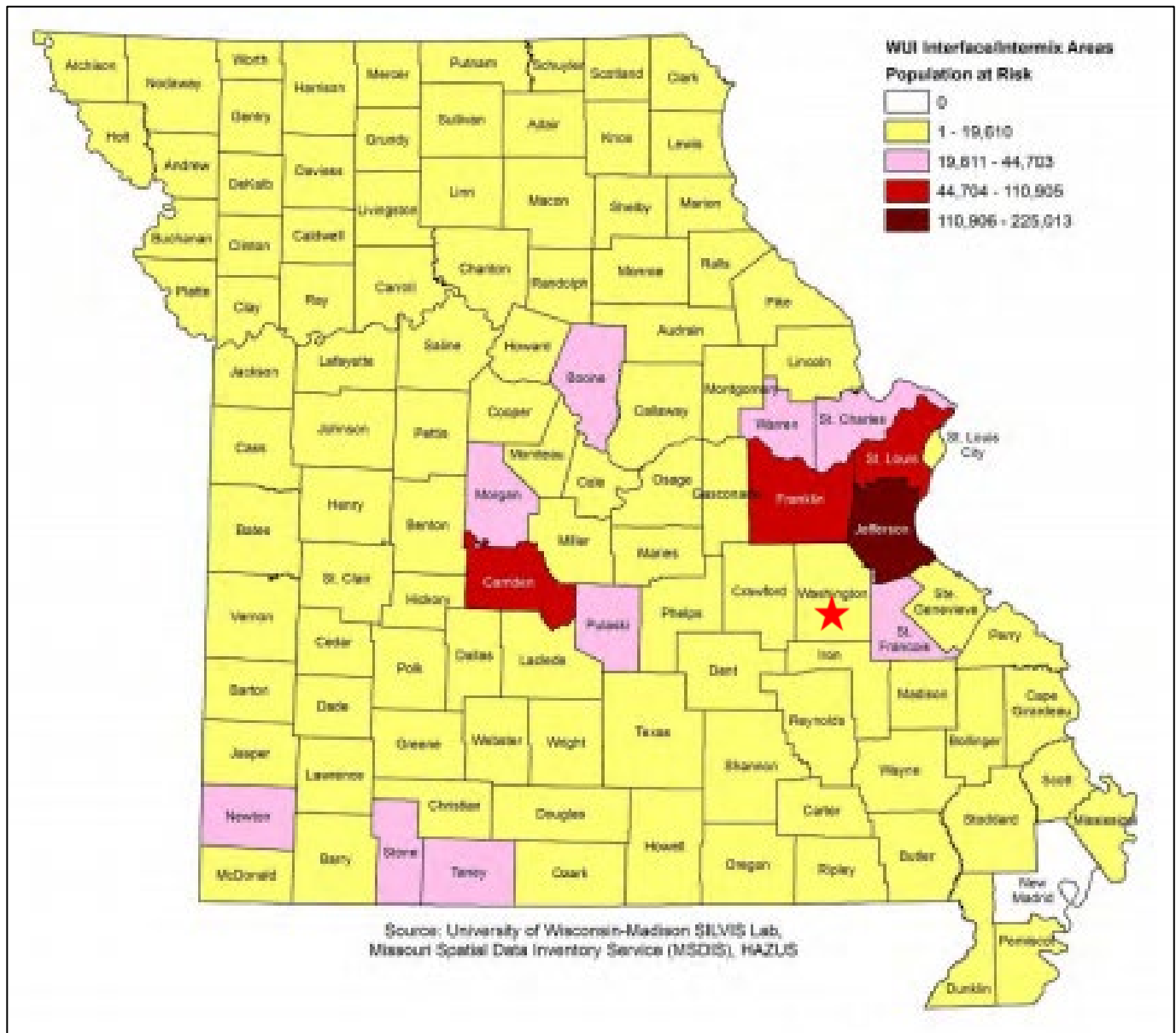
Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.86. Value of Structures in the WUI Interface and Intermix Areas**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

**Figure 3.87. Population at Risk to Wildfire in WUI Interface and Intermix Areas**



Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

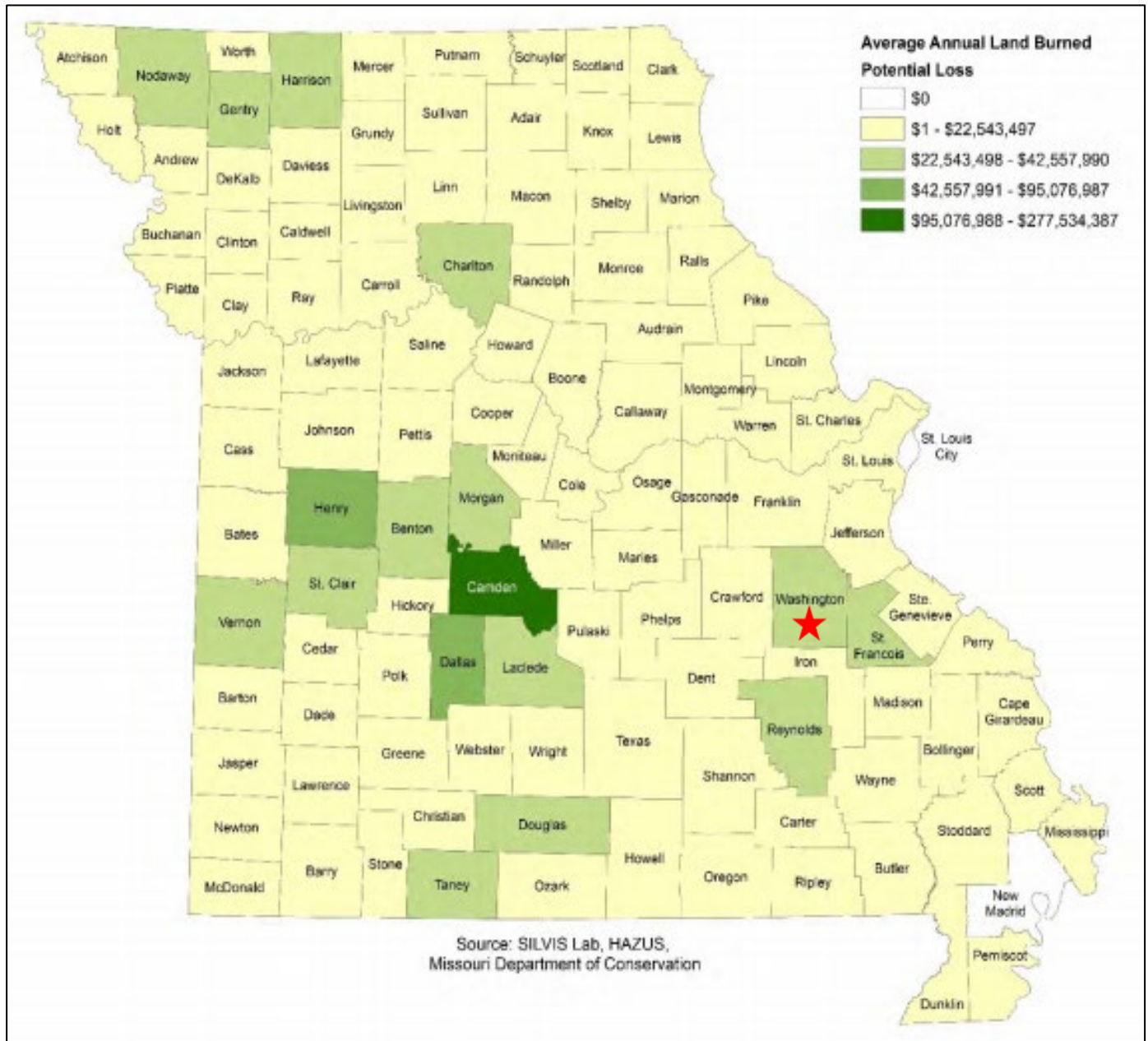
### **Potential Losses to Existing Development**

As there was not data available on Washington County specific losses, data was used from the 2018 Missouri State Hazard Mitigation Plan. The factors considered for estimating potential losses due to wildfires were average acreage burned each year per county and the average value of structures per acre in the WU-Interface/Intermix areas. **Table 3.90** and **Figure 3.88** that follows provide the potential loss figures for Washington County based on this methodology.

**Table 3.90. Wildfire Potential Loss Estimates for Washington County**

Total WUI Acreage	Total Structure Value Within WUI	Average Value/Acre within WUI	Average Annual Acreage Burned	Potential Loss
103,621.44	\$2,247,109,858	\$21,686	1,821	\$39,489,771

Source: 2018 Missouri Hazard Mitigation Plan

**Figure 3.88. Annualized Wildfire Damages**

Source: 2018 Missouri Hazard Mitigation Plan, \*Red star indicates Washington County

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

Few future developments are anticipated in WUI areas, however due to lack of data, it is difficult to enumerate. Additionally, as previously mentioned, each jurisdiction within the county resides in a WUI area. This increases the risk of fire hazards for future development.

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

As long as drought conditions are not severe, future wildfires in Washington County should have a medium adverse impact on the community, depending on the proximity to population centers. Nonetheless, homes, businesses, and schools located in unincorporated areas are at higher risk from wildfires due to proximity to woodland and more importantly, distance from fire services. All cities and school districts are in WUI areas but are closer to fire services.

### **Problem Statement**

An estimated 9,827 structures and 17,443 people are vulnerable to wildfires in Washington County. Wildfires are expected to occur on an annual basis. To mitigate adverse impacts a comprehensive community awareness and educational campaign on wildfire danger should be designed and implemented. This campaign should include the development of capabilities, systems, and procedures for pre-deploying fire-fighting resources during times of high wildfire hazards; training of local fire departments for wildfire scenarios; encouraging the development and dissemination of maps relating to the fire hazards (WUI areas) to help educate and assist builders and homeowners in being engaged in wildfire mitigation activities; and guidance of emergency services during response. Residents should be educated on the dangers of wildfires and what steps they can take to mitigate their vulnerability. This could include landscaping and water supply.

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## 4 MITIGATION STRATEGY

4	MITIGATION STRATEGY .....	4.1
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4.2	Identification and Analysis of Mitigation Actions.....	4.2
4.3	Implementation of Mitigation Actions .....	4.7

**44 CFR Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction’s blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section presents the mitigation strategy developed by the Mitigation Planning Committee (MPC). The mitigation strategy was developed through a collaborative group process. The process included review of general goal statements to guide the jurisdictions in lessening disaster impacts as well as specific mitigation actions to directly reduce vulnerability to hazards and losses. The following definitions are taken from FEMA’s *Local Hazard Mitigation Review Guide* (October 1, 2012).

- **Mitigation Goals** are general guidelines that explain what you want to achieve. Goals are long-term policy statements and global visions that support the mitigation strategy. The goals address the risk of hazards identified in the plan.
- **Mitigation Actions** are specific actions, projects, activities, or processes taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan’s mission and goals.

### 4.1 Goals

**44 CFR Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.**

This planning effort is an update to Washington County’s existing hazard mitigation plan originally approved by FEMA in April 2005 and updated and approved by FEMA on March 22, 2013 and five years later in June, 2018. Therefore, the goals from the updated 2016 Washington County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. The MPC conducted a discussion session during their first meeting to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2018 State Hazard Mitigation Plan goals were reviewed. The MPC reviewed the goals and decided to consolidate them from six goals to three. The following goals were established for the 2023 Washington County plan update:

- Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
- Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
- Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

## 4.2 Identification and Analysis of Mitigation Actions

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**44 CFR 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.**

During the first MPC meeting, the committee discussed what needed to be updated in the risk assessment. Changes in risk since adoption of the previously approved plan were discussed. Since the last update, there have been no deaths due to natural hazard events. The process of reviewing action items was started, and suggestions made for changes to address the changes in risk. Discussions from the actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. The MPC discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

In the 2018 revision of the plan, the MPC determined to include problem statements in the plan update at the end of each hazard profile, which had not been done in the previously approved plan. The problem statements summarize the risk to the planning area presented by each hazard and include possible methods to reduce that risk.

The focus of Meeting #2 was to review, prioritize and update the mitigation strategy. The MPC reviewed the list of actions proposed in the previous mitigation plan and proposed additional mitigation actions. Facilitators also provided suggestions for actions based on what some of the surrounding counties had included in their plans. Participants were also encouraged to refer to the current State Plan and provided a link to the FEMA's publication, *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013)*. This document was developed by FEMA as a resource for identification of a range of potential mitigation actions for reducing risk to natural hazards and disasters.

During the review of the plan document, MPC members were encouraged to review the details of the risk assessment vulnerability analysis specific to their jurisdiction.

The MPC reviewed the actions from the previously approved plan for progress made since the plan had been adopted. Copies of the list of actions for each jurisdiction were provided to MPC members at planning meetings and were emailed out to all members. Action items were reviewed and the MPC provided updates on the status of action items during both planning meetings and the meeting with the road and bridge department. Each action item was reviewed and assigned one of the following:

- Completed, with a description of the progress,
- Not Started/Continue in Plan Update, with a discussion of the reasons for lack of progress,
- In Progress/Continue in Plan Update, with a description of the progress made to date or
- Deleted, with a discussion of the reasons for deletion.

Additionally, the future inclusion of each mitigation action in the plan update was identified as either keep, delete, or modify. Based on the status updates, there were six completed actions, seven deleted actions, nine actions that were combined with other similar actions, 14 continuing actions and two new actions. Seven of the continuing action items were revised to better meet SMART criteria.

**Table 4.1** provides a summary of the action statuses for each jurisdiction:

**Table 4.1. Action Status Summary**

Jurisdiction	Completed Actions	Continuing Actions (ongoing or modify)	Deleted Actions
Washington County	5	14	6
Caledonia	5	12	5
Irondale	5	12	5
Mineral Point	5	12	5
Potosi	5	12	5
Kingston K-14 School District	4	5	1
Potosi R-III School District	4	5	1
Richwoods R-VII School District	4	5	1
Valley R-VI School District	4	5	1

**Table 4.2** provides a summary of the completed and deleted actions from the previous plan.

**Table 4.2. Summary of Completed, Revised and Deleted Actions from the Previous Plan**

Completed Actions	Completion Details (date, amount, funding source)
1.1.5 Educate school staff on natural hazards and make sure all staff are familiar with school emergency plan including evacuation and safety procedures.	This action item has been established in school policy and is required by the Department of Secondary and Elementary Education (DESE). 2010. School operating budget.
1.2.4 Monitor developments in data availability concerning the impact of dam failure, tornadoes, sinkholes, land subsidence, and wildfire upon Washington County and all jurisdictions through local, state, and federal agencies for use in hazard mitigation planning.	This activity is accomplished every five years during the planning process. 2018. Hazard Mitigation Plan Update grant funds and local match.
2.3.2 Have local jurisdictions review their floodplain ordinances and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.	Jurisdictions reported that they had reviewed their floodplain ordinances and they includes these requirements. 2019. City and County operating budgets.

<b>Completed Actions</b>	<b>Completion Details (date, amount, funding source)</b>
3.4.2 Publicize county or citywide drills.	This has been established in policy and procedure as all events are publicized through local media. 2018. County, city and school operating budgets.
4.1.2 Continue to encourage joint training (or drills) between agencies, public and private entities (including schools and businesses).	This has been established in policy and procedure. Examples include hazardous materials tabletop exercises that actively recruit local government and agencies, schools and businesses to participate and hazmat trainings that are promoted to all emergency response agencies in the county. 2005. Local operating budgets and CEPF and HMEP funds from the MERC for hazardous materials programs.
6.3.1 Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health, and property.	Completed through the hazard mitigation planning process. 2022. Hazard mitigation planning grant and local match.
<b>Revised Actions</b>	<b>New Version</b>
1.1.3 Promote development of emergency plans by businesses and public entities by providing information on business continuity and emergency planning through local chambers of commerce and emergency management offices.	1.1.3 Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.
1.1.4 Continue to provide CERT training and encourage the development of CERT teams.	1.1.4 Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.
3.3.2 Implement a public awareness program about the benefits of hazard mitigation projects, both public and private, including distributing press releases by cities/county regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.	3.3.2 Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
5.2.1 Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.	5.2.1 Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
6.1.3 Work with state/local/federal agencies to include mitigation in all economic and community development projects.	6.1.3 Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Revised Actions	New Version
5.2.1 Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties.	5.2.1 Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
6.1.3 Work with state/local/federal agencies to include mitigation in all economic and community development projects.	6.1.3 Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
Deleted Actions	Reason for Deletion
1.2.2 Promote the use of weather radios by local residents to ensure advanced warning about threatening weather.	No longer a high priority with improved technology and poor radio reception in the county.
1.3.1 Place water height gauges and signs near low water crossings.	No longer a high priority. Committee felt that the signs encourage people to attempt crossings. Signs are often vandalized and difficult to maintain.
1.3.2 Provide information on tree trimming and dead tree removal programs to utility companies and local government.	Power lines are the responsibility of the power companies and cities and county did not feel this was a high priority.
2.1.1 Provide information on self-inspection programs to critical facilities to assess earthquake and tornado resistance.	No longer considered a high priority and does not meet SMART criteria.
2.1.4 Promote development of emergency plans by businesses and public entities by providing information on business continuity and emergency planning through local chambers of commerce and emergency management offices.	Combined with 1.1.3.
2.3.1 Develop minimum standards for building codes in county and cities.	No longer considered a high priority.
2.3.3 Encourage the Mark Twain National Forest to levy stricter fines for persons causing fire hazards.	Does not meet SMART criteria. No longer high priority.

Deleted Actions	Reason for Deletion
3.2.2 Encourage meetings between EMD, city/county officials and SEMA to familiarize officials with mitigation planning, implementation and budgeting for mitigation projects.	Combined with 6.1.3.
3.3.1 Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	Combined with 6.1.3.
4.1.1 Schedule joint meetings with different organizations/agencies for mitigation planning.	Combined with 6.1.3.
4.1.3 Pool different agency resources to achieve widespread mitigation results.	Combined with 4.1.2 and removed as completed.
5.1.4 Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties.	Although the city of Potosi requires this, the other cities determined it was a low priority.
5.2.2 Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.	Combined with 5.2.1.
6.1.2 Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met.	Combined with 1.3.3.
6.1.4 Provide information to jurisdictions on the benefits of budgeting for and implementing hazard mitigation projects.	Combined with 6.1.3.
6.2.1 Provide information on the benefits of local governments implementing cost-share programs with private property owners for hazard mitigation projects that benefit the	Combined with 6.1.3.

Source: Previously approved County Hazard Mitigation Plan; MPC committee; data collection questionnaires

## 4.3 Implementation of Mitigation Actions

**44 CFR Requirement §201.6(c)(3)(ii): The mitigation strategy shall include an action strategy describing how the actions identified in paragraph (c)(2)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefits review of the proposed projects and their associated costs.**

Jurisdictional MPC members were encouraged to meet with others in their community to discuss the actions to be included in the updated mitigation strategy. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Missouri State Hazard Mitigation Plan. The benefit/cost review at the planning stage primarily consisted of a qualitative analysis and was not the detailed process required grant funding application. For each action, the plan sets forth a narrative describing the types of benefits that could be realized from action implementation. The cost was estimated as closely as possible, with further refinement to be supplied as project development occurs.

FEMA's STAPLEE methodology was used to assess the costs and benefits, overall feasibility of mitigation actions, and other issues impacting project. During the prioritization process, the MPC worked together to review and assign scores. The process posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the questions as follows:

Definitely yes = 3 points  
Maybe yes = 2 points  
Probably no = 1  
Definitely no = 0

The following questions were asked for each proposed action.

S: Is the action socially acceptable?  
T: Is the action technically feasible and potentially successful?  
A: Does the jurisdiction have the administrative capability to successfully implement this action?  
P: Is the action politically acceptable?  
L: Does the jurisdiction have the legal authority to implement the action?  
E: Is the action economically beneficial?  
E: Will the project have an environmental impact that is either beneficial or neutral? (score "3" if positive and "2" if neutral)

Will the implemented action result in lives saved?  
Will the implanted action result in a reduction of disaster damage?

In addition to the STAPLEE process, each action item was also reviewed for Benefit/Cost. These two aspects of the prioritization process were scored as follows:

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

Note: For the Benefit/Cost Review, the benefit and cost of actions which used the word “encourage” were evaluated as if the action or strategy being encouraged was actually to be carried out.

In addition, the group considered the cost of mitigation versus the long-term savings in relation to potential lives saved and property damage avoided.

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. 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

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

In addition to the STAPLEE and Benefit/Cost analysis, the committee was also asked to consider **SMART** – **S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**ime-bound, per FEMA. All action items were reviewed with this criteria in mind. The results of the STAPLEE process and Benefit/Cost analysis were then mailed out to all MPC members for feedback and consensus.

The final scores are listed below in the analysis of each action. Correspondence regarding the STAPLEE process is included in Appendix B. A spreadsheet with the action items and final scores is illustrated in **Figure 4.4**.

## **Jurisdictional Floodplain Management Programs**

Washington County and the cities of Caledonia, Irondale, Mineral Point, and Potosi are members of the NFIP and regulate development in the floodplain by reviewing permit applications for all development including new and existing structures. Elevation certificates are required for all new construction, and existing structures with 50% or more damage following a flood are required to elevate. Floodplain maps are available in hard copy at the city halls of each community and the

county's flood maps can be obtained from the floodplain coordinator - MRPC. Furthermore, floodplain maps can be found online through FEMA's website <https://msc.fema.gov/portal>.

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**Table 4.1. Jurisdictional Floodplain Ordinance Adoption Date**

Community Name	Ordinance Adoption Date
Washington County	12/19/06
Caledonia	11/05/76
Irondale	05/13/77
Mineral Point	08/08/75
Potosi	12/28/73

Source: FEMA's Community Status Book Report<sup>1</sup>; NSFHA (SEMA)

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<sup>1</sup> [www.fema.gov/cis/mo.html](https://www.fema.gov/cis/mo.html)

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES      1 = Prob NO 2 = Maybe YES    0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
1.1.3 2.1	Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.4 1.2	Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.2.1 1.3	Obtain and update early warning systems and improved communication systems as funding allows.	3	2	2	3	3	2	3	18	IC, PD, LF, EMCC	8	-2	6	24	H
1.3.3 1.4	Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.	3	3	2	3	3	2	3	19	IC, EMCC	4	-2	2	21	H
1.3.4 1.5	Establish warming and cooling centers where residents can go during extreme temperatures or power outages.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.3.6 1.6	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers as funding allows.	3	3	3	3	3	1	2	18	IC, LF, EMCC	8	-5	3	21	H
2.2.1 2.2	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
2.2.2 2.3	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
3.1.1 2.4	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.	2	3	2	2	3	3	3	18	PD, EMCC	4	-2	2	20	H
3.3.2 2.5	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.	1	2	2	2	3	3	3	16	IC, PD, LF, EMCC	8	-1	7	23	H
5.2.1 2.6	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.	2	2	2	2	3	2	3	16	IC, PD, LF, EMCC	8	-3	5	21	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES      1 = Prob NO 2 = Maybe YES    0 = Def NO													
Action No.	Mitigation Actions	S	T	A	P	L	E	E	STAPLEE Total	Losses Avoided (2 pts. Each)	Benefit	Cost	B/C Total	Total	Priority
2.7	Elevate existing structures in the flood plain as funding allows.	3	3	2	3	3	3	2	19	IC, LF, PD EMCC	8	-5	3	22	H
6.1.3 3.1	Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	3	2	2	3	3	3	3	19	IC, PD, LF, EMCC	8	-1	7	26	H
3.2	Purchase generators for critical facilities in the planning area as funding allows.	3	3	3	3	3	3	3	21	IC, LF, EMCC	8	-3	5	26	H

## **Washington County**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.1.4 [1.1]:** Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of CERT Teams and CERT training throughout the planning area.
<b>Hazard(s) Addressed:</b>	All hazards.
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.1.4
<b>Name of Action or Project:</b>	Provide CERT training and encourage the development of CERT teams.
<b>Action or Project Description:</b>	Local Fire Department and EMD will provide CERT training opportunities for local citizens with the purpose of developing CERT teams.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County EMD, Local Fire Departments
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised – in progress
<b>Report of Progress</b>	There have been CERT teams in the County in the past, but none are currently active. This program will benefit from additional efforts on the part of the EMD to get local fire departments to host trainings and fostering of CERT teams.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County Commission, EMD
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	Washington County currently has the Nixle early warning system in place that is available to anyone who signs up. There are no outdoor tornado sirens owned by the county. The Nixle program would benefit from a public awareness and information program to make residents more aware of the warning system available to them. Tornado sirens in areas of the county with higher population density would also be beneficial.

**Action 1.3.3 [1.3]:** Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with flooding and inadequate road/bridge structures and impacts on residents and their property.
<b>Hazard(s) Addressed:</b>	Flood, Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.2 [1.3]
<b>Name of Action or Project:</b>	Complete road and bridge repairs/upgrades to reduce flooding
<b>Action or Project Description:</b>	Complete road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County Commission, Road and Bridge Dept., local planners
<b>Action/Project Priority:</b>	21 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, LEOP, floodplain ordinance, road and bridge budget, county road and bridge specifications
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing - in progress
<b>Report of Progress</b>	Washington County has completed the following projects in the past five years to reduce impacts from flooding: Richwoods area bridge upgrade; Dart Road bridge upgrade; Gorgia Holler bridge upgrade; Goose Creek bridge upgrade; two bridges upgraded on Delbridge Road; Furnace Creek Road bridge upgrade; and Sunlight Road bridge upgrade. The county has also been replacing slab over culvert low water crossings with box culverts. The county would like to replace a bridge in the Mineral Point area that causes major transportation issues when it is flooded. The county maintains a list of high priority projects that will be completed as funding becomes available.

**Action 1.3.4 [1.4]:** Establish warming and cooling centers where residents can go during extreme temperatures or power outages.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack warming and cooling centers during times of extreme temperatures, and power outages
<b>Hazard(s) Addressed:</b>	Severe Weather, Winter Storms, Extreme Temperatures
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.4 [1.4]
<b>Name of Action or Project:</b>	Establish and maintain designated warming and cooling centers.
<b>Action or Project Description:</b>	Establish designated warming and cooling centers for residents to be used during extreme temperatures or power outages.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County EMD
<b>Action/Project Priority:</b>	27 –High Priority
<b>Timeline for Completion:</b>	On-going - 2 years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOPs
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	Shelters have been established in some areas, but as needs change it may be necessary to adjust the list of cooling/heating centers or increase the number of facilities that can be used for this purpose.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County EMD, County Commission
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going – five to ten years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	Kingston K-14 school district and Valley-IV School District both have certified tornado shelters. The county is currently applying for grant funds to build a FEMA certified tornado safe room in the Potosi industrial Park. The program would benefit from additional shelters in areas of the county where there is a high population density.

**Action 3.1.1 [1.6]:** Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of awareness of emergency management and best practices during hazardous events.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.1.1 [1.6]
<b>Name of Action or Project:</b>	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.
<b>Action or Project Description:</b>	Provide information by distributing SEMA brochures and press releases on types of hazards, best practices during a disaster (Ready in 3) and other informational documents.
<b>Applicable Goal Statement:</b>	Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities
<b>Estimated Cost:</b>	\$1,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	City EMD, local emergency response agencies, county health department
<b>Action/Project Priority:</b>	20 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in Progress
<b>Report of Progress</b>	The health department and some local emergency response agencies regularly distribute emergency related brochures and information at local events. The information is also made available through social media. The county EMD and health department also distribute press releases on hazards and how to prepare for them.

**Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure and the local economy.

**Action 1.1.3 [2.1]:** Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.

<b>Name of Jurisdiction:</b>	Washington County
<b>Problem being Mitigated:</b>	Absence of emergency plans by businesses.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action/Project Number:</b>	1.1.3 [New Number 2.1]
<b>Name of Action or Project:</b>	Training for Local Business and Public Entities on Emergency Planning and Business Continuity Planning
<b>Action or Project Description:</b>	Provide training on developing emergency plans and continuity plans for local businesses and public entities through cooperation with local chambers of commerce and emergency management offices.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$4,500 - \$5,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss of function/displacement impacts, and emergency management costs/community costs.
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	1 – 5 years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, Meramec Region Community Economic Development Strategy (CEDS) – includes Chapter 8 – Economic Recovery and Resiliency Strategy
<b>Progress Report</b>	
<b>Action Status</b>	Revised – not started
<b>Report of Progress</b>	

**Action 2.2.1 [2.2]:** Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the general public not being aware of the dangers of floodplain development and benefits of the NFIP.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.1 [2.2]
<b>Name of Action or Project:</b>	Floodplain education/awareness program
<b>Action or Project Description:</b>	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events in order to educate residents about the dangers of floodplain development and the benefits of the NFIP.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$100 - \$200
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	The county floodplain manager distributes brochures, press releases and information on floodplain management and development requirements. Information is also available through social media.

**Action 2.2.2 [2.3]:** Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with noncompliance with NFIP rules and county floodplain ordinance.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.2 [2.3]
<b>Name of Action or Project:</b>	Enforcement of floodplain ordinance.
<b>Action or Project Description:</b>	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$2,500 – \$10,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County Commission, County Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	County Budget, Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing –in progress
<b>Report of Progress</b>	The County floodplain manager enforces the floodplain ordinance.

**Action 3.3.2 [2.4]:** Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the public's lack of knowledge in regards to hazard mitigation and the benefits of adopting mitigation measures.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.3.2 [2.4]
<b>Name of Action or Project:</b>	Hazard mitigation education/awareness program
<b>Action or Project Description:</b>	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$1,000-\$2,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County EMD, County Commission
<b>Action/Project Priority:</b>	23 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in progress
<b>Report of Progress</b>	The county regularly does press releases on road and bridge upgrades/replacements. This program would benefit from a more focused approach to raising awareness through additional information sharing.

**Action 5.2.1 [2.5]:** Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities to property and communities in areas that do not possess adequate storm water management plans.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	5.2.1 [2.5]
<b>Name of Action or Project:</b>	Floodplain buyouts.
<b>Action or Project Description:</b>	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County Commission, Floodplain Manager, Local Planners
<b>Action/Project Priority:</b>	24– High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Not Started
<b>Report of Progress</b>	There has been no progress in this area in Washington County.

**Action 2.6:** Elevate existing structures in the floodplain as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities of properties in the floodplain during a flood event.
<b>Hazard(s) Addressed:</b>	Flood
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.6
<b>Name of Action or Project:</b>	Elevation of structures in the floodplain.
<b>Action or Project Description:</b>	Elevate existing structures in the floodplain as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager, Washington County Commission
<b>Action/Project Priority:</b>	22 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain Management Ordinance, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – No progress
<b>Report of Progress</b>	No progress at this time. New action item.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County EMD, County Commission, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going - annually
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Washington County
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	County EMD, County Commission
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	LEOP, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – On-going
<b>Report of Progress</b>	Washington County currently has one fixed generator and five portable generators.

## **Caledonia**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.1.4 [1.1]:** Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of CERT Teams and CERT training throughout the planning area.
<b>Hazard(s) Addressed:</b>	All hazards.
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.1.4
<b>Name of Action or Project:</b>	Provide CERT training and encourage the development of CERT teams.
<b>Action or Project Description:</b>	Local Fire Department and EMD will provide CERT training opportunities for local citizens with the purpose of developing CERT teams.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Local Fire Departments
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised – in progress
<b>Report of Progress</b>	There have been CERT teams in the past, but none are currently active. This program will benefit from additional efforts on the part of the EMD to get local fire departments to host trainings and fostering of CERT teams.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	Caledonia currently has the Nixle early warning system available to anyone who signs up. There are no outdoor tornado sirens owned by the county. The Nixle program would benefit from a public awareness and information program to make residents more aware of the warning system available to them. Caledonia has one outdoor tornado siren.

**Action 1.3.3 [1.3]:** Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with flooding and inadequate road/bridge structures and impacts on residents and their property.
<b>Hazard(s) Addressed:</b>	Flood, Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.2 [1.3]
<b>Name of Action or Project:</b>	Complete road and bridge repairs/upgrades to reduce flooding
<b>Action or Project Description:</b>	Complete road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Trustees, local planners
<b>Action/Project Priority:</b>	21 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, LEOP, floodplain ordinance, road and bridge budget, county road and bridge specifications
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing - no progress
<b>Report of Progress</b>	Caledonia has completed not completed projects in the past five years to reduce impacts from flooding.

**Action 1.3.4 [1.4]:** Establish warming and cooling centers where residents can go during extreme temperatures or power outages.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack warming and cooling centers during times of extreme temperatures and power outages
<b>Hazard(s) Addressed:</b>	Severe Weather, Winter Storms, Extreme Temperatures
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.4 [1.4]
<b>Name of Action or Project:</b>	Establish and maintain designated warming and cooling centers.
<b>Action or Project Description:</b>	Establish designated warming and cooling centers for residents to be used during extreme temperatures or power outages.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	27 –High Priority
<b>Timeline for Completion:</b>	2 years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOPs
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – no progress
<b>Report of Progress</b>	Caledonia currently has no designated cooling or warming centers.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going – five to ten years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	Valley-IV School District, the largest employer in Caledonia, has a certified tornado shelter.

**Action 3.1.1 [1.6]:** Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of awareness of emergency management and best practices during hazardous events.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.1.1 [1.6]
<b>Name of Action or Project:</b>	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.
<b>Action or Project Description:</b>	Provide information by distributing SEMA brochures and press releases on types of hazards, best practices during a disaster (Ready in 3) and other informational documents.
<b>Applicable Goal Statement:</b>	Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities
<b>Estimated Cost:</b>	\$1,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, local emergency response agencies, county health department
<b>Action/Project Priority:</b>	20 – High Priority
<b>Timeline for Completion:</b>	On-going – six months
<b>Potential Fund Sources:</b>	Local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in Progress
<b>Report of Progress</b>	The health department and some local emergency response agencies regularly distribute emergency related brochures and information at local events. The information is also made available through social media. The county EMD and health department also distribute press releases on hazards and how to prepare for them.

**Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure and the local economy.

**Action 1.1.3 [2.1]:** Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.

<b>Name of Jurisdiction:</b>	Caledonia
<b>Problem being Mitigated:</b>	Absence of emergency plans by businesses.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action/Project Number:</b>	1.1.3 [New Number 2.1]
<b>Name of Action or Project:</b>	Training for Local Business and Public Entities on Emergency Planning and Business Continuity Planning
<b>Action or Project Description:</b>	Provide training on developing emergency plans and continuity plans for local businesses and public entities through cooperation with local chambers of commerce and emergency management offices.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$4,500 - \$5,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss of function/displacement impacts, and emergency management costs/community costs.
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	1 – 5 years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, Meramec Region Community Economic Development Strategy (CEDS) – includes Chapter 8 – Economic Recovery and Resiliency Strategy
<b>Progress Report</b>	
<b>Action Status</b>	Revised – not started
<b>Report of Progress</b>	

**Action 2.2.1 [2.2]:** Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the general public not being aware of the dangers of floodplain development and benefits of the NFIP.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.1 [2.2]
<b>Name of Action or Project:</b>	Floodplain education/awareness program
<b>Action or Project Description:</b>	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events in order to educate residents about the dangers of floodplain development and the benefits of the NFIP.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$100 - \$200
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	The floodplain manager distributes information on floodplain management and development requirements.

**Action 2.2.2 [2.3]:** Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with noncompliance with NFIP rules and county floodplain ordinance.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.2 [2.3]
<b>Name of Action or Project:</b>	Enforcement of floodplain ordinance.
<b>Action or Project Description:</b>	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$2,500 – \$10,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Trustees, Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Budget, Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing –in progress
<b>Report of Progress</b>	The city floodplain manager enforces the floodplain ordinance.

**Action 3.3.2 [2.4]:** Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the public's lack of knowledge in regards to hazard mitigation and the benefits of adopting mitigation measures.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.3.2 [2.4]
<b>Name of Action or Project:</b>	Hazard mitigation education/awareness program
<b>Action or Project Description:</b>	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$1,000-\$2,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	23 –High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in progress
<b>Report of Progress</b>	The city does press releases on any projects being done in the community. This program would benefit from a more focused approach to raising awareness through additional information sharing.

**Action 5.2.1 [2.5]:** Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.

Action Worksheet	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities to property and communities in areas that do not possess adequate storm water management plans.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	5.2.1 [2.5]
<b>Name of Action or Project:</b>	Floodplain buyouts.
<b>Action or Project Description:</b>	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Trustees, Floodplain Manager, Local Planners
<b>Action/Project Priority:</b>	24– High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Not Started
<b>Report of Progress</b>	There has been no progress in this area in Caledonia.

**Action 2.6:** Elevate existing structures in the floodplain as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities of properties in the floodplain during a flood event.
<b>Hazard(s) Addressed:</b>	Flood
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.6
<b>Name of Action or Project:</b>	Elevation of structures in the floodplain.
<b>Action or Project Description:</b>	Elevate existing structures in the floodplain as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager, Board of Trustees
<b>Action/Project Priority:</b>	22 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain Management Ordinance, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – No progress
<b>Report of Progress</b>	No progress at this time. New action item.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees, Mayor, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going - Annually
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Caledonia
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	LEOP, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – On-going
<b>Report of Progress</b>	Caledonia currently has two portable generators.

## **Irondale**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.1.4 [1.1]:** Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of CERT Teams and CERT training throughout the planning area.
<b>Hazard(s) Addressed:</b>	All hazards.
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.1.4
<b>Name of Action or Project:</b>	Provide CERT training and encourage the development of CERT teams.
<b>Action or Project Description:</b>	Local Fire Department and EMD will provide CERT training opportunities for local citizens with the purpose of developing CERT teams.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Local Fire Departments
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	On-going – one - five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised – in progress
<b>Report of Progress</b>	There have been CERT teams in the past, but none are currently active. This program will benefit from additional efforts on the part of the EMD to get local fire departments to host trainings and fostering of CERT teams.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	Irondale currently has access to the Nixle early warning system available to anyone who signs up. There are no outdoor sirens in Irondale. The Nixle program would benefit from a public awareness and information program to make residents more aware of the warning system available to them.

**Action 1.3.3 [1.3]:** Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with flooding and inadequate road/bridge structures and impacts on residents and their property.
<b>Hazard(s) Addressed:</b>	Flood, Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.2 [1.3]
<b>Name of Action or Project:</b>	Complete road and bridge repairs/upgrades to reduce flooding
<b>Action or Project Description:</b>	Complete road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Aldermen, local planners
<b>Action/Project Priority:</b>	21 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, LEOP, floodplain ordinance, road and bridge budget, county road and bridge specifications
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing - no progress
<b>Report of Progress</b>	Irondale has completed not completed projects in the past five years to reduce impacts from flooding.

**Action 1.3.4 [1.4]:** Establish warming and cooling centers where residents can go during extreme temperatures or power outages.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack warming and cooling centers during times of extreme temperatures and power outages
<b>Hazard(s) Addressed:</b>	Severe Weather, Winter Storms, Extreme Temperatures
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.4 [1.4]
<b>Name of Action or Project:</b>	Establish and maintain designated warming and cooling centers.
<b>Action or Project Description:</b>	Establish designated warming and cooling centers for residents to be used during extreme temperatures or power outages.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	27 –High Priority
<b>Timeline for Completion:</b>	2 years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOPs
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – no progress
<b>Report of Progress</b>	Irondale currently has no designated cooling or warming centers.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going – five – ten years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	There are no certified tornado storm shelters in the Irondale area.

**Action 3.1.1 [1.6]:** Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of awareness of emergency management and best practices during hazardous events.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.1.1 [1.6]
<b>Name of Action or Project:</b>	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.
<b>Action or Project Description:</b>	Provide information by distributing SEMA brochures and press releases on types of hazards, best practices during a disaster (Ready in 3) and other informational documents.
<b>Applicable Goal Statement:</b>	Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities
<b>Estimated Cost:</b>	\$1,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, local emergency response agencies, county health department
<b>Action/Project Priority:</b>	20 – High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in Progress
<b>Report of Progress</b>	The health department and some local emergency response agencies regularly distribute emergency related brochures and information at local events. The county EMD and health department also distribute press releases on hazards and how to prepare for them.

**Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure and the local economy.

**Action 1.1.3 [2.1]:** Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.

<b>Name of Jurisdiction:</b>	Irondale
<b>Problem being Mitigated:</b>	Absence of emergency plans by businesses.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action/Project Number:</b>	1.1.3 [2.1]
<b>Name of Action or Project:</b>	Training for Local Business and Public Entities on Emergency Planning and Business Continuity Planning
<b>Action or Project Description:</b>	Provide training on developing emergency plans and continuity plans for local businesses and public entities through cooperation with local chambers of commerce and emergency management offices.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$4,500 - \$5,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss of function/displacement impacts, and emergency management costs/community costs.
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	One – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, Meramec Region Community Economic Development Strategy (CEDS) – includes Chapter 8 – Economic Recovery and Resiliency Strategy
<b>Progress Report</b>	
<b>Action Status</b>	Revised – not started
<b>Report of Progress</b>	

**Action 2.2.1 [2.2]:** Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the general public not being aware of the dangers of floodplain development and benefits of the NFIP.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.1 [2.2]
<b>Name of Action or Project:</b>	Floodplain education/awareness program
<b>Action or Project Description:</b>	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events in order to educate residents about the dangers of floodplain development and the benefits of the NFIP.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$100 - \$200
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	Information on floodplain management is available at city hall.

**Action 2.2.2 [2.3]:** Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with noncompliance with NFIP rules and county floodplain ordinance.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.2 [2.3]
<b>Name of Action or Project:</b>	Enforcement of floodplain ordinance.
<b>Action or Project Description:</b>	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$2,500 – \$10,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Aldermen, Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Budget, Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing –in progress
<b>Report of Progress</b>	The city floodplain manager enforces the floodplain ordinance.

**Action 3.3.2 [2.4]:** Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the public's lack of knowledge in regards to hazard mitigation and the benefits of adopting mitigation measures.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.3.2 [2.4]
<b>Name of Action or Project:</b>	Hazard mitigation education/awareness program
<b>Action or Project Description:</b>	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$1,000-\$2,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	23 –High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in progress
<b>Report of Progress</b>	The city provides information on any projects being done in the community. This program would benefit from a more focused approach to raising awareness through additional information sharing.

**Action 5.2.1 [2.5]:** Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities to property and communities in areas that do not possess adequate storm water management plans.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	5.2.1 [2.5]
<b>Name of Action or Project:</b>	Floodplain buyouts.
<b>Action or Project Description:</b>	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Aldermen, Floodplain Manager, Local Planners
<b>Action/Project Priority:</b>	24– High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Not Started
<b>Report of Progress</b>	There has been no progress in this area in Irondale.

**Action 2.6:** Elevate existing structures in the floodplain as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities of properties in the floodplain during a flood event.
<b>Hazard(s) Addressed:</b>	Flood
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.6
<b>Name of Action or Project:</b>	Elevation of structures in the floodplain.
<b>Action or Project Description:</b>	Elevate existing structures in the floodplain as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager, Board of Aldermen
<b>Action/Project Priority:</b>	22 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain Management Ordinance, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – No progress
<b>Report of Progress</b>	No progress at this time. New action item.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen, Mayor, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Irondale
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going – one to five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	LEOP, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – On-going
<b>Report of Progress</b>	Irondale currently has one portable generator.

## **Mineral Point**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.1.4 [1.1]:** Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of CERT Teams and CERT training throughout the planning area.
<b>Hazard(s) Addressed:</b>	All hazards.
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.1.4
<b>Name of Action or Project:</b>	Provide CERT training and encourage the development of CERT teams.
<b>Action or Project Description:</b>	Local Fire Department and EMD will provide CERT training opportunities for local citizens with the purpose of developing CERT teams.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Local Fire Departments
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised – in progress
<b>Report of Progress</b>	There have been CERT teams in the past, but none are currently active. This program will benefit from additional efforts on the part of the EMD to get local fire departments to host trainings and fostering of CERT teams.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	Mineral Point currently has the Nixle early warning system available to anyone who signs up. There are no outdoor tornado sirens in the city. The Nixle program would benefit from a public awareness and information program to make residents more aware of the warning system available to them.

**Action 1.3.3 [1.3]:** Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with flooding and inadequate road/bridge structures and impacts on residents and their property.
<b>Hazard(s) Addressed:</b>	Flood, Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.2 [1.3]
<b>Name of Action or Project:</b>	Complete road and bridge repairs/upgrades to reduce flooding
<b>Action or Project Description:</b>	Complete road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Trustees, local planners
<b>Action/Project Priority:</b>	21 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, LEOP, floodplain ordinance, road and bridge budget, county road and bridge specifications
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing - no progress
<b>Report of Progress</b>	Mineral Point has completed not completed projects in the past five years to reduce impacts from flooding.

**Action 1.3.4 [1.4]:** Establish warming and cooling centers where residents can go during extreme temperatures or power outages.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack warming and cooling centers during times of extreme temperatures and power outages
<b>Hazard(s) Addressed:</b>	Severe Weather, Winter Storms, Extreme Temperatures
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.4 [1.4]
<b>Name of Action or Project:</b>	Establish and maintain designated warming and cooling centers.
<b>Action or Project Description:</b>	Establish designated warming and cooling centers for residents to be used during extreme temperatures or power outages.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	27 –High Priority
<b>Timeline for Completion:</b>	Two years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOPs
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – no progress
<b>Report of Progress</b>	Mineral Point currently has no designated cooling or warming centers.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going – five – ten years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing –no progress
<b>Report of Progress</b>	There are no certified tornado shelters in Mineral Point.

**Action 3.1.1 [1.6]:** Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of awareness of emergency management and best practices during hazardous events.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.1.1 [1.6]
<b>Name of Action or Project:</b>	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.
<b>Action or Project Description:</b>	Provide information by distributing SEMA brochures and press releases on types of hazards, best practices during a disaster (Ready in 3) and other informational documents.
<b>Applicable Goal Statement:</b>	Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities
<b>Estimated Cost:</b>	\$1,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, local emergency response agencies, county health department
<b>Action/Project Priority:</b>	20 – High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in Progress
<b>Report of Progress</b>	The health department and some local emergency response agencies regularly distribute emergency related brochures and information at local events. The information is also made available through social media. The county EMD and health department also distribute press releases on hazards and how to prepare for them.

**Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure and the local economy.

**Action 1.1.3 [2.1]:** Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.

<b>Name of Jurisdiction:</b>	Mineral Point
<b>Problem being Mitigated:</b>	Absence of emergency plans by businesses.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action/Project Number:</b>	1.1.3 [New Number 2.1]
<b>Name of Action or Project:</b>	Training for Local Business and Public Entities on Emergency Planning and Business Continuity Planning
<b>Action or Project Description:</b>	Provide training on developing emergency plans and continuity plans for local businesses and public entities through cooperation with local chambers of commerce and emergency management offices.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$4,500 - \$5,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss of function/displacement impacts, and emergency management costs/community costs.
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	One – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, Meramec Region Community Economic Development Strategy (CEDS) – includes Chapter 8 – Economic Recovery and Resiliency Strategy
<b>Progress Report</b>	
<b>Action Status</b>	Revised – not started
<b>Report of Progress</b>	

**Action 2.2.1 [2.2]:** Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the general public not being aware of the dangers of floodplain development and benefits of the NFIP.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.1 [2.2]
<b>Name of Action or Project:</b>	Floodplain education/awareness program
<b>Action or Project Description:</b>	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events in order to educate residents about the dangers of floodplain development and the benefits of the NFIP.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$100 - \$200
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going – six month – one year
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	The floodplain manager distributes information on floodplain management and development requirements.

**Action 2.2.2 [2.3]:** Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with noncompliance with NFIP rules and county floodplain ordinance.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.2 [2.3]
<b>Name of Action or Project:</b>	Enforcement of floodplain ordinance.
<b>Action or Project Description:</b>	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$2,500 – \$10,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Trustees, Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Budget, Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing –in progress
<b>Report of Progress</b>	The city floodplain manager enforces the floodplain ordinance.

**Action 3.3.2 [2.4]:** Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the public's lack of knowledge in regards to hazard mitigation and the benefits of adopting mitigation measures.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.3.2 [2.4]
<b>Name of Action or Project:</b>	Hazard mitigation education/awareness program
<b>Action or Project Description:</b>	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$1,000-\$2,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	23 –High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in progress
<b>Report of Progress</b>	The city provides information any projects being done in the community. This program would benefit from a more focused approach to raising awareness through additional information sharing.

**Action 5.2.1 [2.5]:** Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities to property and communities in areas that do not possess adequate storm water management plans.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	5.2.1 [2.5]
<b>Name of Action or Project:</b>	Floodplain buyouts.
<b>Action or Project Description:</b>	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Trustees, Floodplain Manager, Local Planners
<b>Action/Project Priority:</b>	24– High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Not Started
<b>Report of Progress</b>	There has been no progress in this area in Mineral Point.

**Action 2.6:** Elevate existing structures in the floodplain as funding allows.

Action Worksheet	
Name of Jurisdiction:	Mineral Point
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities of properties in the floodplain during a flood event.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	2.6
Name of Action or Project:	Elevation of structures in the floodplain.
Action or Project Description:	Elevate existing structures in the floodplain as funding allows.
Applicable Goal Statement:	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Floodplain Manager, Board of Trustees
Action/Project Priority:	22 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, private donations of cash, goods, or services
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Management Ordinance, Hazard Mitigation Plan
Progress Report	
Action Status	New – No progress
Report of Progress	No progress at this time. New action item.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees, Mayor, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Mineral Point
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Trustees
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	LEOP, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – On-going
<b>Report of Progress</b>	Mineral Point currently has two portable generators.

## **Potosi**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.1.4 [1.1]:** Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of CERT Teams and CERT training throughout the planning area.
<b>Hazard(s) Addressed:</b>	All hazards.
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.1.4
<b>Name of Action or Project:</b>	Provide CERT training and encourage the development of CERT teams.
<b>Action or Project Description:</b>	Local Fire Department and EMD will provide CERT training opportunities for local citizens with the purpose of developing CERT teams.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Local Fire Departments
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised – in progress
<b>Report of Progress</b>	There have been CERT teams in the past, but none are currently active. This program will benefit from additional efforts on the part of the EMD to get local fire departments to host trainings and fostering of CERT teams.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	Potosi currently has the Nixle early warning system available to anyone who signs up. There are also four outdoor tornado sirens in the city. The Nixle program would benefit from a public awareness and information program to make residents more aware of the warning system available to them

**Action 1.3.3 [1.3]:** Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with flooding and inadequate road/bridge structures and impacts on residents and their property.
<b>Hazard(s) Addressed:</b>	Flood, Earthquake
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.2 [1.3]
<b>Name of Action or Project:</b>	Complete road and bridge repairs/upgrades to reduce flooding
<b>Action or Project Description:</b>	Complete road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Aldermen, local planners
<b>Action/Project Priority:</b>	21 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, LEOP, floodplain ordinance, road and bridge budget, county road and bridge specifications
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing - in progress
<b>Report of Progress</b>	Potosi has completed the following projects in the past five years to reduce impacts from flooding: bridge replacement on Mill Street that allowed for better water flow and mitigation of erosion, scour and damage to both the bridge and utilities under the bridge.

**Action 1.3.4 [1.4]:** Establish warming and cooling centers where residents can go during extreme temperatures or power outages.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack warming and cooling centers during times of extreme temperatures and power outages
<b>Hazard(s) Addressed:</b>	Severe Weather, Winter Storms, Extreme Temperatures
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.4 [1.4]
<b>Name of Action or Project:</b>	Establish and maintain designated warming and cooling centers.
<b>Action or Project Description:</b>	Establish designated warming and cooling centers for residents to be used during extreme temperatures or power outages.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	\$2,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	27 –High Priority
<b>Timeline for Completion:</b>	Two years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOPs
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – no progress
<b>Report of Progress</b>	Potosi currently has no designated cooling or warming centers.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going – five – ten years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	There is a certified tornado shelter located at the Potosi R-III elementary school.

**Action 3.1.1 [1.6]:** Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of awareness of emergency management and best practices during hazardous events.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.1.1 [1.6]
<b>Name of Action or Project:</b>	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.
<b>Action or Project Description:</b>	Provide information by distributing SEMA brochures and press releases on types of hazards, best practices during a disaster (Ready in 3) and other informational documents.
<b>Applicable Goal Statement:</b>	Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities
<b>Estimated Cost:</b>	\$1,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, local emergency response agencies, county health department
<b>Action/Project Priority:</b>	20 – High Priority
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	Local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in Progress
<b>Report of Progress</b>	The health department and some local emergency response agencies regularly distribute emergency related brochures and information at local events. The information is also made available through social media. The EMD and health department also distribute press releases on hazards and how to prepare for them.

**Goal 2:** Reduce the potential impact of natural disasters to property, infrastructure and the local

economy.

**Action 1.1.3 [2.1]:** Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.

<b>Name of Jurisdiction:</b>	Potosi
<b>Problem being Mitigated:</b>	Absence of emergency plans by businesses.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action/Project Number:</b>	1.1.3 [New Number 2.1]
<b>Name of Action or Project:</b>	Training for Local Business and Public Entities on Emergency Planning and Business Continuity Planning
<b>Action or Project Description:</b>	Provide training on developing emergency plans and continuity plans for local businesses and public entities through cooperation with local chambers of commerce and emergency management offices.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$4,500 - \$5,500
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss of function/displacement impacts, and emergency management costs/community costs.
<b>Responsible Organization/Department:</b>	EMD
<b>Action/Project Priority:</b>	27 – High Priority
<b>Timeline for Completion:</b>	One – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard mitigation plan, Meramec Region Community Economic Development Strategy (CEDS) – includes Chapter 8 – Economic Recovery and Resiliency Strategy
<b>Progress Report</b>	
<b>Action Status</b>	Revised – not started
<b>Report of Progress</b>	

**Action 2.2.1 [2.2]:** Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the general public not being aware of the dangers of floodplain development and benefits of the NFIP.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.1 [2.2]
<b>Name of Action or Project:</b>	Floodplain education/awareness program
<b>Action or Project Description:</b>	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events in order to educate residents about the dangers of floodplain development and the benefits of the NFIP.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$100 - \$200
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going - six months – one year
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	The floodplain manager distributes information on floodplain management and development requirements.

**Action 2.2.2 [2.3]:** Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.

Action Worksheet	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with noncompliance with NFIP rules and county floodplain ordinance.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.2.2 [2.3]
<b>Name of Action or Project:</b>	Enforcement of floodplain ordinance.
<b>Action or Project Description:</b>	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$2,500 – \$10,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Aldermen, Floodplain Manager
<b>Action/Project Priority:</b>	28 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	City Budget, Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing –in progress
<b>Report of Progress</b>	The city floodplain manager enforces the floodplain ordinance.

**Action 3.3.2 [2.4]:** Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with the public's lack of knowledge in regards to hazard mitigation and the benefits of adopting mitigation measures.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.3.2 [2.4]
<b>Name of Action or Project:</b>	Hazard mitigation education/awareness program
<b>Action or Project Description:</b>	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	\$1,000-\$2,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	23 –High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing in progress
<b>Report of Progress</b>	The city does press releases on any projects being done in the community. This program would benefit from a more focused approach to raising awareness through additional information sharing.

**Action 5.2.1 [2.5]:** Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.

Action Worksheet	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities to property and communities in areas that do not possess adequate storm water management plans.
<b>Hazard(s) Addressed:</b>	Flooding
<b>Action or Project</b>	
<b>Action/Project Number:</b>	5.2.1 [2.5]
<b>Name of Action or Project:</b>	Floodplain buyouts.
<b>Action or Project Description:</b>	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Board of Aldermen, Floodplain Manager, Local Planners
<b>Action/Project Priority:</b>	24– High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, Floodplain Ordinance
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Not Started
<b>Report of Progress</b>	There has been no progress in this area in Potosi.

**Action 2.6:** Elevate existing structures in the floodplain as funding allows.

Action Worksheet	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities of properties in the floodplain during a flood event.
<b>Hazard(s) Addressed:</b>	Flood
<b>Action or Project</b>	
<b>Action/Project Number:</b>	2.6
<b>Name of Action or Project:</b>	Elevation of structures in the floodplain.
<b>Action or Project Description:</b>	Elevate existing structures in the floodplain as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters to property, infrastructure and the local economy.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Floodplain Manager, Board of Aldermen
<b>Action/Project Priority:</b>	22 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Floodplain Management Ordinance, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – No progress
<b>Report of Progress</b>	No progress at this time. New action item.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen, Mayor, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	EMD, Board of Aldermen
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	LEOP, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New – On-going
<b>Report of Progress</b>	Potosi currently has two portable generators.

## **Kingston K-14 School District**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Kingston K-14 School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	The Nixle early warning system is available to anyone who signs up in Washington County. Kingston K-14 uses BlackBoard Connect as a text and cellphone warning/messaging system, but states that it needs upgraded. All entities in the county need to continue to work to improve communications systems within the county to improve county-wide as well as state-wide communications during disasters and joint response efforts.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Kingston K-14 School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going – five – ten years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	Kingston K-14 has a FEMA certified tornado shelter in the elementary school but would like to have another shelter to serve the Junior High and High School students.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Kingston K-14 School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	School Board, Superintendent, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going – six months – one year
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Kingston K-14 School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five years
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	School Emergency Plan, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New Action Item – On-going
<b>Report of Progress</b>	No progress at this time.

## **Potosi R-III School District**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi R-III School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going – one – five yeras
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	The Nixle early warning system is available to anyone who signs up in Washington County. Potosi R-III School District uses BlackBoard Connect as a text and cellphone warning/messaging system, but states that it needs upgraded. All entities in the county need to continue to work to improve communications systems within the county to improve county-wide as well as state-wide communications during disasters and joint response efforts.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi R-III School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – in progress
<b>Report of Progress</b>	Potosi R-III School District has a FEMA certified tornado shelter in the elementary school but would like to have additional shelters at other schools in the district. The district is currently applying for funds to build a FEMA certified tornado shelter that would serve both the Junior High and High School buildings.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

Action Worksheet	
<b>Name of Jurisdiction:</b>	Potosi R-III School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	School Board, Superintendent, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Potosi R-III School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	School Emergency Plan, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New Action Item – On-going
<b>Report of Progress</b>	No progress at this time.

## **Richwoods R-VII School District**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Richwoods R-VII School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	The Nixle early warning system is available to anyone who signs up in Washington County. Richwoods R-VII School District uses Textcaster as a text and cellphone warning/messaging system. All entities in the county need to continue to work to improve communications systems within the county to improve county-wide as well as state-wide communications during disasters and joint response efforts.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Richwoods R-VII School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing – no progress
<b>Report of Progress</b>	Richwoods R-VII School District does not have a FEMA certified tornado shelter.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Richwoods R-VII School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	School Board, Superintendent, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Richwoods R-VII School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	School Emergency Plan, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New Action Item – On-going
<b>Report of Progress</b>	No progress at this time.

## **Valley R-VI School District**

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Action 1.2.1 [1.2]:** Obtain and update early warning systems and improved communication systems as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Valley R-VI School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks and vulnerabilities associated with the need to improve warning and communications systems throughout the county.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.2.1 [1.2]
<b>Name of Action or Project:</b>	Improving early warning systems and improved communications systems.
<b>Action or Project Description:</b>	Obtain and update early warning systems and improved communication systems as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown.
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	24 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised and Continuing – in progress
<b>Report of Progress</b>	The Nixle early warning system is available to anyone who signs up in Washington County. Valley R-VI School District uses BlackBoard Connect as a text and cellphone warning/messaging system. All entities in the county need to continue to work to improve communications systems within the county to improve county-wide as well as state-wide communications during disasters and joint response efforts.

**Action 1.3.6 [1.5]:** Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Valley R-VI School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with lack of storm shelters and tornado safe rooms.
<b>Hazard(s) Addressed:</b>	Severe storms/Tornados
<b>Action or Project</b>	
<b>Action/Project Number:</b>	1.3.6 [1.5]
<b>Name of Action or Project:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities.
<b>Action or Project Description:</b>	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers) as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.
<b>Estimated Cost:</b>	Unknown
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	22 –High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, and private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP
<b>Progress Report</b>	
<b>Action Status</b>	Revised, Continuing –no progress
<b>Report of Progress</b>	Valley R-VI School District has designated tornado shelters but they do not meet all of the FEMA standards.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

**Action 6.1.3 [3.1]:** Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Valley R-VI School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Lack of synergy/communication/coordination of mitigation in public/private partnerships, community development projects and integration of mitigation actions into other plans and economic and community development projects.
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	6.1.3 [3.1]
<b>Name of Action or Project:</b>	Meetings on hazard mitigation with local/state/federal agencies to discuss mitigation projects, planning and cost-share programs.
<b>Action or Project Description:</b>	Hold annual meetings local/state/federal officials to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$0
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	School Board, Superintendent, SEMA Area Coordinator
<b>Action/Project Priority:</b>	28 - H
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	N/A
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	Hazard Mitigation Plan, LEOP, Economic Development plans
<b>Progress Report</b>	
<b>Action Status</b>	Continuing - Ongoing
<b>Report of Progress</b>	The Region C SEMA area coordinator holds quarterly meetings in the region and discussions include a variety of topics, including mitigation. MRPC has provided information and presentations on mitigation at regular board meetings that included representatives from Washington County and its jurisdictions. Due to changes in elected officials, this is an ongoing activity.

**Action 3.2:** Purchase generators for critical facilities in the planning area as funding allows.

<b>Action Worksheet</b>	
<b>Name of Jurisdiction:</b>	Valley R-VI School District
<b>Risk / Vulnerability</b>	
<b>Problem being Mitigated:</b>	Risks/vulnerabilities associated with power outages for critical infrastructure/facilities
<b>Hazard(s) Addressed:</b>	All Hazards
<b>Action or Project</b>	
<b>Action/Project Number:</b>	3.2
<b>Name of Action or Project:</b>	Purchase generators for critical facilities.
<b>Action or Project Description:</b>	Purchase generators for critical facilities in the planning area as funding allows.
<b>Applicable Goal Statement:</b>	Reduce the potential impact of natural disaster on the continuity of government and essential services.
<b>Estimated Cost:</b>	\$5,000 - \$100,000
<b>Benefits:</b>	Losses avoided by implementing this action include injuries and/or casualties, property damages, loss-of-function/displacement impacts, and emergency management costs/community costs.
<b>Plan for Implementation</b>	
<b>Responsible Organization/Department:</b>	Superintendent, School Board
<b>Action/Project Priority:</b>	26 – High Priority
<b>Timeline for Completion:</b>	On-going
<b>Potential Fund Sources:</b>	Grants, local general revenue funds, private donations of cash, goods, or services.
<b>Local Planning Mechanisms to be Used in Implementation, if any:</b>	School Emergency Plan, Hazard Mitigation Plan
<b>Progress Report</b>	
<b>Action Status</b>	New Action Item – On-going
<b>Report of Progress</b>	No progress at this time.

## 5 PLAN MAINTENANCE PROCESS

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<b>5 PLAN MAINTENANCE PROCESS .....</b>	<b>5.1</b>
<b>5.1 Monitoring, Evaluating, and Updating the Plan.....</b>	<b>5.1</b>
5.1.1 Responsibility for Plan Maintenance .....	5.1
5.1.2 Plan Maintenance Schedule .....	5.2
5.1.3 Plan Maintenance Process.....	5.2
5.2 Incorporation into Existing Planning Mechanisms .....	5.3
5.3 Continued Public Involvement .....	5.7

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

### 5.1 Monitoring, Evaluating, and Updating the Plan

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**44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.**

#### 5.1.1 Responsibility for Plan Maintenance

Periodic revisions and updates of the Plan are required by Missouri SEMA to ensure that the goals and objectives for Washington County are kept current. More importantly, revisions may be necessary to ensure the plan is in full compliance with Federal regulations and state statutes. This portion of the plan outlines the procedures for completing such revisions and updates.

A key component of the ongoing plan monitoring, evaluating and updating will be the Washington County Hazard Mitigation Planning Committee (MPC). In order to carry out the activities necessary for maintaining the plan, the MPC will need to remain in place and meet periodically. The coordination of this group, as indicated in the mitigation strategy, should be a responsibility of the county EMD. On-going activities of the MPC are:

- Meet annually, and after a disaster event, to monitor and evaluate the implementation of the plan;
- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high priority, low or no-cost recommended actions;
- Maintain vigilant monitoring of multi-objective, cost-share, and other funding opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;

- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Report on plan progress and recommended changes to the County Board of Supervisors and governing bodies of participating jurisdictions; and
- Inform and solicit input from the public.

The MPC (or other designated responsible entity) is an advisory body and can only make recommendations to county, city, town, or district elected officials. Its primary duty is to see the plan successfully carried out and to report to the community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, hearing stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information in areas accessible to the public.

### **5.1.2 Plan Maintenance Schedule**

The MPC (or other designated responsible entity) agrees to meet annually and after a state or federally declared hazard event, as appropriate, to monitor progress and update the mitigation strategy. The Washington County Emergency Management Director will be responsible for initiating the plan reviews and will invite members of the MPC (or other designated responsible entity) to the meeting.

In coordination with all participating jurisdictions, a five-year written update of the plan will be submitted to the Missouri State Emergency Management Agency (SEMA) and FEMA Region VII per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule.

### **5.1.3 Plan Maintenance Process**

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The MPC (or other designated responsible entity) during the annual meeting should review changes in vulnerability identified as follows:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions;
- Increased vulnerability due to hazard events; and/or
- Increased vulnerability as a result of new development (and/or annexation).

Future 5-year updates to this plan will include the following activities:

- Consideration of changes in vulnerability due to action implementation;
- Documentation of success stories where mitigation efforts have proven effective;
- Documentation of unsuccessful mitigation actions and why the actions were not effective;
- Documentation of previously overlooked hazard events that may have occurred since the previous plan approval;
- Incorporation of new data or studies with information on hazard risks;
- Incorporation of new capabilities or changes in capabilities;

- Incorporation of growth data and changes to inventories; and
- Incorporation of ideas for new actions and changes in action prioritization.

In order to best evaluate any changes in vulnerability as a result of plan implementation, the participating jurisdictions will adopt the following process:

- Each proposed action in the plan identified an individual, office, or agency responsible for action implementation. This entity will track and report on an annual basis to the jurisdictional MPC (or designated responsible entity) member on action status. The entity will provide input on whether the action as implemented meets the defined objectives and is likely to be successful in reducing risk.
- If the action does not meet identified objectives, the jurisdictional MPC (or designated responsible entity) member will determine necessary remedial action, making any required modifications to the plan.

Changes will be made to the plan to remedy actions that have failed or are not considered feasible. Feasibility will be determined after a review of action consistency with established criteria, time frame, community priorities, and/or funding resources. Actions that were not ranked high but were identified as potential mitigation activities will be reviewed as well during the monitoring of this plan. Updating of the plan will be accomplished by written changes and submissions, as the MPC (or designated responsible entity) deems appropriate and necessary. Changes will be approved by the Washington County Hazard Mitigation Planning Committee and the governing boards of the other participating jurisdictions.

## 5.2 Incorporation into Existing Planning Mechanisms

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**44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.**

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Additionally, as jurisdictions review and update existing planning mechanisms, relevant action items and data from the HMP will be integrated. Those existing plans and programs were described in **Section 2.2** of this plan. Based on the capability assessments of the participating jurisdictions, communities in Washington County will continue to plan and implement programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through the following plans:

- Regional Comprehensive Economic Development Strategy (CEDS) document
- General or master plans of participating jurisdictions;
- Ordinances of participating jurisdictions;
- Washington County Local Emergency Operations Plan (LEOP);
- Capital improvement plans and budgets;
- Other community plans within the County, such as water conservation plans, storm water management plans, and parks and recreation plans;
- School and Special District Plans and budgets; and
- Other plans and policies outlined in the capability assessment sections for each jurisdiction in Chapter 2 of this plan.

The MPC (or designated responsible entity) members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The MPC (or designated responsible entity) is also responsible for monitoring this integration and incorporation of the appropriate information into the five-year update of the multi-jurisdictional hazard mitigation plan.

Additionally, after the annual review of the Hazard Mitigation Plan, the Washington County Emergency Management Director (EMD) will provide the updated Mitigation Strategy with current status of each mitigation action to the County (Boards of Supervisors or Commissions) as well as all Mayors, City Clerks, and School District Superintendents. The EMD will request that the mitigation strategy be incorporated, where appropriate, in other planning mechanisms.

**Table 5.1** below lists the planning mechanisms by jurisdiction into which the Hazard Mitigation Plan will be integrated.

**Table 5.1 Planning Mechanisms Identified for Integration of Hazard Mitigation Plan**

<b>Jurisdiction</b>	<b>Planning Mechanisms</b>	<b>Integration Process for Previous Plan</b>	<b>Integration Process for Current Plan</b>
Unincorporated Washington County	County Emergency Operations Plan County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Construction/Road & Bridge Budget	Hazard Mitigation action items were incorporated into the regional CEDS and Regional Transportation Plan by MRPC. EMD was encouraged to incorporate hazard mitigation into LEOP where applicable.	County Commission and road and bridge supervisors incorporating hazard mitigation projects into budgets and future road and bridge improvements. EMD will review LEOP and incorporate hazard mitigation updates where applicable. CEDS and Regional Transportation Plan will be reviewed to update with revised action items.
Caledonia	Emergency Operations Plan (part of county) County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Public Works Construction Budget	Hazard Mitigation action items were incorporated into the regional CEDS and Regional Transportation Plan by MRPC. EMD was encouraged to incorporate hazard mitigation into LEOP where applicable.	Mayor, Trustees will work toward incorporating hazard mitigation projects into city budget where possible and future public works improvements. EMD will review LEOP and incorporate hazard mitigation updates where applicable. CEDS and Regional Transportation Plan will be reviewed to update with revised action items.
Irondale	Emergency Operations	Hazard Mitigation action	Mayor, Aldermen, and

<b>Jurisdiction</b>	<b>Planning Mechanisms</b>	<b>Integration Process for Previous Plan</b>	<b>Integration Process for Current Plan</b>
	Plan (part of county) County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Public Works Construction Budget	items were incorporated into the regional CEDS and Regional Transportation Plan by MRPC. City EMD was encouraged to incorporate hazard mitigation into LEOP where applicable.	public works department will work toward incorporating hazard mitigation projects into city budget where possible and future public works improvements. EMD will review LEOP and incorporate hazard mitigation updates where applicable. CEDS and Regional Transportation Plan will be reviewed to update with revised action items.
Mineral Point	Emergency Operations Plan (part of county) County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Public Works Construction Budget	Hazard Mitigation action items were incorporated into the regional CEDS and Regional Transportation Plan by MRPC. EMD was encouraged to incorporate hazard mitigation into LEOP where applicable.	Mayor, Trustees, and public works department will work toward incorporating hazard mitigation projects into city budget where possible and future public works improvements. EMD will review LEOP and incorporate hazard mitigation updates where applicable. CEDS and Regional Transportation Plan will be reviewed to update with revised action items.
Potosi	Comprehensive Plan Builder's Plan City Emergency Operations Plan County LEOP County Mitigation Plan Comprehensive Plan Land-Use Plan Flood Mitigation Assistance (FMA) Plan Watershed Plan Regional Transportation Plan Comprehensive Economic Development Strategy	Hazard Mitigation action items were incorporated into the regional CEDS and Regional Transportation Plan by MRPC. EMD was encouraged to incorporate hazard mitigation into LEOP where applicable.	Mayor, city council and public works department will work toward incorporating hazard mitigation projects into city budget where possible and future public works improvements. The comprehensive plan, builder's Plan, FMA plan, and Watershed Plan will also be reviewed, and any applicable hazard mitigation activities added to those documents. EMD will review LEOP again and

<b>Jurisdiction</b>	<b>Planning Mechanisms</b>	<b>Integration Process for Previous Plan</b>	<b>Integration Process for Current Plan</b>
	Public Works Construction Budget		incorporate hazard mitigation updates where applicable. CEDS and Regional Transportation Plan will be reviewed to update with revised action items.
Kingston K-14	Master Plan Capital Improvement Plan School Emergency Plan District Budget	School board and superintendent reviewed district emergency plan and district budget to see where hazard mitigation actions could be incorporated.	School board and superintendent will review Master Plan, Capital Improvement Plan, School Emergency Plan, and district budget to update applicable areas with revised action items list. Superintendent will work toward including the certified tornado safe room(s) into the district budget.
Potosi R-III	Master Plan School Emergency Plan Weapons Policy District Budget	School board and superintendent reviewed district emergency plan and district budget to see where hazard mitigation actions could be incorporated.	School board and superintendent will review Master Plan, School Emergency Plan, and district budget to update applicable areas with revised action items list. Superintendent will work toward including the certified tornado safe room(s) into the district budget.
Richwoods R-VII	Master Plan Capital Improvement Plan School Emergency Plan Weapons Policy District Budget	School board and superintendent reviewed district emergency plan and district budget to see where hazard mitigation actions could be incorporated.	School board and superintendent will review Master Plan, Capital Improvement Plan, School Emergency Plan, and district budget to update applicable areas with revised action items list. Superintendent will work toward including the certified tornado safe room(s) into the district budget.
Valley R-VI	Capital Improvement Plan	School board and superintendent reviewed	School board and superintendent will review

Jurisdiction	Planning Mechanisms	Integration Process for Previous Plan	Integration Process for Current Plan
	School Emergency Plan Weapons Policy District Budget	district emergency plan and district budget to see where hazard mitigation actions could be incorporated.	Capital Improvement Plan, School Emergency Plan, and district budget to update applicable areas with revised action items list. Superintendent will work toward including the certified tornado safe room(s) into the district budget.

Source: Jurisdiction surveys 2022

Including hazard mitigation is now routine for any planning projects or plan updates carried out by the Meramec Regional Planning Commission (MRPC). Applicable goals and action items from hazard mitigation plans have been incorporated into the regional transportation plan as well as the Community Economic Development Strategy for the region. Both of these documents are resources for cities and counties within the eight-county area and are updated on a regular basis with input from city and county representatives. This review and update process has helped city and county representatives better understand and appreciate the importance of including hazard mitigation in all applicable plans. In addition, MRPC and the hazard mitigation planning committee are also working to encourage the incorporation of hazard mitigation into the planning activities of all local governments, school districts and local entities through presentations and participation in planning activities.

## 5.3 Continued Public Involvement

**44 CFR Requirement §201.6(c)(4)(iii): [The plan maintenance process shall include a] discussion on how the community will continue public participation in the plan maintenance process.**

The hazard mitigation plan update process provides an opportunity to publicize success stories resulting from the plan's implementation and seek additional public comment. Information about the annual reviews will be posted in the local newspaper as well as on the Meramec Regional Planning Commission's website following each annual review of the mitigation plan. When the MPC reconvenes for the five-year update, it will coordinate with all stakeholders participating in the planning process. Included in this group will be those who joined the MPC after the initial effort to update and revise the plan. Public notice will be posted, and public participation will be actively solicited, at a minimum, through available website postings and press releases to local media outlets, primarily newspapers.

# 6 Appendix

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A: References ..... 6.2

B: Planning Process ..... 6.6

C: Public Survey ..... 6.37

D: Adoption Resolutions ..... 6.52

E: Critical/Essential Facilities ..... 6.61

F: MDC Wildfire Data Search ..... 6.63

## A: References

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## B: Planning Process

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## MEMORANDUM

TO: Washington County Hazard Mitigation Planning Committee

FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director  
Patrick Stites, MRPC Environmental Programs Specialist

DATE: November 11, 2021

SUBJECT: Hazard mitigation planning meeting November 29, 2021

The Meramec Regional Planning Commission (MRPC) has been contracted by Washington County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Washington County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Washington County. We need your help to successfully complete this project.

The county must submit an approved, updated hazard mitigation plan to SEMA and FEMA by November, 2022 in order to continue to be eligible for hazard mitigation grant funds and certain recovery funds after a natural disaster occurs. It is in every jurisdiction's best interest to participate in the review and update of this plan. Hazard mitigation funds are used for such projects as floodplain buyouts, burying electrical lines, tornado shelters for schools, etc.

**A meeting of the Washington County Hazard Mitigation Planning Committee is scheduled for Monday, November 29 at 10:00 a.m. at the Washington Co. Courthouse, County Commission Chambers located at 102 N Missouri St, Potosi, MO.** The focus of this meeting will be to review existing goals and action items and determine if any changes need to be made. In addition, the group will need to report on what action items have been accomplished and what mitigation activities have occurred since the plan was updated five years ago. This can include activities such as improvements to roads and bridges that were prone to flooding, new programs that have reduced risk to residents and/or businesses and new tornado shelters that have been constructed in the past five years. Additionally, we request that **each jurisdiction and school district bring a filled-out Hazard Mitigation Plan Questionnaire** (included). After the meeting we will answer questions and assist with filling out the questionnaire.

As the county, each city and school district are required to participate in the planning process and will be asked to formally approve and adopt the Phelps County Hazard Mitigation Plan, we strongly encourage you to participate in this committee or to send a representative who will convey your jurisdiction or department's needs for hazard mitigation as well as report on your hazard mitigation accomplishments. It is important to include representatives from emergency management offices, law enforcement, city/county officials, fire protection, road and bridge departments, utilities and public works, local health services, disaster relief volunteer services and other appropriate groups. If you are not able to attend, please send a representative from your organization. It is very important that we have good participation from all stakeholders in Washington County.

Thank you for your assistance in addressing hazard mitigation for Washington County. If you have any questions, contact me at (573) 265-2993, or via e-mail: [tsnodgrss@merameregion.org](mailto:tsnodgrss@merameregion.org). I look forward to seeing you at the meeting.

PS  
Enclosures: Meeting Agenda

**Washington County**  
**Multi-Jurisdictional Hazard Mitigation Plan Update**  
**Planning Meeting**

Monday, November 29, 2021 ~ 10:00 a.m.

County Commission Chambers, Washington County Courthouse

**AGENDA**

- I. Welcome/Introductions – Tammy Snodgrass, Assistant Director, Meramec Regional Planning Commission
- II. Hazard Mitigation Planning Purpose
- III. Grant Programs Linked to Approved Plan
- IV. Planning Tasks / Multi-jurisdictional Approach
- V. Participation Requirements
- VI. Public Involvement
- VII. Data Collection Questionnaires
- VIII. Discussion of Hazards
- IX. Critical Facilities
- X. Next Steps in the Planning Process
- XI. Set Next Meeting Date(s)

## NOTICE OF PUBLIC MEETING

Date and time of posting:

Notice is hereby given that the **Washington County Hazard Mitigation Planning Committee** will meet at **10:00 a.m. on Monday, November 29, 2021** at the **Washington County Courthouse, County Commission Chambers, located at 102 N Missouri St, Potosi, MO 63664**

The tentative agenda of this meeting includes:

- Welcome and Introductions
- Hazard Mitigation Planning Purpose
- Grant Programs Linked to Approved Plan
- Planning Tasks/Multi-Jurisdictional Approach
- Participation Requirements
- Public Involvement
- Data Collection Questionnaires
- Discussion of Hazards
- Critical Facilities
- Next Steps in the Planning Process
- Setting of Date and Time for Next Meeting
- Adjourn

Representatives of the news media may obtain copies of this notice by contacting:

Tamara Snodgrass  
#4 Industrial Drive  
St. James, MO 65559  
(573) 265-2993

[tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org)

If you require any accommodations (i.e. qualified interpreter, large print, hearing assistance) in order to attend this meeting, please notify this office at 573-265-2993 no later than 48 hours prior to the scheduled commencement of the meeting.

**Washington County Hazard Mitigation Plan Review Meeting**  
**November 29, 2021 ~ 10:00 a.m.**

Name	Representing	Email Address	Phone #	Address
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Zach Jackson	Sheriff		573-438-5478	
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Patrick Stiles	MRPC			
Tammy Snodgrass	MRPC			

For immediate release  
Jan. 4, 2022

For more information, contact  
Tammy Snodgrass at (573) 265-2993

### **MRPC begins holding meetings to update Washington County hazard mitigation plan**

WASHINGTON COUNTY—Meramec Regional Planning Commission (MRPC) is working on updating the hazard mitigation plan for Washington County. The next meeting, which is open to the public, is scheduled for Feb. 28 at 10:00 a.m. at the Washington County Courthouse, 102 N. Missouri St., Potosi.

The first Washington County hazard mitigation planning meeting was held on Nov. 29, 2021 at the courthouse. MRPC staff did a presentation on hazard mitigation and the process that the group would be going through to update the Washington County plan. Discussions included explanation that hazard mitigation planning is focused on reducing risk before disasters strike (burying electric lines, elevating homes in the floodplain) and sharing the county must have a current, updated plan to be eligible for some hazard mitigation grants.

The first draft of the revised plan must be submitted to SEMA by Nov. 25, 2022. Jurisdictions within the county, such as cities, the county itself, schools, fire departments and others, are asked to participate in the planning process, complete the questionnaire, review the revised plan and adopt the new plan. It was also discussed that a survey on hazard mitigation would be promoted throughout the county to get public input into the plan. That survey can be found and completed at <https://www.meramecregion.org/surveys/>.

If you have questions, please contact Tammy Snodgrass at MRPC at 573-265-2993 or by email at [tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org).

Formed in 1969, MRPC is a voluntary council of governments serving Crawford, Dent, Gasconade, Maries, Osage, Phelps, Pulaski and Washington counties and their respective cities. Steve Vogt, representing the city of Belle, serves as MRPC chairman. A professional staff of 34, led by Executive Director Bonnie Prigge, offers technical assistance and services, such as grant preparation and administration, housing assistance, transportation planning, environmental planning, ordinance codification, business loans and other services to member communities.

To keep up with the latest MRPC news and events, visit the MRPC website at [www.meramecregion.org](http://www.meramecregion.org) or on Facebook at [www.facebook.com/meramecregion/](https://www.facebook.com/meramecregion/).

## From Last Plan Update

**Goal 1:** Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

**Goal 2:** Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

**Goal 3:** Promote education, outreach, research and development programs to improve the knowledge and awareness among the citizens and industry about hazards they may face, their vulnerability to identified hazards, and hazard mitigation alternatives that can reduce their vulnerabilities.

**Goal 4:** Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

**Goal 5:** Establish priorities for reducing risks to the people and their property with emphasis on long-term and maximum benefits to the public rather than short-term benefit of special interests.

**Goal 6:** Secure resources for investment in hazard mitigation.

## New Goals Accepted by Committee

**Goal 1:** Reduce the potential impact of natural disasters on the lives and livelihoods of the citizens of the county.

**Goal 2:** Reduce the potential impact of natural disaster to property, infrastructure, and the local economy.

**Goal 3:** Reduce the potential impact of natural disaster on the continuity of government and essential services.

From Last Plan Update		Revision Suggestions
1.1.3	Promote development of emergency plans by businesses and public entities by providing information on business continuity and emergency planning through local chambers of commerce and emergency management offices.	Provide annual training to local businesses and public entities on emergency planning and business continuity through local chambers of commerce and emergency management offices.
1.1.4	Continue to provide CERT training and encourage the development of CERT teams.	Local Fire Departments and Emergency Management Director will provide CERT training and distribute information on the benefits of the CERT and VOAD programs.
1.1.5	Educate school staff on natural hazards and make sure all staff are familiar with school emergency plan including evacuation and safety procedures.	<b>Complete.</b> Established in School policies.
1.2.1	Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems.	Obtain and update early warning systems and improved communication systems as funding allows.
1.2.2	Promote the use of weather radios by local residents to ensure advanced warning about threatening weather.	<b>Complete.</b> No longer high priority with increased technology and poor radio reception.
1.2.4	Monitor developments in data availability concerning the impact of dam failure, tornadoes, sinkholes, land subsidence, and wildfire upon Washington County and all jurisdictions through local, state, and federal agencies for use in hazard mitigation planning.	<b>Remove.</b> Accomplished during the plan update process.
1.3.1	Place water height gauges and signs near low water crossings.	<b>Remove.</b> No longer high priority. Committee feels that these signs might encourage people to attempt crossings. Signs are often subjected to vandalism.
1.3.2	Provide information on tree trimming and dead tree removal programs to utility companies and local government.	<b>Remove.</b> Power lines are the responsibility of the power companies. These systems are established in private policy.
1.3.3	Review and consider road and bridge upgrades to improve drainage and reduce flooding and the risk to residents and property.	Complete road and bridge repairs/upgrades as funding allows to reduce flooding and the risk to residents and property.
1.3.4	Establish cooling centers where residents can go during extreme heat or power outages.	Establish warming and cooling centers where residents can go during extreme heat/cold or power outages.
1.3.6	Disseminate information on the importance of and funding sources for storm shelters and tornado safe rooms near areas of high population densities (large employers).	Construct storm shelters and tornado safe rooms near areas of high population densities (schools and large employers as funding allows.
2.1.1	Provide information on self-inspection programs to critical facilities to assess earthquake and tornado resistance.	<b>Remove.</b> No longer considered high priority. Does not meet smart criteria.
2.1.4	Promote development of emergency plans by businesses and public entities by providing information on business continuity and emergency	<b>Same as 1.1.3</b>

	planning through local chambers of commerce and emergency management offices.	
2.2.1	Educate residents about the dangers of floodplain development and the benefits of the National Flood Insurance Program.	Distribute FEMA brochures and factsheets about the National Flood Insurance Program (NFIP) at public offices and community events.
2.2.2	Continue to enforce flood damage prevention/floodplain management ordinances in compliance with NFIP requirements.	<b>Keep</b> State requested
2.3.1	Develop minimum standards for building codes in county and cities.	<b>Remove.</b> No longer considered a high priority.
2.3.2	Have local jurisdictions review their floodplain ordinances and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.	<b>Complete?</b>
2.3.3	Encourage the Mark Twain National Forest to levy stricter fines for persons causing fire hazards.	<b>Remove.</b> Does not meet SMART criteria. No longer high priority.
3.1.1	Distribute SEMA brochures on natural hazards and preparedness at public facilities and events.	Established. Information is also provided on social media.
3.2.2	Encourage meetings between EMD, city/county officials and SEMA to familiarize officials with mitigation planning, implementation and budgeting for mitigation projects.	<b>Combine with 6.1.3.</b>
3.3.1	Re-evaluate the hazard mitigation plan, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.	<b>Combine with 6.1.3</b>
3.3.2	Implement a public awareness program about the benefits of hazard mitigation projects, both public and private, including distributing press releases by cities/county regarding adopted mitigation measures to keep public abreast of changes and/or new regulations.	Implement public awareness program about the benefits of adopted hazard mitigation projects, both public and private, through press releases, brochures, EMD website and social media including changes to mitigation policy to keep the public abreast of changes and/or new regulations.
3.4.2	Publicize county or citywide drills.	<b>Remove.</b> Completed. Established in policy.
4.1.1	Schedule joint meetings with different organizations/agencies for mitigation planning.	<b>Combine with 6.1.3</b>
4.1.2	Continue to encourage joint training (or drills) between agencies, public and private entities (including schools and businesses)	<b>Remove.</b> Completed. Established in policy.
4.1.3	Pool different agency resources to achieve widespread mitigation results.	<b>Combine 4.1.2</b>
5.1.4	Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties.	Remove. Potosi does this. Other jurisdictions don't rate it high priority.
5.2.1	Encourage local governments to purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.	Purchase properties in the floodplain to convert land into public space/recreation areas as funds allow.
5.2.2	Encourage communities to discuss zoning repetitive loss properties in the floodplain as open space.	<b>Combine with 5.2.1</b>
6.1.2	Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met.	<b>Combine with 1.3.3</b>

6.1.3	Work with state/local/federal agencies to include mitigation in all economic and community development projects.	Meet with state/local/federal agencies annually to discuss budgeting for mitigation projects, cost-share programs with property owners, including mitigation activities in all economic and community development projects, merge with other community planning and coordinate and integrate hazard mitigation activities, where appropriate, with emergency operations plans and procedures.
6.1.4	Provide information to jurisdictions on the benefits of budgeting for and implementing hazard mitigation projects.	Combine with 6.1.3
6.2.1	Provide information on the benefits of local governments implementing cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole	Combine with 6.1.3
6.3.1	Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health, and property.	Remove. Completed through planning process
New		Purchase generators for critical facilities in the planning area as funding allows.
New		Elevate existing structures in the flood plain as funding allows.

Some infrastructure and policy improvements common to mitigation plans

- Shelters and safe rooms
- Bridges and roads
- Generators
- Emergency communication systems
- Code development (building/fire/stormwater/debris removal)
- property upgrades (earthquake proofing, landscaping for flooding, etc.)

## MEMORANDUM

TO: Washington County Hazard Mitigation Planning Committee

FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director  
Patrick Stites, MRPC Environmental Programs Specialist

DATE: January 20, 2022

SUBJECT: Hazard mitigation planning meeting February 28, 2022

**The next meeting of the Washington County hazard mitigation planning committee is scheduled for Monday, February 28, at 10:00 a.m.** at the Washington Co. Courthouse, County Commission Chambers located at 102 N Missouri St, Potosi, MO. The focus of this meeting will be to review pieces of the draft risk assessment for the county and review existing action items and determine what changes need to be made. A copy of a revised list of action items is attached for your review. In addition, the group will need to report on what action items have been accomplished and what mitigation activities have occurred since the plan was updated five years ago. This can include activities such as improvements to roads and bridges that were prone to flooding, new programs that have reduced risk to residents and/or businesses and new tornado shelters that have been constructed in the past five years. If you have data on damages from natural events that have occurred in the last five years, or information on hazard mitigation projects that have been accomplished in the past five years, please bring this and any other pertinent data with you to the meeting.

The Meramec Regional Planning Commission (MRPC) has been contracted by Washington County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Washington County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Washington County. We need your help to successfully complete this project. If your jurisdiction has not completed and returned the data collection questionnaire, please do so at your earliest convenience.

The county must submit the first draft of an updated hazard mitigation plan to SEMA and FEMA by November 25, 2022 in order to continue to be eligible for some hazard mitigation grants, so it is in every jurisdiction's best interest to participate in the review and update of this plan. Hazard mitigation funds are used for such projects as floodplain buyouts, burying electrical lines, tornado shelters for schools, etc.

As the county, each city and school district are required to participate in the planning process and will be asked to formally approve and adopt the Washington County Hazard Mitigation Plan, we strongly encourage you to participate in this committee or to send a representative who will convey your jurisdiction or department's needs for hazard mitigation as well as report on your hazard mitigation accomplishments. It is important to include representatives from road and bridge, local planners, emergency management offices, law enforcement, city/county officials, fire protection, local health services, disaster relief volunteer services and other appropriate groups.

Thank you for your assistance in addressing hazard mitigation for Phelps County. If you have any questions, contact me at (573) 265-2993, extension 135 or via e-mail: [pstites@merameregion.org](mailto:pstites@merameregion.org). I look forward to seeing you at the meeting.

PS

**Washington County**  
**Multi-Jurisdictional Hazard Mitigation Plan Update**  
**Planning Meeting**

Monday, February 28, 2022 ~ 10:00 a.m.

County Commission Chambers, Washington County Courthouse

**AGENDA**

- I. Welcome/Introductions – Tammy Snodgrass, Assistant Director, Meramec Regional Planning Commission
- II. Brief Review
- III. Public Survey Update
- IV. Participation Requirements/Status
- V. Plan Update Format
- VI. Discuss Mitigation Action Updates – *(Which have been accomplished or had progress made; which are no longer high priority; which can be combined or eliminated)*
- VII. Next Steps
- VIII. Set Next Meeting Date(s)

## NOTICE OF PUBLIC MEETING

Date and time of posting:

Notice is hereby given that the **Washington County Hazard Mitigation Planning Committee** will meet at **10:00 a.m. on Monday, February 28, 2022** at the **Washington County Courthouse, County Commission Chambers, located at 102 N Missouri St, Potosi, MO 63664**

The tentative agenda of this meeting includes:

- Welcome and Introductions
- Integration of Other Data, Reports, Studies, Plans
- Discussion of Goals and Objectives and Progress Made in Past Five Years
- Review and Prioritize Action Items
- Jurisdiction and School District Questionnaire Assistance
- Adjourn

Representatives of the news media may obtain copies of this notice by contacting:

Tamara Snodgrass  
#4 Industrial Drive  
St. James, MO 65559  
(573) 265-2993

[tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org)

If you require any accommodations (i.e. qualified interpreter, large print, hearing assistance) in order to attend this meeting, please notify this office at 573-265-2993 no later than 48 hours prior to the scheduled commencement of the meeting.

**Washington County Hazard Mitigation Plan Review Meeting**  
**February 28, 2022 ~ 10:00 a.m.**

Name	Representing	Email Address	Phone #	Address
Doug Short	Wash Co. Ma	eaglecabinetco@conturytel.net	573-747-7257	
David Sansegrau	Wash Co. Mo	DSansegrau@yahoo.com	573-761-2028	
Cody Brinley	Wash Co. Mo.	brinley—three@yahoo	573-915-8638	
Jeanette Allen	Wash. Co.	jallen@washcomd.us	573 436-7004	102 N. Mo. St. Potosi, MO 63664
Nick Branson	EMD	nbranson@washcomd.us	573-438-1185	
T.R. Dudley	Mineral Point Grande la Great Mines Health Center	trdudley123@gmail.com	573.210.8521	
Tina Hammers	Mineral Point	tinahammers@yahoo.com	573-200-1464	
TOM DE GOWIA	Mineral Point		573-438-2700	
Alex M <sup>c</sup> Ca-1	Potosi R-3 School Dist.	alex.mccaul@potosi3.org	573-438-8435	

Name	Representing	Email Address	Phone #	Address
Lindell Conway	Richwoods R-VII	lconway@richwoods.k12.mo.us	573-678-2257	10788 State A Hwy Richwoods, Mo 63071
Rochelle Nickles	Public	r-nickles1966@yahoo.com	573 327-0211	10106 Nickles Lane Mineral Point, MO 63067
Tammy Snodgrass	MRPC			
Patrick Skiles	MRPC			

For immediate release  
Feb. 7, 2022

For more information, contact  
Tammy Snodgrass at (573) 265-2993

### **MRPC to hold public meeting for Washington County hazard mitigation plan**

WASHINGTON COUNTY—Meramec Regional Planning Commission (MRPC) will be meeting with the Washington County hazard mitigation planning committee at 10:00 a.m. on Feb. 28, 2022, at the Washington County Courthouse, 102 N. Missouri St., Potosi, to update the county's hazard mitigation plan. The meeting is open to the public.

Hazard mitigation planning is focused on reducing risk before disasters strike. Activities such as burying electric lines, reduces damage during tornadoes and elevating homes in the floodplain help reduce damage and loss of life during natural disasters. Public input is necessary to truly understand the risks that could be facing the county. Additionally, the county must have a current, updated plan to be eligible for some hazard mitigation grants.

The first draft of the revised plan must be submitted to SEMA by Nov. 25, 2022. Jurisdictions within the county, such as cities, the county itself, schools, fire departments and others, are asked to participate in the planning process. Jurisdictions such as local governments and the school districts are required to complete questionnaires, review the revised plan and adopt the new plan. For those members of the public interested in providing input, a public survey can be found and completed at <https://www.meramecregion.org/surveys/>.

County-level hazard mitigation plans cover a five-year timeframe. Washington County's last plan was approved in June 2018 and can be found at <https://www.meramecregion.org/publications/>.

If you have questions, please contact Tammy Snodgrass at MRPC at 573-265-2993 or by email at [tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org).

Formed in 1969, MRPC is a voluntary council of governments serving Crawford, Dent, Gasconade, Maries, Osage, Phelps, Pulaski and Washington counties and their respective cities. Steve Vogt, representing the city of Belle, serves as MRPC chairman. A professional staff of 36, led by Executive Director Bonnie Prigge, offers technical assistance and services, such as grant preparation and administration, housing assistance, transportation planning, environmental planning, ordinance codification, business loans and other services to member communities.

To keep up with the latest MRPC news and events, visit the MRPC website at [www.meramecregion.org](http://www.meramecregion.org) or on Facebook at [www.facebook.com/meramecregion/](https://www.facebook.com/meramecregion/).

## MEMORANDUM

TO: Washington County Hazard Mitigation Planning Committee

FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director  
Patrick Stites, MRPC Environmental Programs Specialist

DATE: August 29, 2022

SUBJECT: Hazard mitigation planning meeting September 19, 2022

**The next meeting of the Washington County hazard mitigation planning committee is scheduled for Monday, September 19, at 10:00 a.m.** at the Washington Co. Courthouse, County Commission Chambers located at 102 N Missouri St, Potosi, MO. The focus of this meeting will be to review and discuss all completed draft chapters of the hazard mitigation plan and discuss the formal adoption process for each jurisdiction. The draft of chapter 3 of the plan has already been sent out via email. As additional chapter drafts are completed, we will continue to send those out. As you spend time reviewing these drafts it is very important that you document those hours spent and submit in-kind match forms so that we can get those hours counted. If you have comments or corrections, please feel free to send those over to me via email and I will get those addressed.

The Meramec Regional Planning Commission (MRPC) has been contracted by Washington County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Washington County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Washington County. We need your help to successfully complete this project.

All jurisdictions must formally adopt the plan document prior to submittal to be included in the plan. The first draft of the updated hazard mitigation plan must be submitted to SEMA and FEMA by November 25, 2022, in order to continue to be eligible for some hazard mitigation grants, so it is in every jurisdiction's best interest to participate in the review and update of this plan. Hazard mitigation funds are used for such projects as floodplain buyouts, burying electrical lines, tornado shelters for schools, etc.

As the county, each city and school district are required to participate in the planning process and will be asked to formally approve and adopt the Washington County Hazard Mitigation Plan, we strongly encourage you to participate in this committee or to send a representative who will convey your jurisdiction or department's needs for hazard mitigation as well as report on your hazard mitigation accomplishments. It is important to include representatives from road and bridge, local planners, emergency management offices, law enforcement, city/county officials, fire protection, local health services, disaster relief volunteer services and other appropriate groups.

Thank you for your assistance in addressing hazard mitigation for Washington County. If you have any questions, contact me at (573) 265-2993, extension 135 or via e-mail: [pstites@merameregion.org](mailto:pstites@merameregion.org). I look forward to seeing you at the meeting.

PS

**Washington County**  
**Multi-Jurisdictional Hazard Mitigation Plan Update**  
**Planning Meeting**

Monday, September 19, 2022 ~ 10:00 a.m.  
County Commission Chambers, Washington County Courthouse

**AGENDA**

- I. Welcome/Introductions – Tammy Snodgrass, Assistant Director, Meramec Regional Planning Commission
- II. Brief Review
- III. Participation Requirements/Status
- IV. Review and Discussion on Draft Chapters
- V. Plan Maintenance
- VI. Adoption Process
- VII. Next Steps
- VIII. Adjourn

## NOTICE OF PUBLIC MEETING

Date and time of posting:

Notice is hereby given that the **Washington County Hazard Mitigation Planning Committee** will meet at **10:00 a.m. on Monday, September 19, 2022** at the **Washington County Courthouse, County Commission Chambers, located at 102 N Missouri St, Potosi, MO 63664**

The tentative agenda of this meeting includes:

- Welcome and Introductions
- Brief Review
- Participation Requirements
- Review and Discussion on Draft Chapters
- Plan Maintenance
- Adoption Process
- Next Steps
- Adjourn

Representatives of the news media may obtain copies of this notice by contacting:

Tamara Snodgrass  
#4 Industrial Drive  
St. James, MO 65559  
(573) 265-2993  
[tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org)

If you require any accommodations (i.e. qualified interpreter, large print, hearing assistance) in order to attend this meeting, please notify this office at 573-265-2993 no later than 48 hours prior to the scheduled commencement of the meeting.

**Washington County Hazard Mitigation Plan Review Meeting**  
**September 19, 2022 ~ 10:00 a.m.**

Name	Representing	Email Address	Phone #	Address
Lindell Conway	Richwoods R-VII	lconway@richwoods.k12.mo.us	573-678-2257	10758 State A Hwy Richwoods, Mo 63071
Floyd Hawthorn	Wash Co EMD	fhawthorn@washco.mo.us	573-701-2634	23117 St. Hwy P Belgrade Mo 63622
Alex McCaul	Potosi R-3	alex.mccaul@potosi-r3.org	573-437-5495	400 N. Mine St. Potosi, Mo 63664
Jason Samples	Valley R-6	jason.samples@valley.k12.mo.us	573-779-3446	# Viking Dr Caledonia, Mo
Rochelle Nickle	Potosi Fire Volunteer	r-nickle1946@yahoo.com	573 321-0211	10106 Nickel Lane Mineral Point Mo 63664
Jeanette Allen	Washington Co.	jallen@washco.mo.us	573 436-7704	102 N. Mo. St. Potosi, Mo 63664
Cody Brinley	Wash Co	Jallen@Washco.mo	573 915 8635	102 W 9th St Potosi, Mo 63664
David Sanseger	Wash Co	DSanseger@yahoo.com	573-747-2025	1524th Mo St Potosi Mo 63664
Doug Short	WASH Co	eaglecabinetco@centurytel.net	573-747-7257	18750 State Hwy F Potosi Mo. 63664

Name	Representing	Email Address	Phone #	Address
Matthew Hart	Washington County Ambulance District	mhart@wcodems.org	573-701-2643	6900 Bill Gum blvd. Potosi
Patrick Stiles	MRPC			
Tammy Snodgrass	MRPC			

For immediate release  
October 6, 2022

For more information, contact  
Tammy Snodgrass at (573) 265-2993

### **Public comment being accepted on Washington County Hazard Mitigation Plan until Oct. 31**

WASHINGTON COUNTY—Public comment is being accepted until Oct. 31, 2022, on the Washington County Hazard Mitigation Plan. The plan update is available for review on Meramec Regional Planning Commission's website, <http://www.meramecregion.org/publications/>. The 2022 plan update is located under the Hazard Mitigation Plans by county along with the county's approved 2018 plan. A hard copy of the plan is also available at the Washington County Courthouse in the county clerk's office.

The purpose of the plan is to reduce or eliminate long-term risk to people and property from natural hazards. It is required that the county have this plan in place in order to be eligible for several Federal Emergency Management Agency grant programs.

Several entities participated in the planning process to update the plan, including Washington County, the villages of Caledonia and Mineral Point and the cities of Irondale and Potosi, as well as Kingston K-14 School District, Potosi R-III School District, Richwoods R-VII School District, Valley R-VI School District and Great Mines Health Center.

The Meramec Regional Planning Commission (MRPC) facilitated focus group meetings and assisted these entities in developing the plan. Following a public comment period, a final draft will be created and sent to FEMA and SEMA for review and approval.

If you need assistance locating the plan or have questions, please contact Tammy Snodgrass at MRPC at 573-265-2993 or by email at [tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org).

Formed in 1969, MRPC is a voluntary council of governments serving Crawford, Dent, Gasconade, Maries, Osage, Phelps, Pulaski and Washington counties and their respective cities. Steve Vogt, representing the city of Belle, serves as MRPC chairman. A professional staff of 34, led by Executive Director Bonnie Prigge, offers technical assistance and services, such as grant preparation and administration, housing assistance, transportation planning, environmental planning, ordinance codification, business loans and other services to member communities.

To keep up with the latest MRPC news and events, visit the MRPC website at [www.meramecregion.org](http://www.meramecregion.org) or on Facebook at [www.facebook.com/meramecregion/](https://www.facebook.com/meramecregion/).

Mailing list for surrounding jurisdictions:

Mayor Dave Lafferty  
Bourbon City Hall  
P. O. Box 164  
Bourbon, MO 65441

Mayor Cody Leathers  
Cuba City Hall  
PO Box K  
Cuba, MO 65453

Chairman Jared West  
Village of Leasburg  
PO Box 39  
Leasburg, MO 65535

Presiding Commissioner Leo Sanders  
Crawford County Courthouse  
PO Box AS  
Steelville, MO 65565

Mayor John Terry Beckham  
Steelville City Hall  
PO Box M  
Steelville, MO 65565

Mayor Dennis Watz  
Sullivan City Hall  
210 W. Washington  
Sullivan, MO 63080

Superintendent Dr. Kyle Gibbs  
Crawford Co. R-I School District  
1444 Old Hwy 66  
Bourbon, MO 65441

Superintendent Dr. Curt Groves  
Crawford Co. R-II School District  
#1 Wildcat Pride Dr.  
Cuba, MO 65453

Superintendent Christina Hess  
Steelville R-III District  
P.O. Box 339  
Steelville, MO 65565

Dr. Jana Thornsberry, Supt.  
Sullivan School District  
138 Taylor St.  
Sullivan, MO 63080

Superintendent Ray Forshee  
Bellevue R-3 School District  
27431 Highway 32  
Bellevue, MO 63623

Superintendent Adam Portell  
Iron County C-4 School District  
35 Highway 49  
Viburnum, MO 65566

Jim Scaggs, Presiding Commissioner  
Iron County Courthouse  
PO Box 42  
Ironton, MO 63650

Annapolis City Hall  
204 School Street  
Annapolis, MO 63620

Roy Carr, Mayor  
City of Arcadia  
PO Box 86  
Arcadia, MO 63621

Village of Des Arc  
PO Box 207  
Des Arc, MO 63636

Robert Lourwood, Mayor  
City of Ironton  
123 N. Main Street  
Ironton, MO 63650

City of Pilot Knob  
PO Box 188  
Pilot Knob, MO 63663

Johnny Setzer, Mayor  
City of Viburnum  
PO Box 596  
Viburnum, MO 65566

Superintendent Brian Beard  
Arcadia Valley R-II School District  
750 Park Drive  
Ironton, MO 63650

Superintendent Don Wakefield  
South Iron R-I School District  
210 School Street  
Annapolis, MO 63620

Tim Brinker, Presiding Commissioner  
Franklin County Courthouse  
400 E Locust  
Union, MO 63084

Superintendent Jennifer Kephart  
School District of Washington  
220 Locust Street  
Washington, MO 63090

Superintendent Scott Hayes  
Union R-XI School District  
P.O. BOX 440  
Union, MO 63084

Shelley Smythe, City Clerk  
Gerald City Hall  
106 East Fitzgerald Ave.  
Gerald, MO 63037

Don Stolberg, City Administrator  
St. Clair City Hall  
#1 Paul Parks Drive  
St. Clair, MO 63077

Berger City Hall  
404 Rosalie Avenue  
Berger, MO 63014

Administrator Rhonda Huffman  
Hillside Living Center  
10109 Restoration Circle  
Mineral Point, MO 63660

Superintendent Josh Hoener  
New Haven School District  
100 Park Drive  
New Haven, MO 63068

Superintendent Kathy Vandegriffe  
Strain-Japan School District  
4640 Highway H  
Sullivan, MO 63080

Sam Richards, Mayor  
City of Festus  
711 West Main  
Festus, MO 63028

Mike Osher, Mayor  
130 Mississippi Avenue  
Crystal City, MO 63019

Mayor Phil Stang  
City of Kimmswick  
PO Box 27  
Kimmswick, MO 63053

Kathleen Trentmann, City  
Administrator  
New Haven City Hall  
101 Front Street  
New Haven, MO 63068

Jonathan Zimmerman, City  
Administrator  
Union City Hall  
10 E. Locust Street  
Union, MO 63084

Oak Grove Village City Hall  
260 James Street  
Sullivan, MO 63080

Superintendent Jenny Ulrich  
Lonedell R-XIV School District  
7466 Hwy FF  
Lonedell, MO 63060

Superintendent Jeannie Jenkins  
Spring Bluff R-XV School District  
9374 Highway 185  
Sullivan, MO 63080

Dennis Gannon, County Executive  
Jefferson County Admin. Center  
729 Maple Street, Suite G30  
Hillsboro, MO 63050

Ron Counts, Mayor  
City of Arnold  
2101 Jeffco Boulevard  
Arnold, MO 63010

Stephanie Haas, Mayor  
City of Pevely  
401 Main Street  
Pevely, MO 63070

Rob Kiczenski, Mayor  
City of Byrnes Mill  
141 Osage Executive Circle  
Byrnes Mill, MO 63051

Steve Roth, City Administrator  
Pacific City Hall  
300 Hoven Drive  
Pacific, MO 63069

Darren Lamb, City Administrator  
Washington City Hall  
405 Jefferson Street  
Washington, MO 63090

Village of Parkway  
1361 Parkway Drive  
St. Clair, MO 63077

Dr. Carrie Schwierjohn  
Meramec Valley R-III School District  
126 N Payne Street  
Pacific, MO 63069

Superintendent Kyle Kruse  
St. Clair R-XIII School District  
905 Bardot Street  
St. Clair, MO 63077

Buddy Russell, Mayor  
City of Hillsboro  
P.O. Box 19  
Hillsboro, MO 63050

Mayor Clayton Henry  
City of De Soto  
17 Boyd Street  
De Soto, MO 63020

Bill Haggard, Mayor  
City of Herculaneum  
#1 Parkwood Court  
Herculaneum, MO 63048

Chairman  
Village of Cedar Hill Lakes  
PO BOX 64  
Cedar Hill, Missouri 63016

Superintendent Jennifer Hecktor  
Northwest R-I School District  
4290 Gravois Rd  
House Springs, MO 63051

Superintendent Johnathon Isaacson  
Hillsboro R-3 School District  
5 Ridgewood Drive  
Hillsboro, MO 63050

Superintendent Clint Johnston  
Jefferson R-VII School District  
1250 Dooling Hollow Rd  
Festus, MO 63028

Superintendent Dr. Josh Isaacson  
DeSoto 73 Public School District  
610 Vineland School Road  
De Soto, MO 63020

Erik Schonhardt, Mayor  
City of Bonne Terre  
118 N. Allen Street  
Bonne Terre, MO 63628

City of Leadington  
12 Weir Street  
Leadington, MO 63601

Larry Forsythe, Mayor  
City of Farmington  
564 Burks Street  
Farmington, MO 63640

Superintendent Kevin Coffman  
West St. Francois County R-IV  
1124 Main Street  
Leadwood, MO 63653

Superintendent Matthew Ruble  
Farmington R-7 School District  
510 S Franklin St  
Farmington, MO 63640

Superintendent Dr. Paul Fregeau  
Fox C-6 School District  
745 Jeffco Boulevard  
Arnold, MO 63010

Superintendent Matt Zoph  
Grandview R-II School District  
11470 Highway C  
Hillsboro, MO 63050

Superintendent Matthew  
Holdinghausen  
Crystal City 47 School District  
1100 Mississippi Avenue  
Crystal City, MO 63019

Superintendent Amanda Spurgin  
Sunrise R-IX School District  
4485 Sunrise School Road  
De Soto, MO 63020

David Shaw, Mayor  
City of Desloge  
300 North Lincoln Street  
Desloge, MO 63601

Ed Austin, Mayor  
City of Leadwood  
708 Bank Street  
Leadwood, MO 63653

Seth Redford, Mayor  
City of Bismarck  
PO BOX 27  
Bismarck, MO 63624

Superintendent Ashley Mcmillian  
Central R-3 School District  
200 High Street  
Park Hills, MO 63601

Water/Sewer Supt. Dave Douglas  
City of Potosi  
121 East High St.  
Potosi, MO 63664

Superintendent Jason King  
Windsor C-1 School District  
6208 US Highway 61-67  
Imperial, MO 63052

Superintendent Nichole Ruess  
Festus R-VI School District  
1515 Mid Meadow Lane  
Festus, MO 63028

Superintendent Clinton Freeman  
**Dunklin R-5 School District**  
497 Joachim Avenue  
Herculaneum, MO 63048

Harold Gallaher, Presiding Comm.  
St. Francois County Courthouse  
1 West Liberty Street  
Annex Building, Suite 301  
Farmington, Missouri 63640

Stacey Easter, Mayor  
City of Park Hills  
9 Bennett Street  
Park Hills, MO 63601

City of Iron Mountain Lake  
591 N. Lakeshore Drive  
Bismarck, MO 63624

Superintendent Kathryn Bockman  
North St. Francois County R-I  
300 Berry Road  
Bonne Terre, MO 63628

Superintendent Michael Silvy  
Bismarck R-V School District  
PO BOX 257  
Bismarck, MO 63624

Natural Gas Supt. Sam Johnson  
City of Potosi  
121 East High St.  
Potosi, MO 63664

Presiding Commissioner Dave  
Sansegraw  
Washington County  
102 N. Missouri  
Potosi, MO 63664

Assoc. Commissioner Doug Short  
Washington County  
102 N. Missouri  
Potosi, MO 63664

Assoc. Commissioner Cody Brinley  
Washington County  
102 N. Missouri  
Potosi, MO 63664

Clerk Jeanette Allen  
Washington County  
102 N. Missouri  
Potosi, MO 63664

Sheriff Zach Jacobsen  
Washington Co. Sherriff's Office  
116 W High St.  
Potosi, MO 63664

EMD Nicholas Branson  
116 West High Street  
Potosi, MO 63664

Washington Co. Highway Dept.  
10629 Midwest Rd.  
Mineral Point, MO 63660

Chairperson John Robinson III  
City of Caledonia  
PO BOX 100  
Caledonia, MO 63631

Clerk Debra Bay  
City of Caledonia  
PO BOX 100  
Caledonia, MO 63631

Maintenance/Sewer Michael Green  
City of Caledonia  
PO BOX 100  
Caledonia, MO 63631

Fire Chief Chuck Hampton  
Caledonia Fire Prot. Dist.  
PO BOX 30  
Caledonia, MO 63631

Mayor Jay Horton  
City of Irondale  
PO BOX 53  
Irondale, MO 63648

Clerk Amber Forshee  
City of Irondale  
PO BOX 53  
Irondale, MO 63648

Marty O'Neial  
Water/Street/Waste Supt.  
City of Irondale  
PO BOX 53  
Irondale, MO 63648

Fire Chief Ryan Hardy  
Irondale Fire Prot. Dist.  
PO BOX 121  
Irondale, MO 63648

MO State Emergency Management  
Agency – Hank Voelker  
Region C Rural Area Coordinator  
2302 Militia Drive, PO Box 116  
Jefferson City, MO 65102

EMD Ryan Hardy  
City of Irondale  
PO BOX 121  
Irondale, MO 63648

Chairperson Tom Degonia  
City of Mineral Point  
701 State St. Box 127  
Mineral Point, MO 63660

Clerk Tina Hammers  
City of Mineral Point  
701 State St. Box 127  
Mineral Point, MO 63660

Water/Sewer Manager  
Paula Williams  
City of Mineral Point  
701 State St. Box 127  
Mineral Point, MO 63660

EMD  
City of Mineral Point  
701 State St. P.O. Box 127  
Mineral Point, MO 63660

Mayor Joseph Blount  
City of Potosi  
121 East High St.  
Potosi, MO 63664

Clerk Brenda Smith  
City of Potosi  
121 East High St.  
Potosi, MO 63664

Street Supt. Martin Lawson  
City of Potosi  
121 East High St.  
Potosi, MO 63664

EMD Doris Coffman  
City of Potosi  
121 East High St.  
Potosi, MO 63664

Fire Chief Roger LaChance  
Potosi Fire Prot. Dist.  
PO BOX 338  
Potosi, MO 63664

Chief of Police Michael Gum  
Potosi Police Dept.  
1 Police Plaza  
Potosi, MO 63664

Fire Chief Bob Haworth  
Belgrade Vol. Fire Dept.  
PO Box 71  
Belgrade, MO 63622

Fire Chief David Hoffmann Jr.  
Richwoods Fire Prot. Dist.  
P.O. Box 124  
Richwoods, MO 63071

Shawnee Douglas Administrator  
Washington Co. Health Dept.  
520 Purcell Dr.  
Potosi, MO 63664

Bryan Nicholson  
Washington Co. Memorial Hospital  
300 Healthway Dr.  
Potosi, MO 63660

Ameren UE  
P.O. Box 790098  
St. Louis, MO 63179-0098

Crawford Electric Cooperative  
10301 N. Service Rd.  
PO BOX 10  
Bourbon, MO 65441

Captain Ryan A Burckhardt  
Troop C  
891 Technology Drive  
Weldon Spring, MO 63304

MoDOT  
10681 E HWY E  
Potosi, MO 63630

Socket Internet Services  
202 W Breton St.  
Potosi, MO 63664

Administrator Karen Veach  
South Haven Residential  
10462 Airport Rd.  
Mineral Point, MO 63660

Administrator Melissa Smith  
Potosi Manor  
307 MO-21  
Potosi, MO 63664

Administrator Suzanne Mayfield  
Georgian Gardens Rehab  
1 Georgian Gardens Dr.  
Potosi, MO 63664

American Red Cross  
10195 Corporate Square Dr.  
Creve Coeur, MO 63132

MO State Emergency Management  
Agency  
Floodplain Management Officer  
2302 Militia Drive, PO Box 116  
Jefferson City, MO 65102

U.S. Army Corps of Engineers  
US Army Engineer District, St. Louis  
Matt Shively  
1222 Spruce Street  
St. Louis, MO 63103-2822

FEMA Region VII  
ATTN: Ken Sessa  
11224 Holmes Rd  
Kansas City, MO 64131-3626

U.S. Fish & Wildlife Service  
Ecological Services Field Office  
Karen Herrington, Field Supvr.  
101 Park DeVille Drive, Suite A  
Columbia, MO 65203-0057

Missouri Department of  
Conservation  
ATTN: Resource Science Division  
2901 W. Truman Blvd., PO Box 180  
Jefferson City, MO 65102

USDA, NRCS  
Parkade Center, Suite 250  
601 Business Loop 70 West  
Columbia, MO 65203

CenturyLink  
828 E High St. #14  
Potosi, MO 63664

Independent Journal  
119 E High St. P.O. Box 340  
Potosi, MO 63664


Dr. Lee Ann Wallace, Superintendent  
Kingston K-14  
10047 Diamond Rd.  
Cadet, MO 63630

Superintendent Alex McCaul  
Potosi R-III  
400 N. Mine  
Potosi, MO 63664

Superintendent Lindell Conway  
Richwoods R-VII  
10788 State Hwy A  
Richwoods, MO 63071

Dr. Michael Silvy, Superintendent  
Valley R-VI  
1 Viking Dr.  
Caledonia, MO 63631

**Meramec Regional Planning Commission**  
#4 Industrial Drive  
St. James, MO 65559



Washington  
County  
Hazard  
Mitigation Plan is  
Ready for Review!

10/05/22

**Attention Members of the Washington County Hazard Mitigation Planning Committee and neighboring jurisdictions:**

The first draft of the Washington County Hazard Mitigation Plan is now available for review on the MRPC website – <http://www.meramecregion.org/publications/>. A hard copy of the draft document is being made available at the Washington County Clerk's Office for public viewing as well. Please take some time to review the planning document, especially sections that have specifics regarding your jurisdiction. The public comment period will be open until October 31, 2022. Please notify us no later than **October 31, 2022** with any recommended changes or corrections. Contact Tammy Snodgrass at (573) 265 -2993 or via email at [tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org).

## C: Public Survey

# Public Survey: Washington County Multi-jurisdictional Hazard Mitigation Plan

The federal government requires all states and local governments to have hazard mitigation plans approved by FEMA that are consistent with the Disaster Mitigation Act of 2000. Approved mitigation plans are required to maintain eligibility for certain types of federal Hazard Mitigation Assistance Grants.

A planning committee comprised of representatives from Washington County, the incorporated cities, and the public school districts is currently developing an update to the comprehensive Washington County Multi-jurisdictional Hazard Mitigation Plan with a strategy to reduce the vulnerability of people and property in the planning area to the impacts of hazards and to remain eligible for mitigation funding programs from FEMA.

One of the key components of a hazard mitigation plan is public input during the planning process. The planning committee will be evaluating information on the hazards that impact each jurisdiction within Washington County. The committee is seeking your input on the hazards that will be evaluated as well as your opinions on the types of activities that should be considered to reduce future impacts. Your comments will be considered by your community's representatives on the planning committee as the plan is developed. Please take a few moments to answer the following questions. Thank you for your participation.

1. Please select your jurisdiction from the list. You may only select one jurisdiction for each survey completed. If you belong to more than one jurisdiction in this list, please complete multiple surveys.

- |   |  |
|---|--|
| <input type="checkbox"/> Unincorporated Washington County | <input type="checkbox"/> Kingston K-14 School District   |
| <input type="checkbox"/> Village of Caledonia             | <input type="checkbox"/> Potosi R-III School District    |
| <input type="checkbox"/> City of Irondale                 | <input type="checkbox"/> Richwoods R-VII School District |
| <input type="checkbox"/> Village of Mineral Point         | <input type="checkbox"/> Valley R-VI School District     |
| <input type="checkbox"/> City of Potosi                   |  |

2. The hazards addressed in the Multi-jurisdictional Hazard Mitigation Plan Update are listed below. Please indicate your opinion on the likelihood for each hazard to impact YOUR JURISDICTION (identified above). **Please rate EACH hazard 1 through 4 as follows:**

**1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely**

- |                           |  |                            |
|---------------------------|--|----------------------------|
| ____ Dam Failure          | ____ Flooding (Riverine and Flash)           | ____ Severe Winter Weather |
| ____ Drought              | ____ Land Subsidence / Sinkholes             | ____ Tornado               |
| ____ Earthquakes          | ____ Severe Thunderstorms                    | ____ Wildfires             |
| ____ Extreme Temperatures | Including High Winds, Hail and<br>Lightening |                            |

3. Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

**1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic**

____ Dam Failure	____ Flooding (Riverine and Flash)	____ Severe Winter Weather
____ Drought	____ Land Subsidence / Sinkholes	____ Tornado
____ Earthquakes	____ Severe Thunderstorms	____ Wildfires
____ Extreme Temperatures	Including High Winds, Hail and Lightening	

4. FEMA Hazard Mitigation Assistance Grants are administered by the State Emergency Management Agency. Listed below are some types of projects considered.

**Please check all those that could benefit your jurisdiction, in your opinion:**

- |  |   |
|--|---|
| <input type="checkbox"/> Flood-prone Property Acquisition & Structure Demolition /Relocation                                   | <input type="checkbox"/> Retrofitting of Existing Buildings, and Facilities from Wind Damage. |
| <input type="checkbox"/> Flood-Prone Structure Elevation   | <input type="checkbox"/> New Tornado Safe Room Construction                                   |
| <input type="checkbox"/> Dry Floodproofing of Historical Residential Structures and/or Non-residential Structures              | <input type="checkbox"/> Electrical Utilities Infrastructure Retrofit                         |
| <input type="checkbox"/> Minor Localized Flood Reduction Projects (storm water management or localized flood control projects) | <input type="checkbox"/> Soil Erosion Stabilization   |
| <input type="checkbox"/> Structural Retrofitting of Existing Buildings to Add a Tornado Safe Room                              | <input type="checkbox"/> Wildfire Mitigation  |
| <input type="checkbox"/> Storm Sirens  | <input type="checkbox"/> Other (please specify)   |
| <input type="checkbox"/> Early Warning Systems such as phone/text alerts   | _____   |
|  | _____   |
|  | _____   |

5. Please comment on any other issues that the Washington County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by hazard events.

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**Please return your completed survey no later than March 15, 2021 to:**

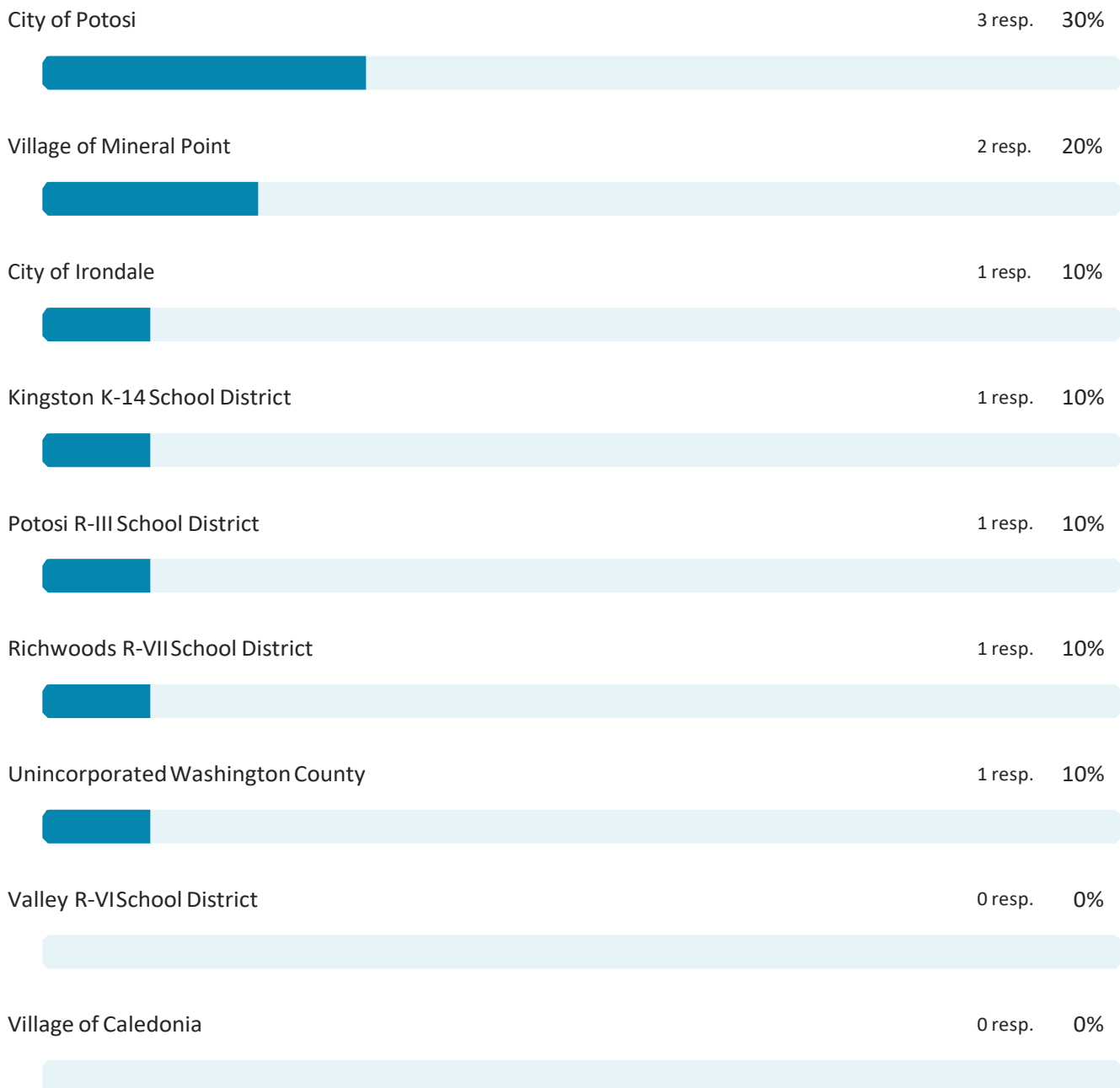
Tamara Snodgrass  
Meramec Regional Planning Commission  
4 Industrial Drive ~ St. James, MO 65559  
Phone: 573-265-2993, ext. 104 ~ FAX: 573-265-3550  
[tsnodgrass@meramecregion.org](mailto:tsnodgrass@meramecregion.org)



# Public Survey: Washington County Multi-jurisdictional Hazard Mitigation Plan

Please select your jurisdiction from the list. You may only select one jurisdiction for each survey completed. If you belong to more than one jurisdiction in this list, please complete multiple surveys.

10 out of 10 answered



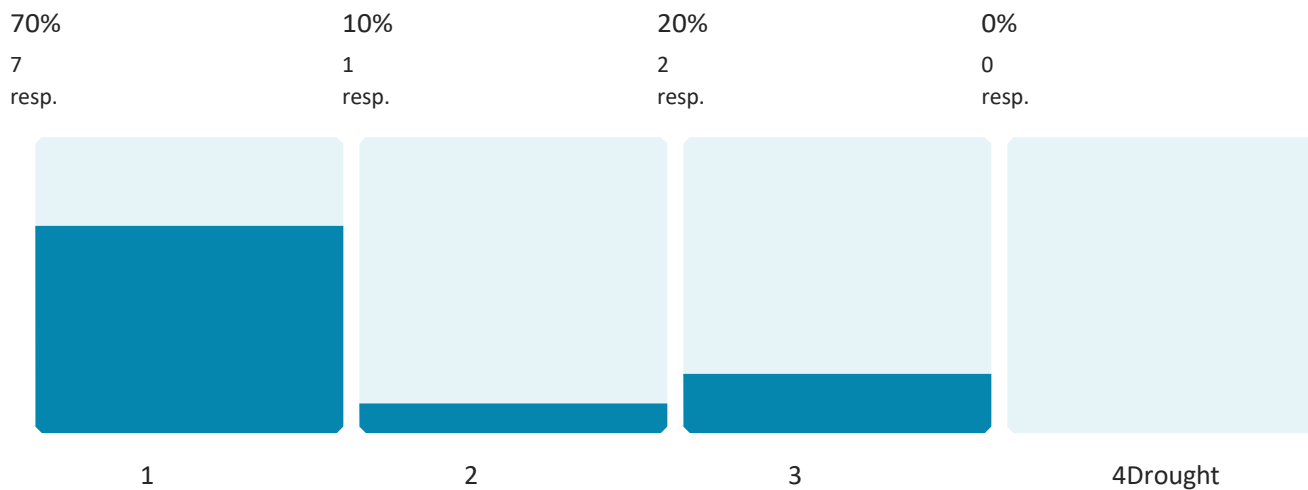
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely

## Dam Failure

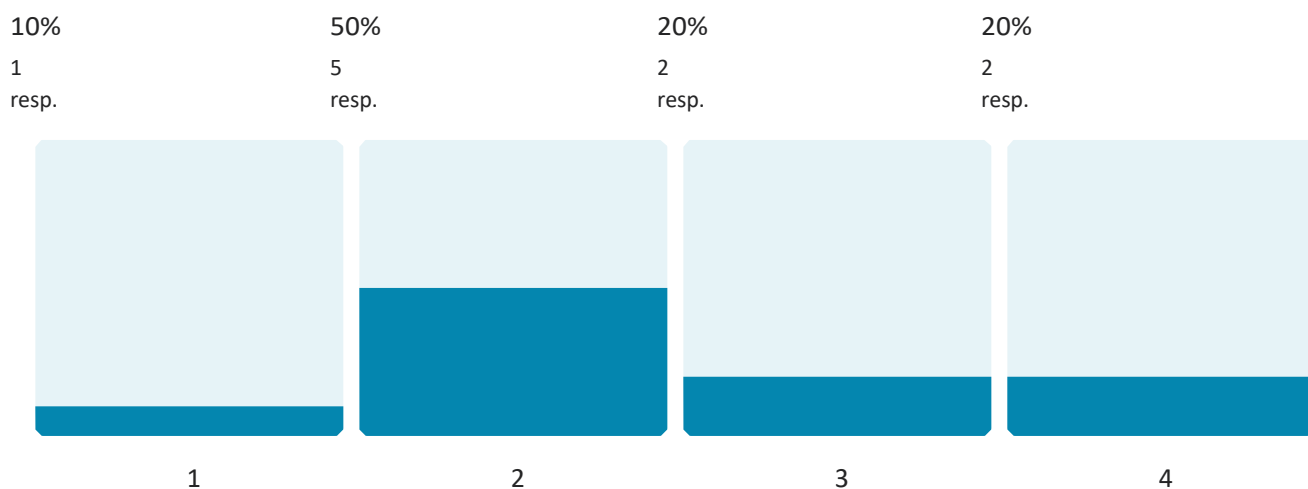
10 out of 10 answered

### 1.5 Average rating



10 out of 10 answered

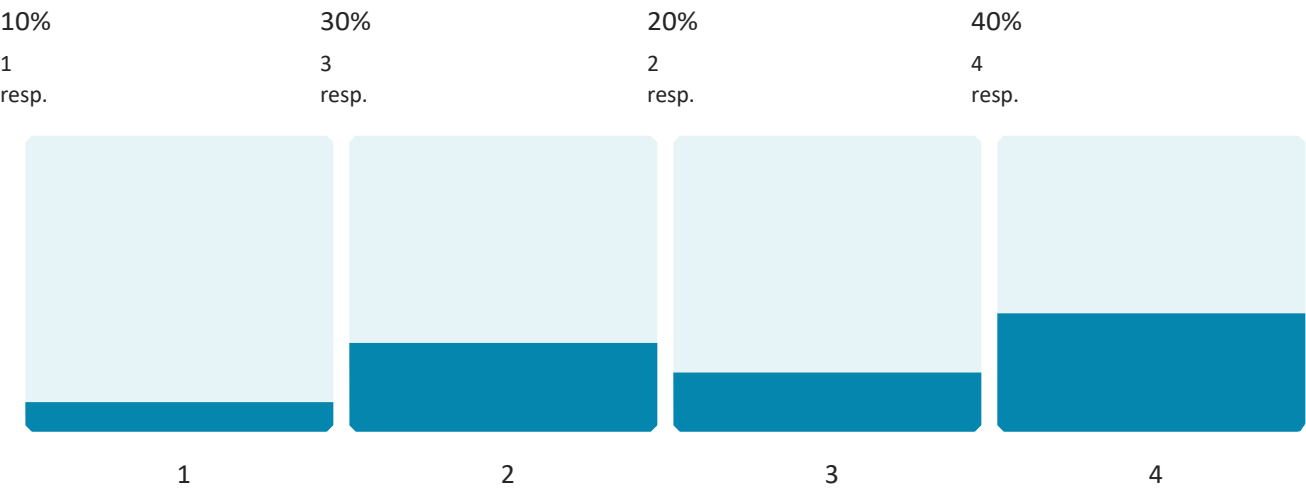
### 2.5 Average rating



Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:  
1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely

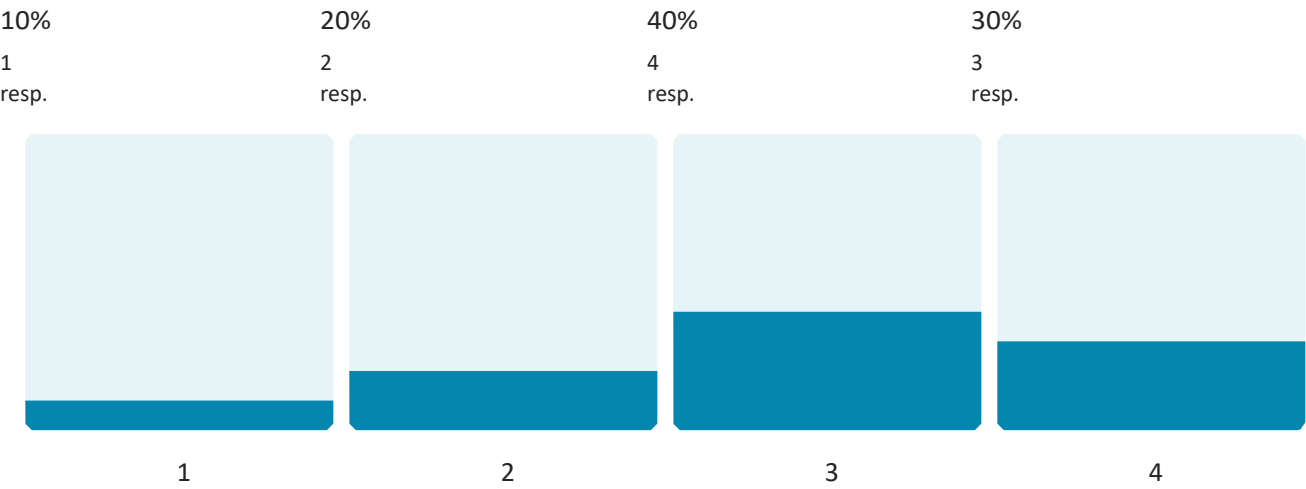
Earthquake  
10 out of 10 answered

2.9 Average rating



Extreme Temperatures 10  
out of 10 answered

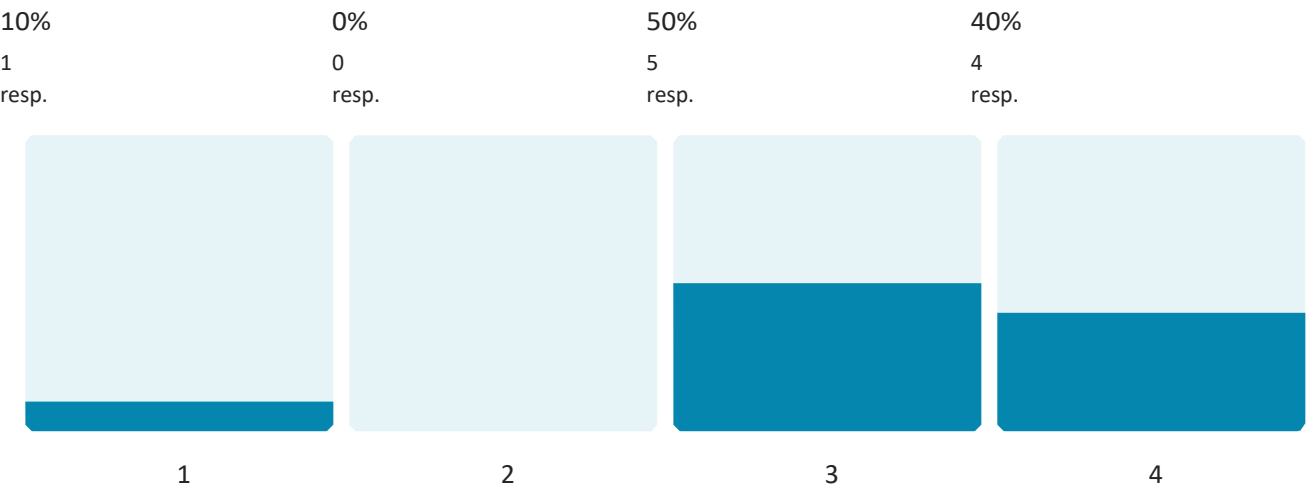
2.9 Average rating



Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:  
1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely

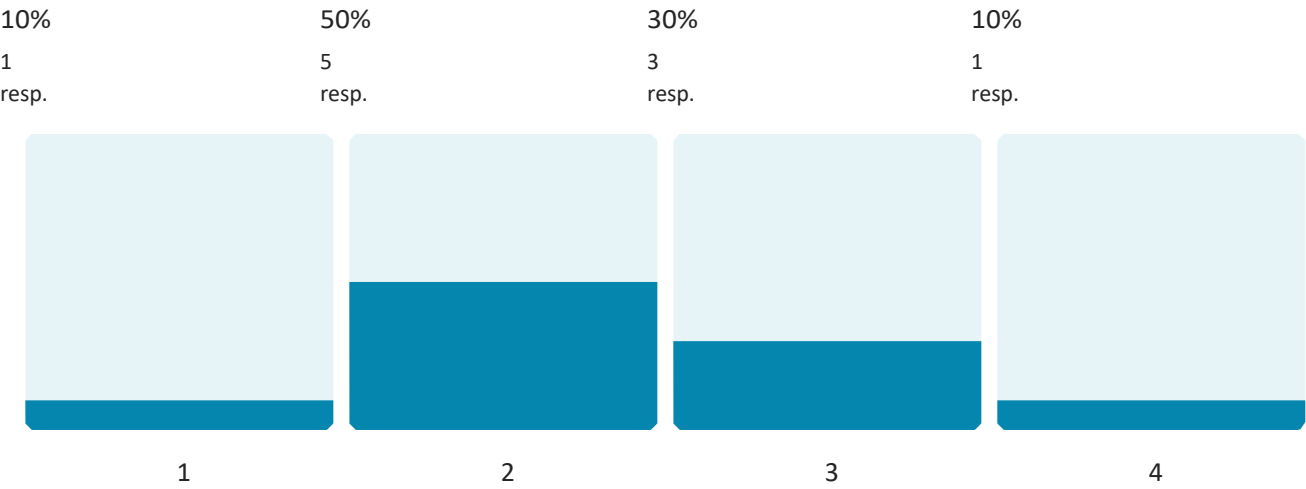
Flooding (Flash and River) 10 out  
of 10 answered

3.2 Average rating



Land Subsidence/Sinkholes 10  
out of 10 answered

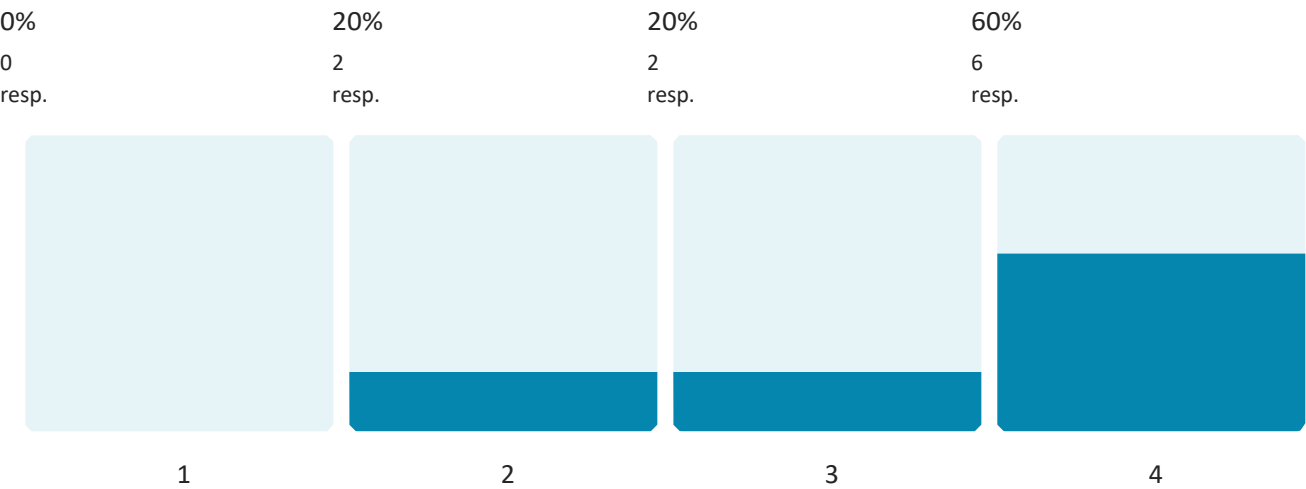
2.4 Average rating



Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:  
1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely

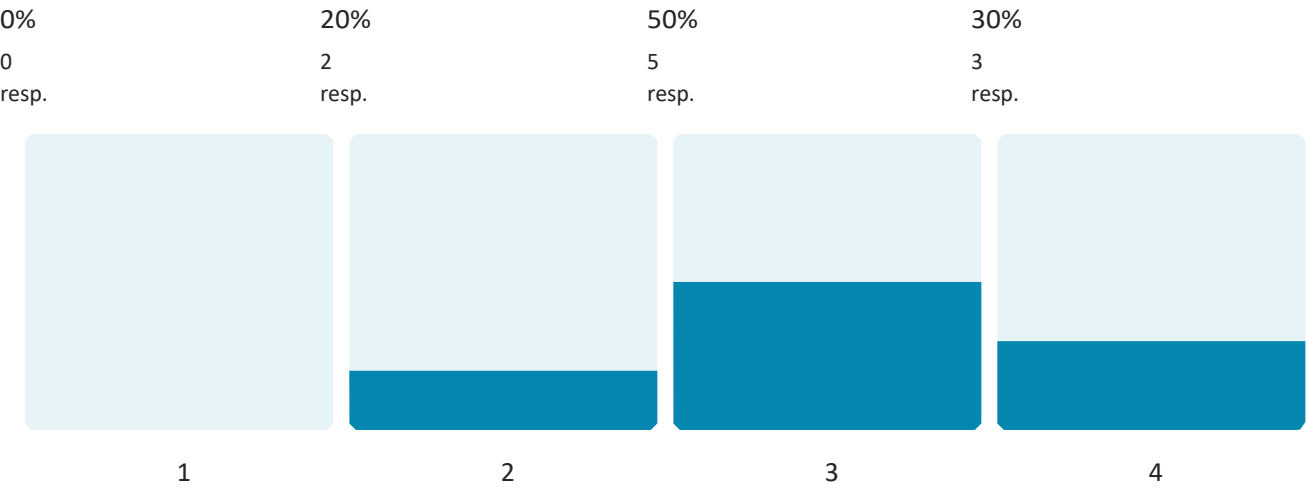
Severe Thunderstorms - Including high winds, hail, & lightning 10  
out of 10 answered

3.4 Average rating



Severe Winter Weather 10 out  
of 10 answered

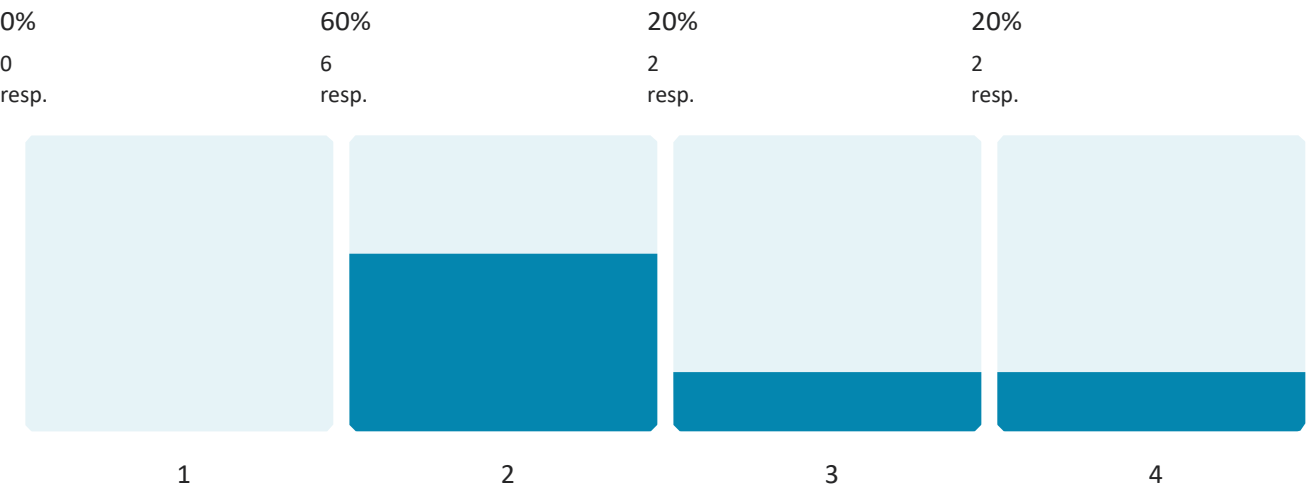
3.1 Average rating



Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:  
1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely

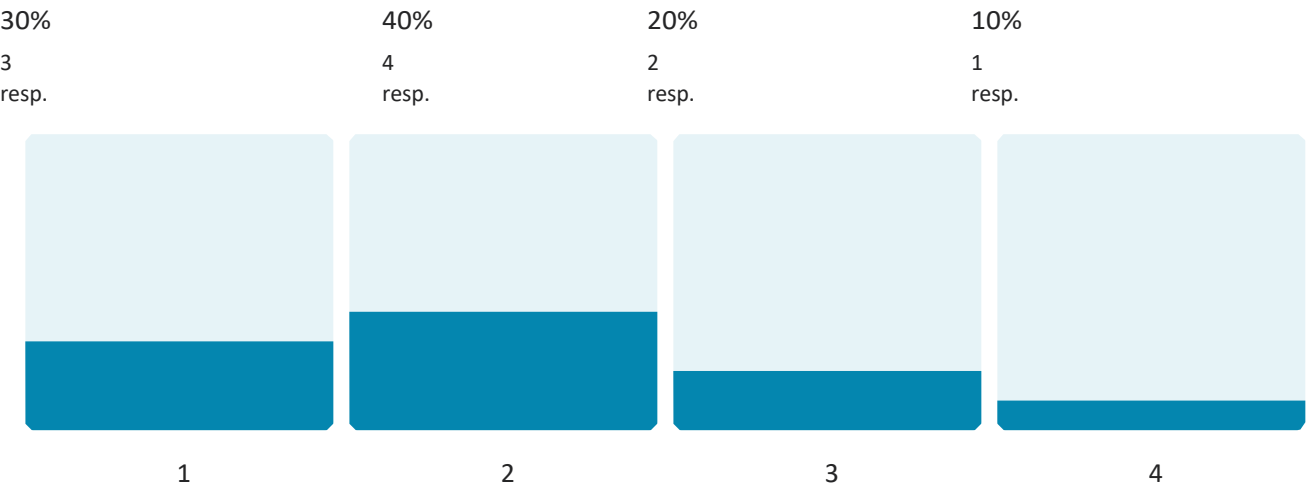
Tornadoes  
10 out of 10 answered

2.6 Average rating



Wildfire  
10 out of 10 answered

2.1 Average rating



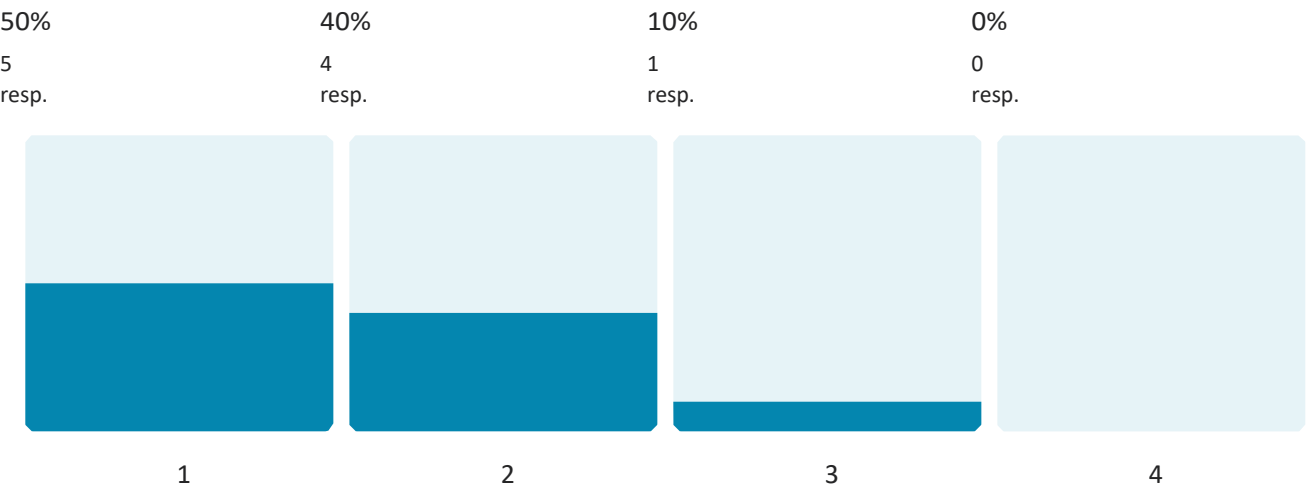
Please indicate your opinion on the potential magnitude of each hazard’s impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic

Dam Failure

10 out of 10 answered

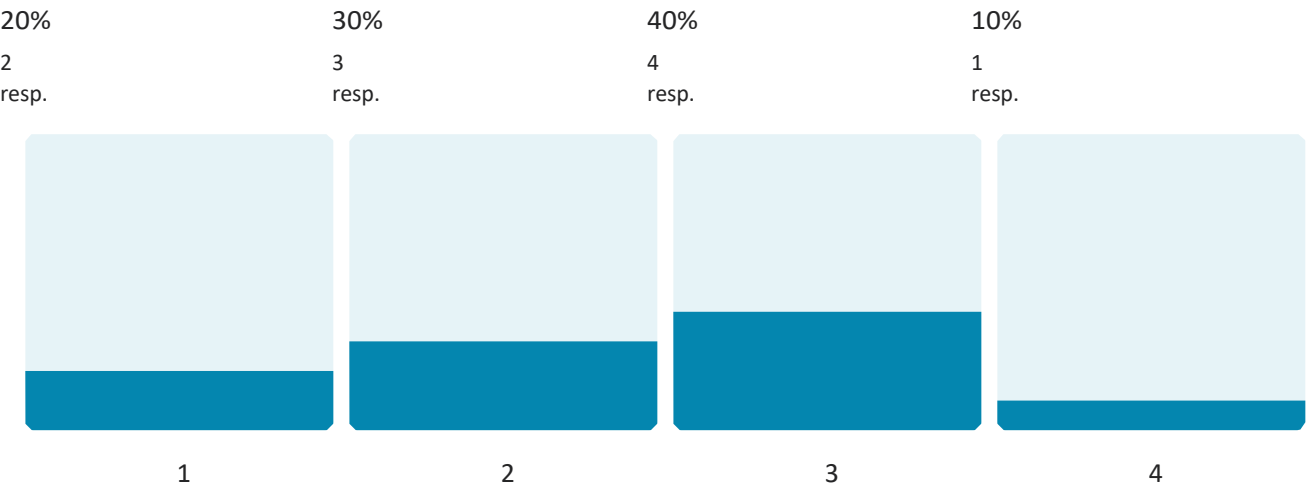
1.6 Average rating



Drought

10 out of 10 answered

2.4 Average rating



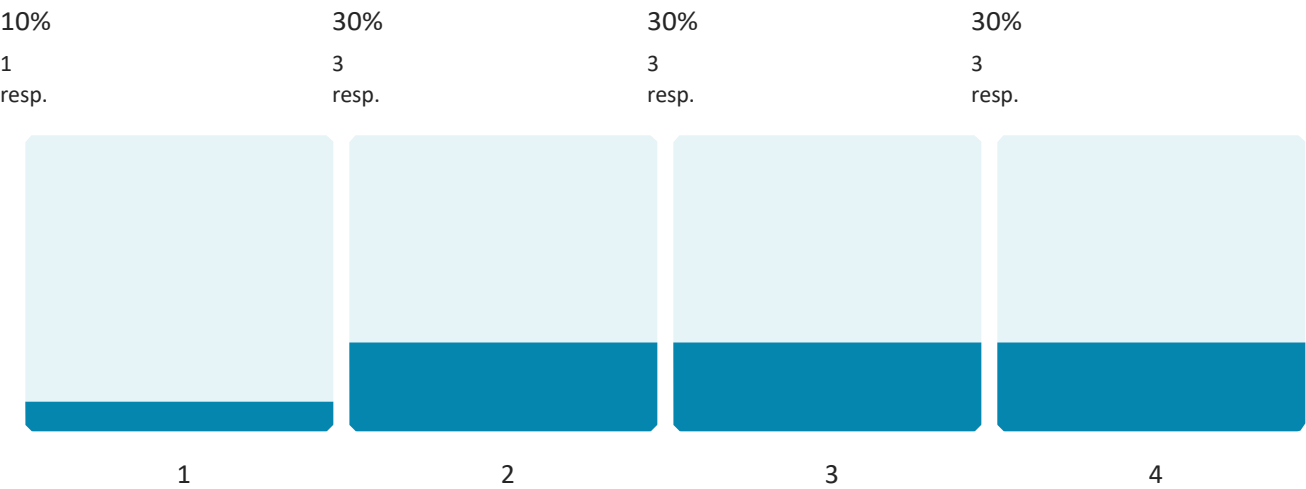
Please indicate your opinion on the potential magnitude of each hazard’s impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic

Earthquake

10 out of 10 answered

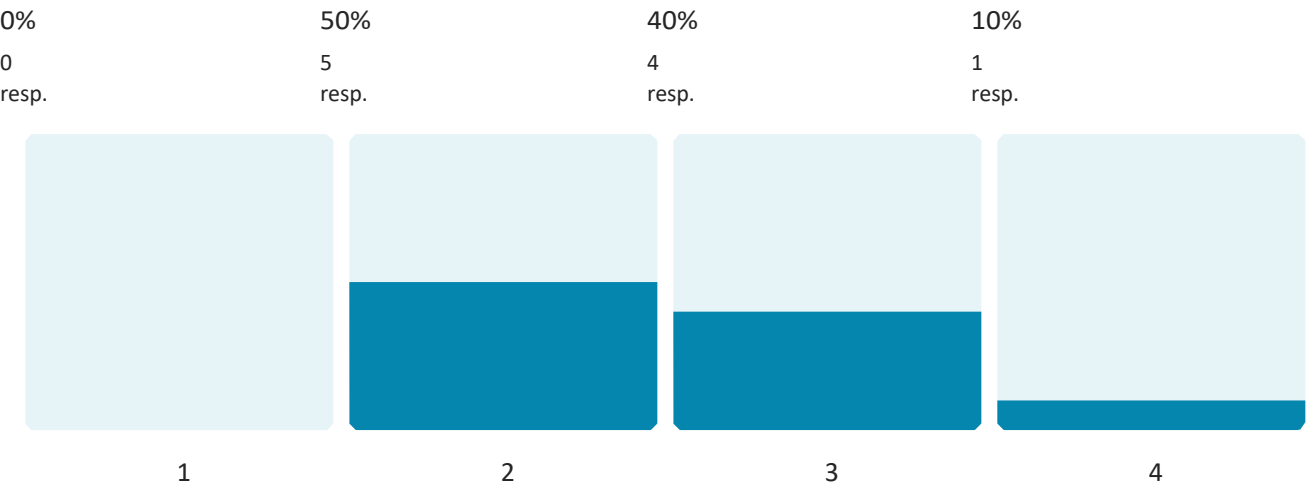
2.8 Average rating



Extreme Temperatures 10

out of 10 answered

2.6 Average rating

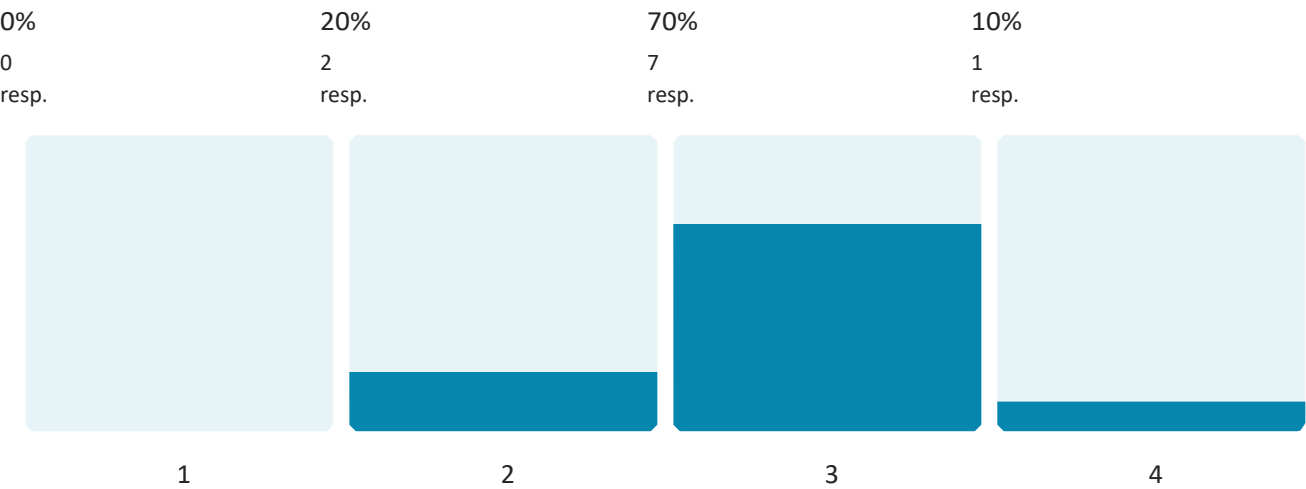


Please indicate your opinion on the potential magnitude of each hazard’s impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic

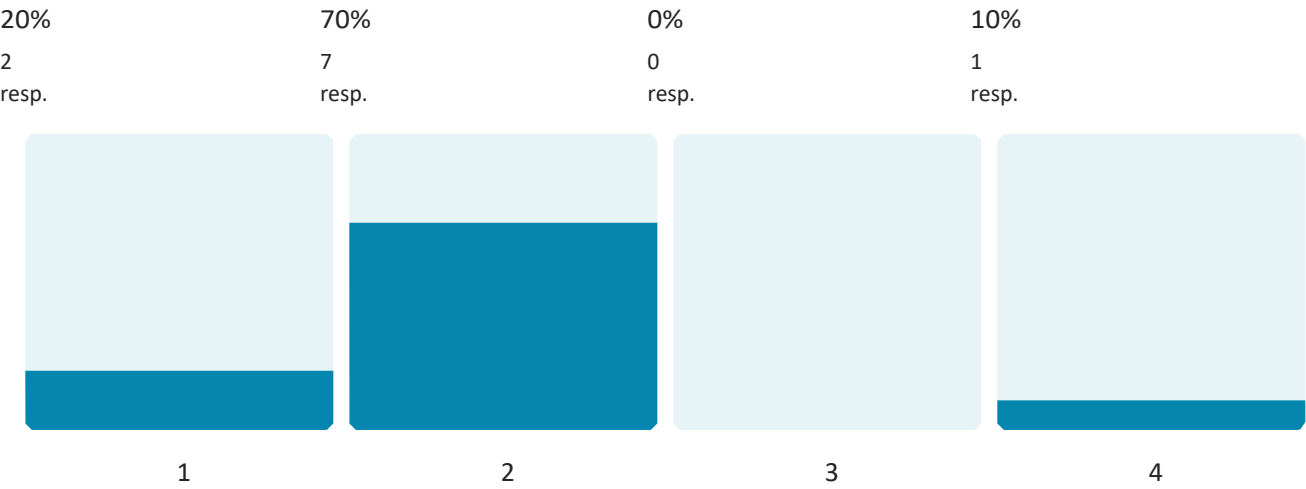
Flooding (Flash and River) 10 out of 10 answered

2.9 Average rating



Land Subsidence/Sinkholes 10 out of 10 answered

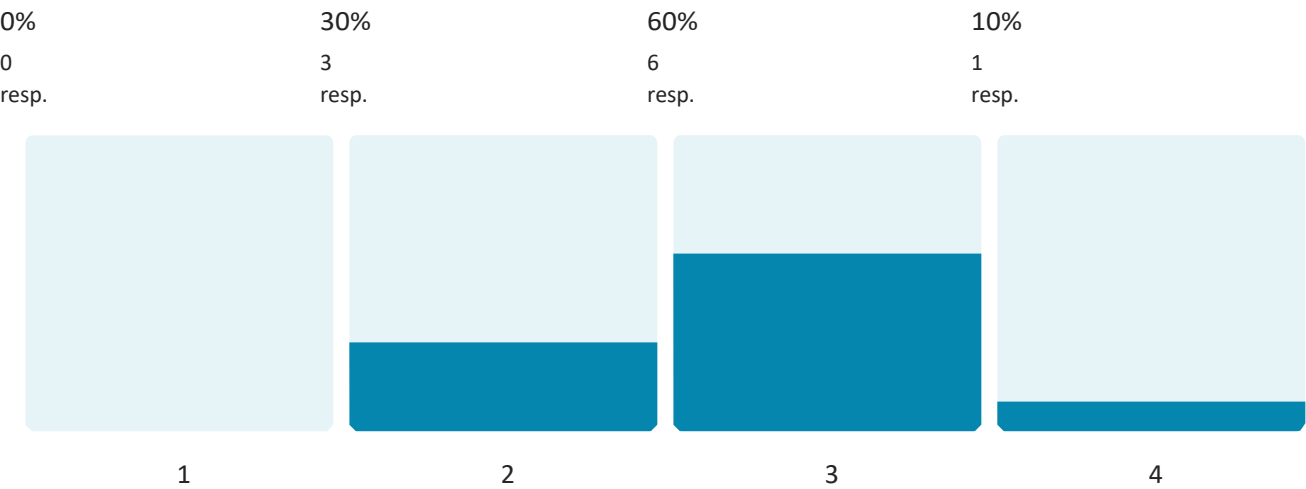
2.0 Average rating



Please indicate your opinion on the potential magnitude of each hazard’s impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:  
1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic

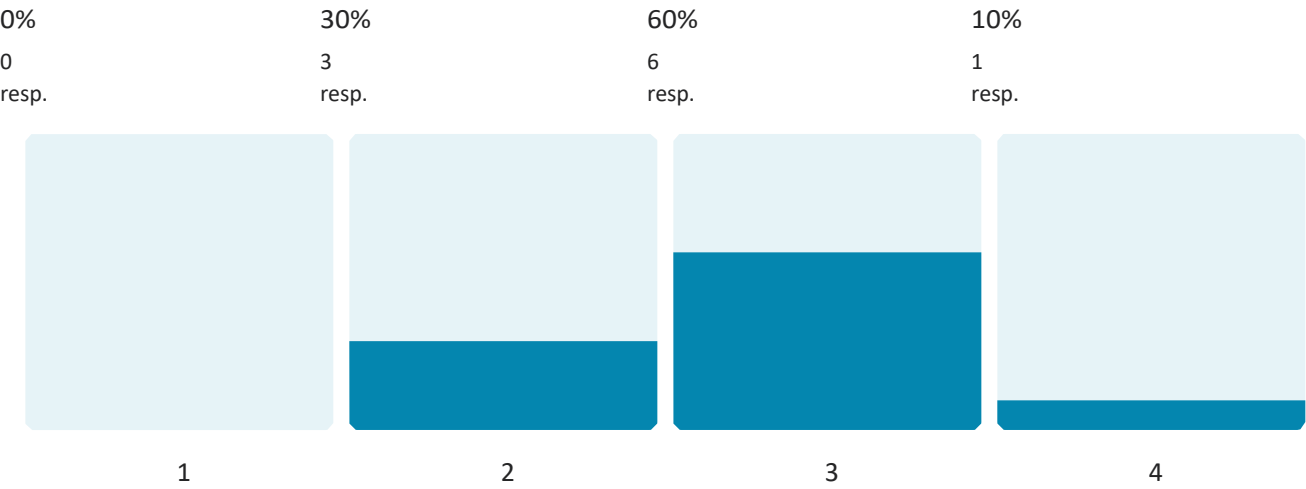
Severe Thunderstorms - Including high winds, hail, & lightning 10  
out of 10answered

2.8 Average rating



Severe Winter Weather 10 out  
of 10 answered

2.8 Average rating



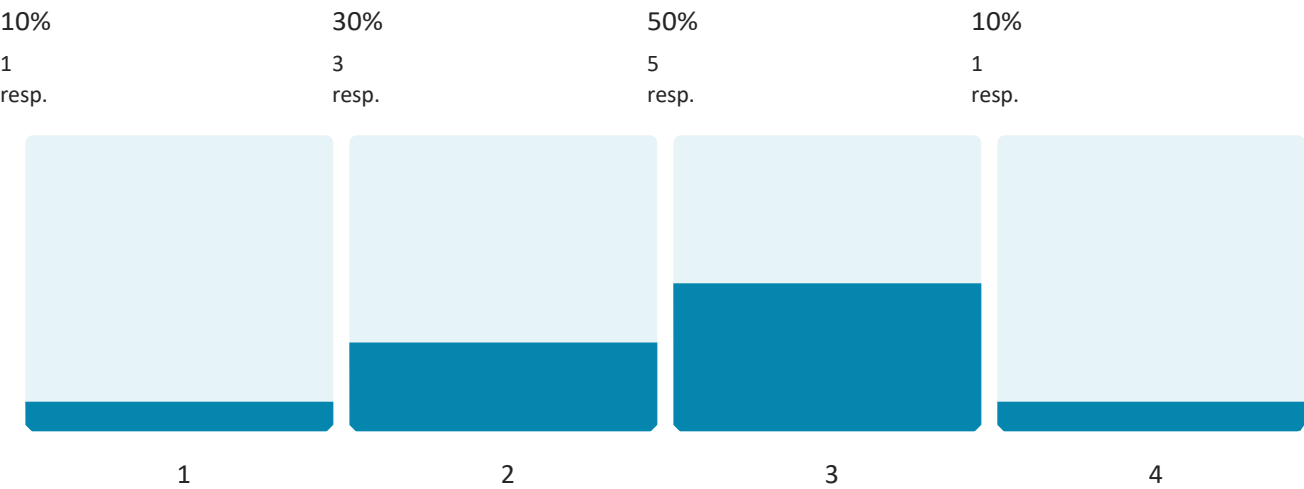
Please indicate your opinion on the potential magnitude of each hazard’s impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic

Tornadoes

10 out of 10 answered

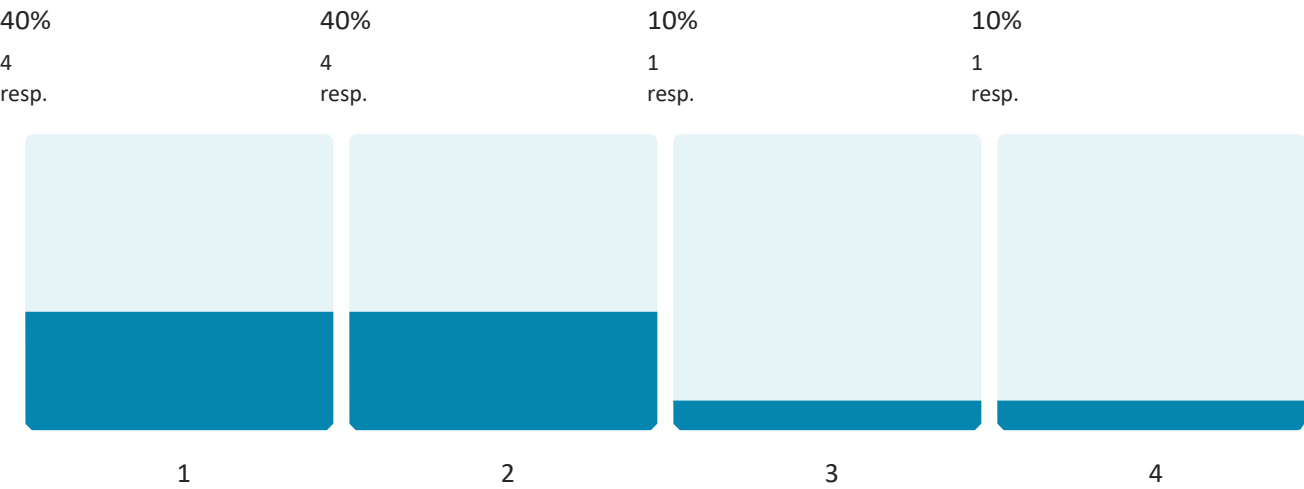
2.6 Average rating



Wildfire

10 out of 10 answered

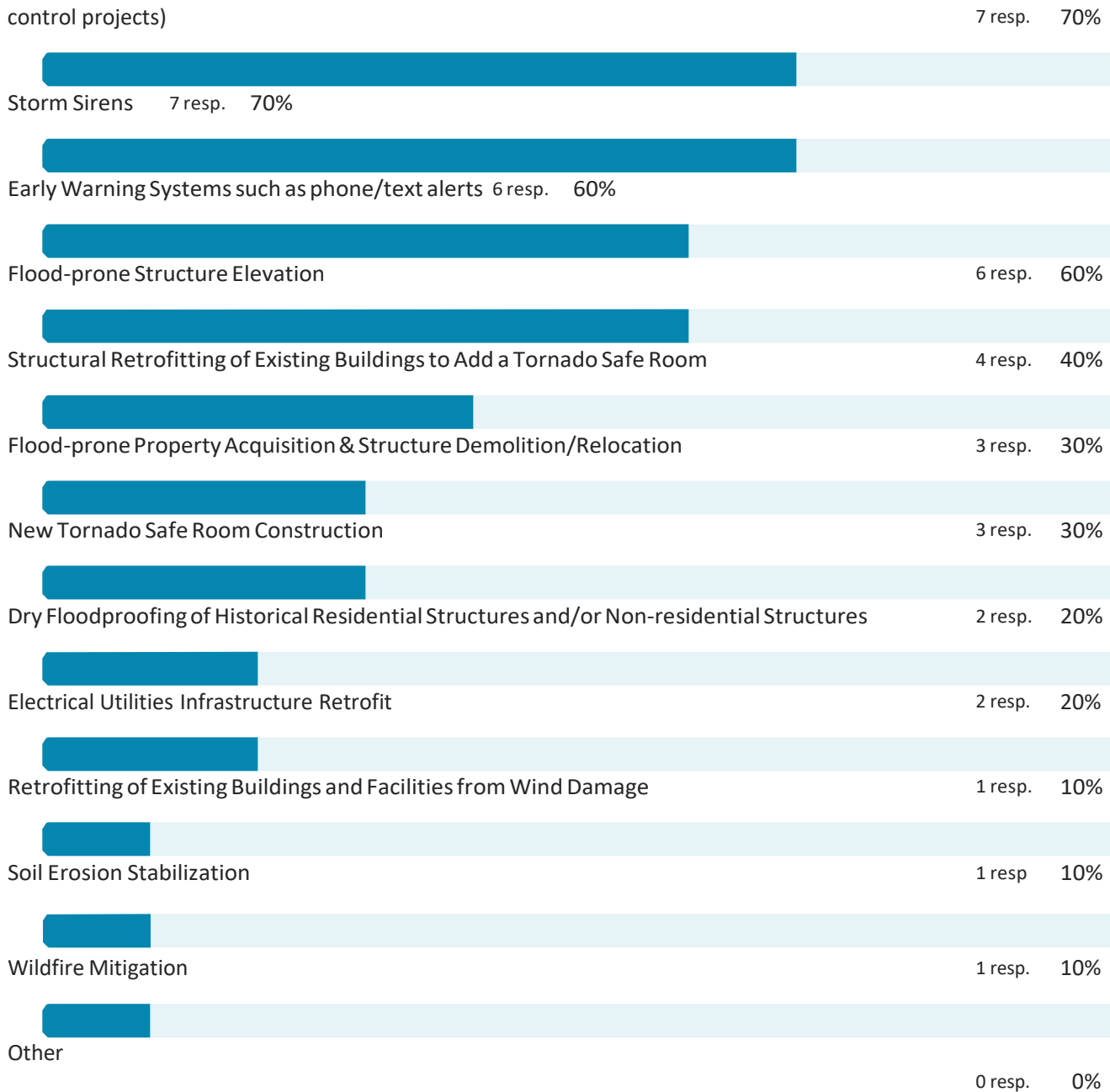
1.9 Average rating



FEMA Hazard Mitigation Assistance Grants are administered by the State Emergency Management Agency. Listed below are some types of projects considered.

10 out of 10 answered

Minor Localized Flood Reduction Projects (storm water management or localized flood control projects)



Please comment on any other issues that the Washington County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by hazard events.

- Storm Shelters in rural areas and improve areas in flash flood zones.
- You cannot possibly predict with any accuracy what type of events will affect this area or when. I think you are better to save the funds and provide assistance on a case by case basis when and if something occurs.
- The city has applied for a Community Development Block Grant to renovate the old rec hall in the scout camp into a community center which will serve as a shelter in the event of severe weather. A grant should be applied for to install a generator in this facility.
- Replacement of flood prone low water bridge on State Street/Landfill Road over Mill Creek. Establish a shelter in the historic Catholic Church/Lion's Den building.
- be more organized
- Seems like after big storms alot of sewers go out
- Fix the ditches for better drainage to stop flooding
- Communications - back up communications and back up to the back up communications

## D: Adoption Resolutions

---

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

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, Washington County recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

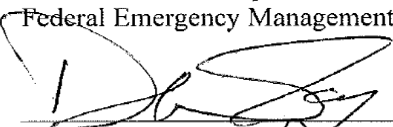
**WHEREAS**, Washington County fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, Washington County desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of Washington County demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that Washington County Commission adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

  
\_\_\_\_\_  
Presiding Commissioner

9/26/2022  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Associate Commissioner

9/24/2022  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Associate Commissioner

9/26/2022  
\_\_\_\_\_  
Date

RESOLUTION NO. 10-2022-17

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the Village of Caledonia recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

**WHEREAS**, the Village of Caledonia fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the Village of Caledonia desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of the Village of Caledonia demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that the Village of Caledonia Board of Aldermen adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

John M. Robinson, III  
Chairperson

10-17-22  
Date

Sat Sims  
Witness

10-17-22  
Date

RESOLUTION NO. 100

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the City of Irondale recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

**WHEREAS**, the City of Irondale fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the City of Irondale desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of the City of Irondale demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that the City of Irondale Board of Aldermen adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

William Hall  
Mayor

10 24 22  
Date

Amanda Barton  
Witness

10/24/2022  
Date

RESOLUTION NO. 2022.10.1

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the Village of Mineral Point recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

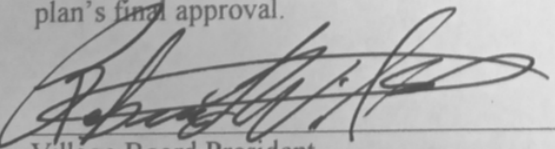
**WHEREAS**, the Village of Mineral Point fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the Village of Mineral Point desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

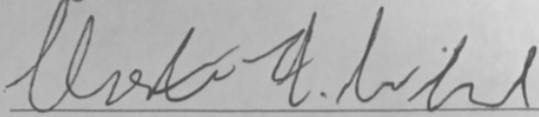
**WHEREAS**, adoption by the governing body of the Village of Mineral Point demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that the Village of Mineral Point Board of Aldermen adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

  
Village Board President

10-26-22  
Date

  
Witness

10-16-22  
Date

**CITY OF POTOSI, MISSOURI**

**RESOLUTION #500**

***A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN***

**WHEREAS** (Government/District) recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS** the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS** an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS** (Government/District) fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and


**WHEREAS** (Government/ District) desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS** adoption by the governing body of (Government/District) demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives in the Mitigation Plan; and

**WHEREAS** adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

**NOW, THEREFORE BE IT RESOLVED**, that (Government/ District) adopts the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan as an official plan and will submit the is Adoption Resolution to the Missouri Emergency Management Agency officials to enable the plan's final approval.

Passed on this 27<sup>th</sup> Day of October 2022.

  
Joseph Blount, Mayor

10-27-2022  
Date

  
Tiffany Cain, City Clerk

10-27-2022  
Date

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

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the Kingston K-14 School District recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and


**WHEREAS**, the Kingston K-14 School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the Kingston K-14 School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

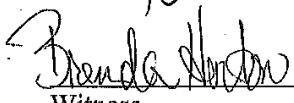
**WHEREAS**, adoption by the governing body of the Kingston K-14 School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that the Kingston K-14 School District Board of Education adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

  
\_\_\_\_\_  
School Board President

10-20-2022  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Witness

10-20-2022  
\_\_\_\_\_  
Date

RESOLUTION NO. 22-0001

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the Potosi R-III School District recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

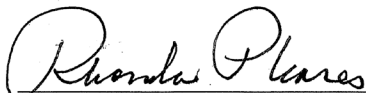
**WHEREAS**, the Potosi R-III School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the Potosi R-III School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of the Potosi R-III School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

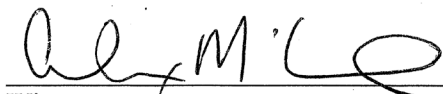
**NOW, THEREFORE BE IT RESOLVED**, that the Potosi R-III School District Board of Education adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.



School Board President

10/18/2022

Date



Witness

10/18/2022

Date

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

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the Richwoods R-VII School District recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

**WHEREAS**, the Richwoods R-VII School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the Richwoods R-VII School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of the Richwoods R-VII School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that the Richwoods R-VII School District Board of Education adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

  
\_\_\_\_\_  
School Board President

10/27/22  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Witness

10/27/22  
\_\_\_\_\_  
Date

RESOLUTION NO. Valley R-VI

**A RESOLUTION TO ADOPT THE WASHINGTON COUNTY  
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

**WHEREAS**, the Valley R-VI School District recognizes the threat that natural hazards pose to people and property within our community; and

**WHEREAS**, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

**WHEREAS**, the U.S. Congress passed the Disaster Mitigation Act of 2000 emphasizing the need for pre-disaster mitigation of potential hazards and made available hazard mitigation grants to state and local governments; and

**WHEREAS**, an adopted Multi-Jurisdiction Natural Hazards Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre-and post-disaster mitigation grant programs; and

**WHEREAS**, the Valley R-VI School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

**WHEREAS**, the Valley R-VI School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Washington County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

**WHEREAS**, adoption by the governing body of the Valley R-VI School District demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

**WHEREAS**, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan;

**NOW, THEREFORE BE IT RESOLVED**, that the Valley R-VI School District Board of Education adopts the Washington County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.

Blake Grant  
School Board President

10-20-22  
Date

Juan Snyder  
Witness

10-20-22  
Date

## E: Critical/Essential Facilities

The table below (**Table 6.1**) provides information for critical facilities in the planning area. Specific information includes a Hazus ID if applicable, jurisdiction, building name/owner, and address.

**Table 6.1 Washington County Critical Facilities by Type and Jurisdiction**

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
<b>Emergency Facilities</b>						
	Washington Co.	Emergency Management Director	23117 State Highway P	Belgrade	MO	63622
	Washington Co.	Washington Co. E-911	12252 N State Highway 21	Cadet	MO	63630
<b>Fire Department Facilities</b>						
MO000138	Belgrade	Belgrade Volunteer Fire Dept.	14126 State Hwy C	Belgrade	MO	63622
MO000715	Caledonia	Caledonia Fire Protection Dist.	155 Webster Road	Caledonia	MO	63631
	Irondale	Irondale Community Vol. Fire Dept.	107 West Pine St.	Irondale	MO	63648
MO000517	Potosi	Potosi Fire Prot. Dist., No. 1	313 East Jefferson St.	Potosi	MO	63664
	Potosi	Potosi Fire Prot. Dist., No. 2	10441 State Hwy AA	Potosi	MO	63664
	Potosi	Potosi Fire Prot. Dist., No. 3	10047 Tiff Road	Cadet	MO	63630
	Potosi	Potosi Fire Prot. Dist., No. 4	19076 North State Hwy 21	Cadet	MO	63630
	Potosi	Potosi Fire Prot. Dist., No. 5	10051 Jeff City Road	Potosi	MO	63664
MO000137	Richwoods	Richwoods Fire Prot. Dist.	10015 Turtle Road	Richwoods	MO	63071
	Sullivan	Sullivan Fire Protection District, Station 2	11890 Mine Road	Sullivan	MO	63080
<b>Law Enforcement Facilities</b>						
	Potosi	Potosi Police Department	1 Police Plaza	Potosi	MO	63664
	Washington Co.	Washington County Sheriff's Department	116 West High Street	Potosi	MO	63664
<b>Medical Facilities</b>						
MO000099	Potosi	Washington Co. Memorial Hospital	300 Health Way	Potosi	MO	63664
	Washington Co.	Washington Co. Health Dept.	520 Purcell Drive	Potosi	MO	63664
<b>School Facilities</b>						

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
	Cadet	Kingston Primary	10047 Diamond Road	Cadet	MO	63630
MO001824	Cadet	Kingston Elem.	10047 Diamond Road	Cadet	MO	63630
MO001825	Cadet	Kingston Middle	10047 Diamond Road	Cadet	MO	63630
MO001120	Cadet	Kingston High	10047 Diamond Road	Cadet	MO	63630
MO000822	Potosi	Potosi Elem.	205 State Hwy P	Potosi	MO	63664
MO000825	Potosi	Trojan Intermediate	367 Intermediate Drive	Potosi	MO	63664
MO000823	Potosi	John A. Evans Middle	303 S Lead St.	Potosi	MO	63664
MO000824	Potosi	Potosi High	1 Trojan Drive	Potosi	MO	63664
MO000173	Potosi	Citadel School	400 S Mine	Potosi	MO	63664
MO001177	Richwoods	Richwoods Elem.	10788 State Hwy A	Richwoods	MO	63071
MO001827	Caledonia	Caledonia Elem.	1 Viking Drive	Caledonia	MO	63631
MO001828	Caledonia	Valley High	1 Viking Drive	Caledonia	MO	63631
<b>Childcare Facilities</b>						
	Mineral Point	East Missouri Action Agency, Inc	512 State St.	Mineral Point	MO	63660
	Potosi	Happy Days Preschool	10079 Simmental LN	Potosi	MO	63664
	Potosi	Kids Zone	402 N. Missouri	Potosi	MO	63664
	Potosi	Little Learners Academy	10965 Hwy. 185	Potosi	MO	63664
	Caledonia	Martin, Kimberly	10350 Webster Rd.	Caledonia	MO	63631
	Potosi	Mim's Just Like Home, LLC	10405 State Hwy P	Potosi	MO	63664
	Potosi	Randall, Sandra Kay	303 College St.	Potosi	MO	63664
	Potosi	Tammy's Tiny Tots	606 Raymond	Potosi	MO	63664
	Potosi	Wilson, Dena Mae	10271 Outer Rd.	Potosi	MO	63664
<b>Nursing Homes</b>						
	Potosi	Georgian Gardens Center for Rehab and Healthcare	1 Georgian Gardens Dr.	Potosi	MO	63664
	Mineral Point	Hillside Living Center	10109 Restoration Circle	Mineral Point	MO	63660
	Potosi	Potosi Manor	307 S. Hwy. 21	Potosi	MO	63664
	Mineral Point	South Haven Residential Care Center, LLC	10462 Airport Road	Mineral Point	MO	63664

Source: 2020 Data Collection Questionnaires, Missouri DHSS

<https://healthapps.dhss.mo.gov/childcaresearch/>, <https://healthapps.dhss.mo.gov/showmeltc/default.aspx>

## F: MDC Wildfire Data Search

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View	Discovered Date	County	Station	Cause	Acres Burned
2007-11044-032483	02/18/2007	Washington	Richwoods Fire Protection District	Arson	0.1
2007-11044-032484	01/09/2007	Washington	Richwoods Fire Protection District	Arson	0.1
2008-11040-036790	04/21/2008	Washington	Belgrade Volunteer Fire Department	Arson	0.1
2014-11044-130666	07/19/2014	Washington	Richwoods Fire Protection District	Arson	0.1
2017-11044-158212	11/25/2016	Washington	Richwoods Fire Protection District	Arson	0.1
2012-11044-091660	12/04/2012	Washington	Richwoods Fire Protection District	Arson	0.2
2007-11044-032498	04/23/2007	Washington	Richwoods Fire Protection District	Arson	0.25
2014-11044-130651	02/25/2014	Washington	Richwoods Fire Protection District	Arson	0.25
2002-11040-000847	11/23/2002	Washington	Belgrade Volunteer Fire Department	Arson	1
2007-11042-028898	04/02/2007	Washington	Irondale Fire Protection Distrct	Arson	1
2008-11044-036461	01/28/2008	Washington	Richwoods Fire Protection District	Arson	1
2008-11044-036464	03/17/2008	Washington	Richwoods Fire Protection District	Arson	1
2009-09421-039628	03/23/2009	Washington	Leadwood Fire Protection District	Arson	1
2010-03600-049741	11/10/2010	Washington	SULLIVAN FORESTRY	Arson	1
2010-11041-052717	05/09/2010	Washington	Caledonia Fire Protection Dist.	Arson	1
2010-09421-052318	11/09/2010	Washington	Leadwood Fire Protection District	Arson	2
2012-11042-074583	07/24/2012	Washington	Irondale Fire Protection Distrct	Arson	3
2006-04718-011306	02/23/2006	Washington	Quad County Fire Protection District	Arson	5
2004-11043-004064	02/22/2004	Washington	Potosi Fire Protection District	Arson	6
2006-09421-033042	09/26/2006	Washington	Leadwood Fire Protection District	Arson	6
2006-00008-012920	04/18/2006	Washington	MDC REPORTING REGION - ST. LOUIS	Arson	8
2005-11040-009952	11/12/2005	Washington	Belgrade Volunteer Fire Department	Arson	9
2012-11042-074584	07/25/2012	Washington	Irondale Fire Protection Distrct	Arson	20
2002-11040-000849	11/29/2002	Washington	Belgrade Volunteer Fire Department	Arson	22
2006-09600-013035	04/17/2006	Washington	ST LOUIS FORESTRY	Arson	25
2007-03600-030804	08/15/2007	Washington	SULLIVAN FORESTRY	Arson	30
					6.63

2005-09600-008749	04/03/2005	Washington	ST LOUIS FORESTRY	Arson	36
2007-00008-028796	03/27/2007	Washington	MDC REPORTING REGION - ST. LOUIS	Arson	40
2006-09600-013034	04/19/2006	Washington	ST LOUIS FORESTRY	Arson	48
2010-09407-045601	04/15/2010	Washington	Desloge Vounteer Fire Department	Arson	50
2008-00008-036010	11/13/2008	Washington	MDC REPORTING REGION - ST. LOUIS	Arson	60
2003-00008-001541	04/01/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Arson	80
2010-09400-050542	10/24/2010	Washington	FARMINGTON FORESTRY	Arson	100
2011-09421-062290	03/23/2011	Washington	Leadwood Fire Protection District	Arson	400
2002-11040-000848	11/29/2002	Washington	Belgrade Volunteer Fire Department	Arson	
2004-11043-004081	03/01/2004	Washington	Potosi Fire Protection District	Arson	
2010-03627-045507	04/11/2010	Washington	Sullivan Fire Protection District	Campfire	0.05
2008-11040-036791	06/21/2008	Washington	Belgrade Volunteer Fire Department	Campfire	0.1
2005-03627-008669	04/16/2005	Washington	Sullivan Fire Protection District	Campfire	1
2005-03627-008670	04/16/2005	Washington	Sullivan Fire Protection District	Campfire	1
2007-03627-029438	04/21/2007	Washington	Sullivan Fire Protection District	Campfire	1
2010-11040-058210	08/28/2010	Washington	Belgrade Volunteer Fire Department	Campfire	2
2009-03600-039459	04/05/2009	Washington	SULLIVAN FORESTRY	Campfire	3
2009-03600-039924	04/26/2009	Washington	SULLIVAN FORESTRY	Campfire	10
2006-11044-026721	10/08/2006	Washington	Richwoods Fire Protection District	Campfire	13
2004-11043-006259	07/29/2004	Washington	Potosi Fire Protection District	Children	1
2005-11043-008402	03/17/2005	Washington	Potosi Fire Protection District	Children	1
2009-11044-039515	03/14/2009	Washington	Richwoods Fire Protection District	Children	1
2011-03627-058542	07/17/2011	Washington	Sullivan Fire Protection District	Debris	0.01
2013-11044-091605	11/09/2013	Washington	Richwoods Fire Protection District	Debris	0.01
2017-11044-160343	01/21/2016	Washington	Richwoods Fire Protection District	Debris	0.01
2021-11044-323115	11/12/2020	Washington	Richwoods Fire Protection District	Debris	0.06
2004-09421-007200	02/28/2004	Washington	Leadwood Fire Protection District	Debris	0.1
2007-03627-029440	04/21/2007	Washington	Sullivan Fire Protection District	Debris	0.1
2007-11044-032479	02/06/2007	Washington	Richwoods Fire Protection District	Debris	0.1
2007-11044-032481	02/12/2007	Washington	Richwoods Fire Protection District	Debris	0.1

6.64

2007-11044-032482	02/12/2007	Washington	Richwoods Fire Protection District	Debris	0.1
2007-11044-032487	03/05/2007	Washington	Richwoods Fire Protection District	Debris	0.1
2007-11044-032490	03/14/2007	Washington	Richwoods Fire Protection District	Debris	0.1
2007-11044-032512	09/05/2007	Washington	Richwoods Fire Protection District	Debris	0.1
2008-11040-036794	11/02/2008	Washington	Belgrade Volunteer Fire Department	Debris	0.1
2009-11040-036900	01/17/2009	Washington	Belgrade Volunteer Fire Department	Debris	0.1
2010-11044-051245	10/23/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051246	10/25/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051258	11/11/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051274	11/14/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051306	11/07/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051310	11/08/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051311	11/08/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2010-11044-051312	11/08/2010	Washington	Richwoods Fire Protection District	Debris	0.1
2011-11044-052957	01/05/2011	Washington	Richwoods Fire Protection District	Debris	0.1
2012-11044-075923	07/27/2012	Washington	Richwoods Fire Protection District	Debris	0.1
2012-11044-075941	07/27/2012	Washington	Richwoods Fire Protection District	Debris	0.1
2012-11044-091659	11/20/2012	Washington	Richwoods Fire Protection District	Debris	0.1
2013-11044-091604	10/17/2013	Washington	Richwoods Fire Protection District	Debris	0.1
2014-11044-130665	04/30/2014	Washington	Richwoods Fire Protection District	Debris	0.1
2017-11044-158213	06/23/2016	Washington	Richwoods Fire Protection District	Debris	0.1
2021-11044-323111	09/16/2020	Washington	Richwoods Fire Protection District	Debris	0.18
2018-03627-165897	01/19/2018	Washington	Sullivan Fire Protection District	Debris	0.23
2004-11043-005158	04/14/2004	Washington	Potosi Fire Protection District	Debris	0.25
2006-11044-026716	03/07/2006	Washington	Richwoods Fire Protection District	Debris	0.25
2006-11044-026718	04/13/2006	Washington	Richwoods Fire Protection District	Debris	0.25
2007-11044-032500	05/14/2007	Washington	Richwoods Fire Protection District	Debris	0.25
2008-11040-036798	12/16/2008	Washington	Belgrade Volunteer Fire Department	Debris	0.25
2012-05007-074304	06/27/2012	Washington	Desoto Rural Fire Protection District	Debris	0.25
2012-11044-091655	09/21/2012	Washington	Richwoods Fire Protection District	Debris	0.25
					6.65

2012-11044-091657	10/02/2012	Washington	Richwoods Fire Protection District	Debris	0.25
2013-11044-093205	12/28/2013	Washington	Richwoods Fire Protection District	Debris	0.25
2014-03627-093658	01/26/2014	Washington	Sullivan Fire Protection District	Debris	0.25
2014-03627-097267	03/30/2014	Washington	Sullivan Fire Protection District	Debris	0.25
2014-11044-093577	01/20/2014	Washington	Richwoods Fire Protection District	Debris	0.25
2014-11044-130656	03/12/2014	Washington	Richwoods Fire Protection District	Debris	0.25
2016-03627-142415	03/17/2016	Washington	Sullivan Fire Protection District	Debris	0.25
2017-03627-165089	12/16/2017	Washington	Sullivan Fire Protection District	Debris	0.25
2017-03627-165091	12/16/2017	Washington	Sullivan Fire Protection District	Debris	0.25
2018-03627-177957	04/27/2018	Washington	Sullivan Fire Protection District	Debris	0.29
2010-03627-044487	02/27/2010	Washington	Sullivan Fire Protection District	Debris	0.3
2021-11044-323101	01/09/2020	Washington	Richwoods Fire Protection District	Debris	0.41
2018-03627-176305	03/10/2018	Washington	Sullivan Fire Protection District	Debris	0.45
2021-11044-323102	02/23/2020	Washington	Richwoods Fire Protection District	Debris	0.48
2003-03627-003214	12/27/2003	Washington	Sullivan Fire Protection District	Debris	0.5
2005-11044-026702	03/16/2005	Washington	Richwoods Fire Protection District	Debris	0.5
2005-11044-026706	02/27/2005	Washington	Richwoods Fire Protection District	Debris	0.5
2006-03627-024865	07/31/2006	Washington	Sullivan Fire Protection District	Debris	0.5
2007-11044-032480	02/10/2007	Washington	Richwoods Fire Protection District	Debris	0.5
2007-11044-032488	03/05/2007	Washington	Richwoods Fire Protection District	Debris	0.5
2007-11044-032505	07/24/2007	Washington	Richwoods Fire Protection District	Debris	0.5
2007-11044-032510	08/31/2007	Washington	Richwoods Fire Protection District	Debris	0.5
2008-11040-036788	01/29/2008	Washington	Belgrade Volunteer Fire Department	Debris	0.5
2010-11044-051263	04/15/2010	Washington	Richwoods Fire Protection District	Debris	0.5
2010-11044-051313	11/09/2010	Washington	Richwoods Fire Protection District	Debris	0.5
2011-11044-061912	10/27/2011	Washington	Richwoods Fire Protection District	Debris	0.5
2012-03627-074301	07/21/2012	Washington	Sullivan Fire Protection District	Debris	0.5
2012-11044-091653	08/21/2012	Washington	Richwoods Fire Protection District	Debris	0.5
2013-03627-086012	04/07/2013	Washington	Sullivan Fire Protection District	Debris	0.5
2013-11044-091602	08/21/2013	Washington	Richwoods Fire Protection District	Debris	0.5

6.66

2013-11044-091603	10/11/2013	Washington	Richwoods Fire Protection District	Debris	0.5
2014-09432-096212	03/23/2014	Washington	Terre Du Lac Fire	Debris	0.5
2015-11043-128791	09/24/2015	Washington	Potosi Fire Protection District	Debris	0.5
2015-11044-130675	03/30/2015	Washington	Richwoods Fire Protection District	Debris	0.5
2015-11044-130682	10/20/2015	Washington	Richwoods Fire Protection District	Debris	0.5
2017-03627-149953	03/24/2017	Washington	Sullivan Fire Protection District	Debris	0.5
2017-11044-158211	12/29/2016	Washington	Richwoods Fire Protection District	Debris	0.5
2012-03627-073667	07/13/2012	Washington	Sullivan Fire Protection District	Debris	0.75
2003-00008-001362	03/24/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	1
2003-03627-003134	04/14/2003	Washington	Sullivan Fire Protection District	Debris	1
2003-03627-003215	12/21/2003	Washington	Sullivan Fire Protection District	Debris	1
2003-11040-000850	02/11/2003	Washington	Belgrade Volunteer Fire Department	Debris	1
2003-11040-003123	10/21/2003	Washington	Belgrade Volunteer Fire Department	Debris	1
2003-11040-003125	07/24/2003	Washington	Belgrade Volunteer Fire Department	Debris	1
2004-03627-003687	02/20/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-03627-003692	02/28/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-03627-003693	02/29/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-03627-004118	03/21/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-03627-005103	06/03/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-03627-005104	06/03/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-03627-006249	11/07/2004	Washington	Sullivan Fire Protection District	Debris	1
2004-09401-003652	02/22/2004	Washington	Bismarck City Fire Department	Debris	1
2004-09401-003653	02/22/2004	Washington	Bismarck City Fire Department	Debris	1
2004-09401-005146	02/22/2004	Washington	Bismarck City Fire Department	Debris	1
2004-11040-005096	04/03/2004	Washington	Belgrade Volunteer Fire Department	Debris	1
2004-11040-006255	10/17/2004	Washington	Belgrade Volunteer Fire Department	Debris	1
2004-11043-004055	01/11/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-004059	01/15/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-004062	02/18/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-004085	03/07/2004	Washington	Potosi Fire Protection District	Debris	1

2004-11043-004092	03/13/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-004093	03/19/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-004094	03/20/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-005119	04/03/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-005123	04/04/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-005126	04/06/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-005135	04/08/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-006261	08/11/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-006262	07/14/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-006263	07/19/2004	Washington	Potosi Fire Protection District	Debris	1
2004-11043-006264	06/20/2004	Washington	Potosi Fire Protection District	Debris	1
2005-03627-008666	04/18/2005	Washington	Sullivan Fire Protection District	Debris	1
2005-09421-008641	03/06/2005	Washington	Leadwood Fire Protection District	Debris	1
2005-11040-009953	11/11/2005	Washington	Belgrade Volunteer Fire Department	Debris	1
2005-11043-007785	04/06/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007787	04/04/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007789	04/04/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007792	04/03/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007793	04/03/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007794	04/03/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007796	04/03/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007797	04/03/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007799	04/03/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007800	04/02/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007804	03/30/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007805	03/30/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007807	03/30/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007815	03/13/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007817	03/12/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007821	03/12/2005	Washington	Potosi Fire Protection District	Debris	1

2005-11043-007823	03/11/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007825	03/06/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007827	03/06/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007828	03/06/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007831	03/05/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-007832	02/26/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008364	02/25/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008365	02/22/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008373	02/12/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008379	01/22/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008399	03/18/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008401	03/17/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008403	03/17/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008404	03/17/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008405	03/17/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008721	04/17/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-008730	04/09/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009154	07/10/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009155	07/10/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009524	07/30/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009525	07/26/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009805	09/23/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009806	09/11/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-009807	09/11/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-010041	11/24/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-010042	11/24/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-010043	11/24/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-010045	11/19/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-010046	11/16/2005	Washington	Potosi Fire Protection District	Debris	1
2005-11043-010053	11/12/2005	Washington	Potosi Fire Protection District	Debris	1

2005-11043-011045	01/08/2005	Washington	Potosi Fire Protection District	Debris	1
2006-00008-012919	04/14/2006	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	1
2006-03627-013012	02/23/2006	Washington	Sullivan Fire Protection District	Debris	1
2006-03627-023764	04/19/2006	Washington	Sullivan Fire Protection District	Debris	1
2006-03627-023766	04/14/2006	Washington	Sullivan Fire Protection District	Debris	1
2006-11040-011397	02/26/2006	Washington	Belgrade Volunteer Fire Department	Debris	1
2006-11040-026174	10/13/2006	Washington	Belgrade Volunteer Fire Department	Debris	1
2006-11043-011038	01/26/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-011402	02/26/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-011407	02/08/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-012840	03/26/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-012842	03/19/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-013028	04/07/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-025169	07/25/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-025176	07/16/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-025273	08/08/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-026175	10/15/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-027376	11/26/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-027379	11/23/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11043-027380	11/22/2006	Washington	Potosi Fire Protection District	Debris	1
2006-11044-026715	02/27/2006	Washington	Richwoods Fire Protection District	Debris	1
2007-03627-027984	03/07/2007	Washington	Sullivan Fire Protection District	Debris	1
2007-11040-030197	07/04/2007	Washington	Belgrade Volunteer Fire Department	Debris	1
2007-11042-027697	02/19/2007	Washington	Irondale Fire Protection Distrct	Debris	1
2007-11042-028895	04/03/2007	Washington	Irondale Fire Protection Distrct	Debris	1
2007-11042-028896	03/21/2007	Washington	Irondale Fire Protection Distrct	Debris	1
2007-11043-027414	01/31/2007	Washington	Potosi Fire Protection District	Debris	1
2007-11043-027762	02/22/2007	Washington	Potosi Fire Protection District	Debris	1
2007-11043-028028	03/04/2007	Washington	Potosi Fire Protection District	Debris	1
2007-11043-028205	03/07/2007	Washington	Potosi Fire Protection District	Debris	1

2007-11043-029443	04/29/2007	Washington	Potosi Fire Protection District	Debris	1
2007-11043-031516	10/21/2007	Washington	Potosi Fire Protection District	Debris	1
2007-11044-032511	09/01/2007	Washington	Richwoods Fire Protection District	Debris	1
2008-03627-032699	01/01/2008	Washington	Sullivan Fire Protection District	Debris	1
2008-03627-034258	04/14/2008	Washington	Sullivan Fire Protection District	Debris	1
2008-11043-034587	05/21/2008	Washington	Potosi Fire Protection District	Debris	1
2008-11043-036000	11/10/2008	Washington	Potosi Fire Protection District	Debris	1
2008-11044-036460	01/04/2008	Washington	Richwoods Fire Protection District	Debris	1
2008-11044-036470	04/15/2008	Washington	Richwoods Fire Protection District	Debris	1
2008-11044-036471	04/21/2008	Washington	Richwoods Fire Protection District	Debris	1
2009-00008-037834	02/25/2009	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	1
2009-03627-039891	04/23/2009	Washington	Sullivan Fire Protection District	Debris	1
2009-11040-041885	03/26/2009	Washington	Belgrade Volunteer Fire Department	Debris	1
2009-11041-041290	03/10/2009	Washington	Caledonia Fire Protection Dist.	Debris	1
2009-11043-041573	08/25/2009	Washington	Potosi Fire Protection District	Debris	1
2009-11044-039509	01/09/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-039510	01/22/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-039511	02/25/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-039513	01/22/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-039514	03/14/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-039516	03/18/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-039556	03/31/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-040038	04/22/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043076	03/22/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043077	03/23/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043078	08/14/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043079	11/08/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043080	12/07/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043094	11/04/2009	Washington	Richwoods Fire Protection District	Debris	1
2009-11044-043095	11/08/2009	Washington	Richwoods Fire Protection District	Debris	1

2010-03627-049229	10/31/2010	Washington	Sullivan Fire Protection District	Debris	1
2010-11041-045200	03/31/2010	Washington	Caledonia Fire Protection Dist.	Debris	1
2010-11041-052711	03/30/2010	Washington	Caledonia Fire Protection Dist.	Debris	1
2010-11041-052716	05/08/2010	Washington	Caledonia Fire Protection Dist.	Debris	1
2010-11043-048521	10/05/2010	Washington	Potosi Fire Protection District	Debris	1
2011-11040-066685	01/30/2011	Washington	Belgrade Volunteer Fire Department	Debris	1
2011-11040-066721	01/30/2011	Washington	Belgrade Volunteer Fire Department	Debris	1
2011-11043-054862	03/12/2011	Washington	Potosi Fire Protection District	Debris	1
2011-11044-061891	01/29/2011	Washington	Richwoods Fire Protection District	Debris	1
2011-11044-061896	04/09/2011	Washington	Richwoods Fire Protection District	Debris	1
2012-11040-072427	03/13/2012	Washington	Belgrade Volunteer Fire Department	Debris	1
2012-11040-072461	03/01/2012	Washington	Belgrade Volunteer Fire Department	Debris	1
2012-11043-066229	01/30/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-066234	01/31/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-069133	03/05/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-069163	03/05/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-074167	06/28/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-074168	06/28/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-076040	08/22/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11043-076347	08/24/2012	Washington	Potosi Fire Protection District	Debris	1
2012-11044-068947	02/26/2012	Washington	Richwoods Fire Protection District	Debris	1
2012-11044-068963	02/27/2012	Washington	Richwoods Fire Protection District	Debris	1
2012-11044-068964	02/27/2012	Washington	Richwoods Fire Protection District	Debris	1
2012-11044-075913	01/09/2012	Washington	Richwoods Fire Protection District	Debris	1
2013-11043-092663	12/28/2013	Washington	Potosi Fire Protection District	Debris	1
2014-11043-093644	01/25/2014	Washington	Potosi Fire Protection District	Debris	1
2014-11044-093206	01/13/2014	Washington	Richwoods Fire Protection District	Debris	1
2014-11044-093579	01/26/2014	Washington	Richwoods Fire Protection District	Debris	1
2014-11044-130664	04/19/2014	Washington	Richwoods Fire Protection District	Debris	1
2014-11044-130669	11/30/2014	Washington	Richwoods Fire Protection District	Debris	1

2015-03627-123490	04/30/2015	Washington	Sullivan Fire Protection District	Debris	1
2015-11044-130684	10/22/2015	Washington	Richwoods Fire Protection District	Debris	1
2016-09401-142474	11/08/2016	Washington	Bismarck City Fire Department	Debris	1
2017-05007-148051	03/19/2017	Washington	Desoto Rural Fire Protection District	Debris	1
2017-11044-158223	03/29/2016	Washington	Richwoods Fire Protection District	Debris	1
2017-11044-158224	03/26/2016	Washington	Richwoods Fire Protection District	Debris	1
2017-11044-160331	02/27/2016	Washington	Richwoods Fire Protection District	Debris	1
2017-11044-160336	02/06/2016	Washington	Richwoods Fire Protection District	Debris	1
2021-11044-323108	04/18/2020	Washington	Richwoods Fire Protection District	Debris	1.08
2020-11040-220579	01/09/2020	Washington	Belgrade Volunteer Fire Department	Debris	1.37
2021-11044-323113	10/05/2020	Washington	Richwoods Fire Protection District	Debris	1.43
2005-11044-026695	04/05/2005	Washington	Richwoods Fire Protection District	Debris	1.5
2014-11043-099743	03/10/2014	Washington	Potosi Fire Protection District	Debris	1.5
2020-11040-220578	01/10/2020	Washington	Belgrade Volunteer Fire Department	Debris	1.68
2003-03627-003135	04/14/2003	Washington	Sullivan Fire Protection District	Debris	2
2003-11044-003202	10/25/2003	Washington	Richwoods Fire Protection District	Debris	2
2004-03627-006250	11/09/2004	Washington	Sullivan Fire Protection District	Debris	2
2004-11043-004069	02/28/2004	Washington	Potosi Fire Protection District	Debris	2
2004-11043-004098	03/22/2004	Washington	Potosi Fire Protection District	Debris	2
2005-11040-007774	04/03/2005	Washington	Belgrade Volunteer Fire Department	Debris	2
2005-11043-007791	04/04/2005	Washington	Potosi Fire Protection District	Debris	2
2005-11043-007809	03/29/2005	Washington	Potosi Fire Protection District	Debris	2
2005-11043-007819	03/12/2005	Washington	Potosi Fire Protection District	Debris	2
2005-11043-007824	03/10/2005	Washington	Potosi Fire Protection District	Debris	2
2005-11043-007826	03/06/2005	Washington	Potosi Fire Protection District	Debris	2
2005-11043-008378	02/04/2005	Washington	Potosi Fire Protection District	Debris	2
2005-11044-026698	04/04/2005	Washington	Richwoods Fire Protection District	Debris	2
2006-11040-011398	02/26/2006	Washington	Belgrade Volunteer Fire Department	Debris	2
2006-11043-011405	02/23/2006	Washington	Potosi Fire Protection District	Debris	2
2006-11043-011406	02/23/2006	Washington	Potosi Fire Protection District	Debris	2

2006-11043-026169	09/06/2006	Washington	Potosi Fire Protection District	Debris	2
2006-11043-026172	08/12/2006	Washington	Potosi Fire Protection District	Debris	2
2006-11043-027378	11/24/2006	Washington	Potosi Fire Protection District	Debris	2
2006-11044-026711	01/09/2006	Washington	Richwoods Fire Protection District	Debris	2
2007-11043-027372	01/28/2007	Washington	Potosi Fire Protection District	Debris	2
2007-11043-027413	01/31/2007	Washington	Potosi Fire Protection District	Debris	2
2007-11043-028288	03/10/2007	Washington	Potosi Fire Protection District	Debris	2
2007-11043-028292	03/11/2007	Washington	Potosi Fire Protection District	Debris	2
2007-11043-030783	08/11/2007	Washington	Potosi Fire Protection District	Debris	2
2008-03627-034427	04/29/2008	Washington	Sullivan Fire Protection District	Debris	2
2008-11043-033742	03/12/2008	Washington	Potosi Fire Protection District	Debris	2
2009-03627-039600	04/08/2009	Washington	Sullivan Fire Protection District	Debris	2
2009-11040-036901	01/18/2009	Washington	Belgrade Volunteer Fire Department	Debris	2
2009-11040-041861	03/04/2009	Washington	Belgrade Volunteer Fire Department	Debris	2
2009-11040-041881	03/13/2009	Washington	Belgrade Volunteer Fire Department	Debris	2
2009-11040-041884	03/21/2009	Washington	Belgrade Volunteer Fire Department	Debris	2
2010-11043-045101	03/22/2010	Washington	Potosi Fire Protection District	Debris	2
2010-11044-045154	03/23/2010	Washington	Richwoods Fire Protection District	Debris	2
2010-11044-051247	10/30/2010	Washington	Richwoods Fire Protection District	Debris	2
2011-11044-052964	01/07/2011	Washington	Richwoods Fire Protection District	Debris	2
2012-03600-073237	07/04/2012	Washington	SULLIVAN FORESTRY	Debris	2
2012-03627-066221	01/29/2012	Washington	Sullivan Fire Protection District	Debris	2
2012-11042-076241	08/22/2012	Washington	Irondale Fire Protection District	Debris	2
2012-11043-069132	03/01/2012	Washington	Potosi Fire Protection District	Debris	2
2012-11043-069134	03/06/2012	Washington	Potosi Fire Protection District	Debris	2
2012-11043-069170	03/10/2012	Washington	Potosi Fire Protection District	Debris	2
2012-11043-076348	08/24/2012	Washington	Potosi Fire Protection District	Debris	2
2013-03627-091242	11/14/2013	Washington	Sullivan Fire Protection District	Debris	2
2013-09421-091691	04/22/2013	Washington	Leadwood Fire Protection District	Debris	2
2013-11044-091606	11/11/2013	Washington	Richwoods Fire Protection District	Debris	2

2014-11044-130657	03/15/2014	Washington	Richwoods Fire Protection District	Debris	2
2015-02813-120271	03/16/2015	Washington	Steelville Fire Protection District	Debris	2
2015-03627-120332	03/16/2015	Washington	Sullivan Fire Protection District	Debris	2
2015-11044-130676	03/30/2015	Washington	Richwoods Fire Protection District	Debris	2
2015-11044-130685	10/25/2015	Washington	Richwoods Fire Protection District	Debris	2
2016-05007-134086	02/06/2016	Washington	Desoto Rural Fire Protection District	Debris	2
2017-11044-158215	04/25/2016	Washington	Richwoods Fire Protection District	Debris	2
2017-11044-160339	01/30/2016	Washington	Richwoods Fire Protection District	Debris	2
2018-03627-177959	05/01/2018	Washington	Sullivan Fire Protection District	Debris	2.05
2021-11044-323106	04/08/2020	Washington	Richwoods Fire Protection District	Debris	2.09
2014-03627-095316	03/13/2014	Washington	Sullivan Fire Protection District	Debris	2.3
2014-11044-130660	03/20/2014	Washington	Richwoods Fire Protection District	Debris	2.5
2003-00008-001546	04/14/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	3
2004-03600-003912	03/11/2004	Washington	SULLIVAN FORESTRY	Debris	3
2005-11043-007801	04/01/2005	Washington	Potosi Fire Protection District	Debris	3
2005-11043-010056	11/13/2005	Washington	Potosi Fire Protection District	Debris	3
2006-09600-013033	04/21/2006	Washington	ST LOUIS FORESTRY	Debris	3
2006-11043-011024	01/27/2006	Washington	Potosi Fire Protection District	Debris	3
2006-11043-013021	04/13/2006	Washington	Potosi Fire Protection District	Debris	3
2006-11043-013022	04/13/2006	Washington	Potosi Fire Protection District	Debris	3
2006-11044-026712	01/24/2006	Washington	Richwoods Fire Protection District	Debris	3
2006-11044-026713	01/25/2006	Washington	Richwoods Fire Protection District	Debris	3
2007-11040-029162	03/18/2007	Washington	Belgrade Volunteer Fire Department	Debris	3
2007-11043-027798	02/22/2007	Washington	Potosi Fire Protection District	Debris	3
2007-11044-032486	03/04/2007	Washington	Richwoods Fire Protection District	Debris	3
2008-03627-032702	01/04/2008	Washington	Sullivan Fire Protection District	Debris	3
2009-11041-041289	03/04/2009	Washington	Caledonia Fire Protection Dist.	Debris	3
2010-09450-049652	11/12/2010	Washington	Big River Fire Protection, Inc.	Debris	3
2010-11041-052680	03/19/2010	Washington	Caledonia Fire Protection Dist.	Debris	3
2010-11044-045057	03/19/2010	Washington	Richwoods Fire Protection District	Debris	3

2010-11044-045058	03/19/2010	Washington	Richwoods Fire Protection District	Debris	3
2010-11044-051256	11/10/2010	Washington	Richwoods Fire Protection District	Debris	3
2011-11043-055985	03/13/2011	Washington	Potosi Fire Protection District	Debris	3
2013-03627-083922	01/19/2013	Washington	Sullivan Fire Protection District	Debris	3
2013-03627-086011	04/05/2013	Washington	Sullivan Fire Protection District	Debris	3
2013-03627-086013	04/07/2013	Washington	Sullivan Fire Protection District	Debris	3
2013-11043-089742	09/14/2013	Washington	Potosi Fire Protection District	Debris	3
2013-11044-091600	04/22/2013	Washington	Richwoods Fire Protection District	Debris	3
2014-03627-101482	04/16/2014	Washington	Sullivan Fire Protection District	Debris	3
2014-05007-096597	03/21/2014	Washington	Desoto Rural Fire Protection District	Debris	3
2014-11040-096566	02/22/2014	Washington	Belgrade Volunteer Fire Department	Debris	3
2015-11040-130552	10/30/2015	Washington	Belgrade Volunteer Fire Department	Debris	3
2017-03627-160097	10/14/2017	Washington	Sullivan Fire Protection District	Debris	3
2017-11044-160338	01/30/2016	Washington	Richwoods Fire Protection District	Debris	3
2016-11042-132272	01/27/2016	Washington	Irondale Fire Protection Distrct	Debris	3.5
2003-11040-000851	03/15/2003	Washington	Belgrade Volunteer Fire Department	Debris	4
2004-03600-003910	03/08/2004	Washington	SULLIVAN FORESTRY	Debris	4
2004-03627-003690	02/29/2004	Washington	Sullivan Fire Protection District	Debris	4
2004-11040-004037	03/13/2004	Washington	Belgrade Volunteer Fire Department	Debris	4
2004-11043-005164	04/15/2004	Washington	Potosi Fire Protection District	Debris	4
2004-11043-005170	04/17/2004	Washington	Potosi Fire Protection District	Debris	4
2005-04718-009097	04/09/2005	Washington	Quad County Fire Protection District	Debris	4
2005-11040-007773	03/31/2005	Washington	Belgrade Volunteer Fire Department	Debris	4
2005-11043-007798	04/05/2005	Washington	Potosi Fire Protection District	Debris	4
2005-11043-007808	03/29/2005	Washington	Potosi Fire Protection District	Debris	4
2005-11043-008372	02/15/2005	Washington	Potosi Fire Protection District	Debris	4
2005-11043-008722	04/15/2005	Washington	Potosi Fire Protection District	Debris	4
2006-00008-012880	03/31/2006	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	4
2006-03627-013017	03/31/2006	Washington	Sullivan Fire Protection District	Debris	4
2007-00008-029449	04/30/2007	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	4

2008-11040-036799	12/30/2008	Washington	Belgrade Volunteer Fire Department	Debris	4
2012-11044-091658	11/10/2012	Washington	Richwoods Fire Protection District	Debris	4
2015-11040-130554	11/12/2015	Washington	Belgrade Volunteer Fire Department	Debris	4
2021-11044-323110	08/23/2020	Washington	Richwoods Fire Protection District	Debris	4.1
2003-00008-001356	03/14/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	5
2004-00008-004125	04/02/2004	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	5
2004-03627-004042	02/18/2004	Washington	Sullivan Fire Protection District	Debris	5
2004-11043-004056	01/11/2004	Washington	Potosi Fire Protection District	Debris	5
2004-11043-004082	03/02/2004	Washington	Potosi Fire Protection District	Debris	5
2004-11043-029791	05/25/2004	Washington	Potosi Fire Protection District	Debris	5
2005-03627-009906	11/13/2005	Washington	Sullivan Fire Protection District	Debris	5
2005-09600-008746	04/03/2005	Washington	ST LOUIS FORESTRY	Debris	5
2005-11040-007776	04/04/2005	Washington	Belgrade Volunteer Fire Department	Debris	5
2005-11043-007812	03/14/2005	Washington	Potosi Fire Protection District	Debris	5
2005-11043-008375	02/05/2005	Washington	Potosi Fire Protection District	Debris	5
2005-11043-008376	02/05/2005	Washington	Potosi Fire Protection District	Debris	5
2006-09408-032754	01/28/2006	Washington	Doe Run Fire Protection District	Debris	5
2006-11043-023762	04/20/2006	Washington	Potosi Fire Protection District	Debris	5
2007-03600-031757	11/05/2007	Washington	SULLIVAN FORESTRY	Debris	5
2007-11043-028206	03/07/2007	Washington	Potosi Fire Protection District	Debris	5
2007-11044-032485	02/11/2007	Washington	Richwoods Fire Protection District	Debris	5
2008-03600-033776	03/14/2008	Washington	SULLIVAN FORESTRY	Debris	5
2009-03627-042441	11/07/2009	Washington	Sullivan Fire Protection District	Debris	5
2009-11040-041841	02/15/2009	Washington	Belgrade Volunteer Fire Department	Debris	5
2010-03627-045346	04/05/2010	Washington	Sullivan Fire Protection District	Debris	5
2010-11044-051252	11/06/2010	Washington	Richwoods Fire Protection District	Debris	5
2010-11044-051262	03/23/2010	Washington	Richwoods Fire Protection District	Debris	5
2012-11043-069135	03/06/2012	Washington	Potosi Fire Protection District	Debris	5
2012-11043-069168	03/06/2012	Washington	Potosi Fire Protection District	Debris	5
2012-11044-068966	03/13/2012	Washington	Richwoods Fire Protection District	Debris	5

2012-11044-075916	04/02/2012	Washington	Richwoods Fire Protection District	Debris	5
2012-11044-075917	05/27/2012	Washington	Richwoods Fire Protection District	Debris	5
2012-11044-091654	09/01/2012	Washington	Richwoods Fire Protection District	Debris	5
2013-11044-091599	04/14/2013	Washington	Richwoods Fire Protection District	Debris	5
2014-03627-104962	05/06/2014	Washington	Sullivan Fire Protection District	Debris	5
2015-11044-130672	03/07/2015	Washington	Richwoods Fire Protection District	Debris	5
2017-11043-145342	01/30/2017	Washington	Potosi Fire Protection District	Debris	5
2017-11044-158217	04/18/2016	Washington	Richwoods Fire Protection District	Debris	5
2017-11044-160291	03/18/2016	Washington	Richwoods Fire Protection District	Debris	5
2004-11043-004061	01/24/2004	Washington	Potosi Fire Protection District	Debris	6
2004-11043-004063	02/22/2004	Washington	Potosi Fire Protection District	Debris	6
2004-11043-004079	03/01/2004	Washington	Potosi Fire Protection District	Debris	6
2004-11044-004146	01/24/2004	Washington	Richwoods Fire Protection District	Debris	6
2005-03627-008676	04/03/2005	Washington	Sullivan Fire Protection District	Debris	6
2005-09407-008573	04/04/2005	Washington	Desloge Vounteer Fire Department	Debris	6
2005-11043-008380	01/24/2005	Washington	Potosi Fire Protection District	Debris	6
2011-11044-061897	09/30/2011	Washington	Richwoods Fire Protection District	Debris	6
2012-09421-069208	03/10/2012	Washington	Leadwood Fire Protection District	Debris	6
2013-03627-086403	04/22/2013	Washington	Sullivan Fire Protection District	Debris	6
2013-09446-091341	11/17/2013	Washington	Lake Timberline Vol. Fire Dept	Debris	6
2017-11044-160337	02/01/2016	Washington	Richwoods Fire Protection District	Debris	6
2004-11040-003917	02/18/2004	Washington	Belgrade Volunteer Fire Department	Debris	7
2010-03627-049141	10/23/2010	Washington	Sullivan Fire Protection District	Debris	7
2009-00008-038241	03/05/2009	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	8
2013-11043-086029	04/04/2013	Washington	Potosi Fire Protection District	Debris	8
2014-11040-094225	01/30/2014	Washington	Belgrade Volunteer Fire Department	Debris	8
2020-11040-241142	11/06/2020	Washington	Belgrade Volunteer Fire Department	Debris	9.49
2003-11044-003201	10/25/2003	Washington	Richwoods Fire Protection District	Debris	10
2005-11044-026705	03/06/2005	Washington	Richwoods Fire Protection District	Debris	10
2007-02813-028542	03/05/2007	Washington	Steelville Fire Protection District	Debris	10

6.78

2007-11044-032495	03/27/2007	Washington	Richwoods Fire Protection District	Debris	10
2007-11044-032502	06/19/2007	Washington	Richwoods Fire Protection District	Debris	10
2009-11040-036899	01/04/2009	Washington	Belgrade Volunteer Fire Department	Debris	10
2009-11040-041862	03/06/2009	Washington	Belgrade Volunteer Fire Department	Debris	10
2009-11044-039518	03/23/2009	Washington	Richwoods Fire Protection District	Debris	10
2010-11043-045861	03/31/2010	Washington	Potosi Fire Protection District	Debris	10
2010-11044-051243	04/10/2010	Washington	Richwoods Fire Protection District	Debris	10
2012-11042-073781	07/10/2012	Washington	Irondale Fire Protection Distrct	Debris	10
2012-11042-074581	07/19/2012	Washington	Irondale Fire Protection Distrct	Debris	10
2012-11043-074191	07/11/2012	Washington	Potosi Fire Protection District	Debris	10
2012-11044-075912	01/07/2012	Washington	Richwoods Fire Protection District	Debris	10
2012-11044-075920	07/23/2012	Washington	Richwoods Fire Protection District	Debris	10
2014-02813-093567	01/26/2014	Washington	Steelville Fire Protection District	Debris	10
2014-02813-093568	01/26/2014	Washington	Steelville Fire Protection District	Debris	10
2017-03627-165087	12/16/2017	Washington	Sullivan Fire Protection District	Debris	10
2018-03627-177955	04/20/2018	Washington	Sullivan Fire Protection District	Debris	10.22
2005-09600-008621	03/07/2005	Washington	ST LOUIS FORESTRY	Debris	11
2004-03627-004117	03/20/2004	Washington	Sullivan Fire Protection District	Debris	12
2011-11044-061910	04/07/2011	Washington	Richwoods Fire Protection District	Debris	13
2005-09600-008748	04/04/2005	Washington	ST LOUIS FORESTRY	Debris	14
2018-09401-177401	04/13/2018	Washington	Bismarck City Fire Department	Debris	14.21
2004-11043-004070	02/28/2004	Washington	Potosi Fire Protection District	Debris	15
2004-11043-004074	02/29/2004	Washington	Potosi Fire Protection District	Debris	15
2004-11043-004075	02/29/2004	Washington	Potosi Fire Protection District	Debris	15
2004-11043-004083	03/06/2004	Washington	Potosi Fire Protection District	Debris	15
2005-11043-007830	03/06/2005	Washington	Potosi Fire Protection District	Debris	15
2006-11043-010035	01/08/2006	Washington	Potosi Fire Protection District	Debris	15
2007-11044-032497	04/22/2007	Washington	Richwoods Fire Protection District	Debris	15
2009-11040-041848	04/08/2009	Washington	Belgrade Volunteer Fire Department	Debris	15
2010-03600-049494	11/07/2010	Washington	SULLIVAN FORESTRY	Debris	15

6.79

2010-03627-044716	03/08/2010	Washington	Sullivan Fire Protection District	Debris	15
2010-03627-049041	10/20/2010	Washington	Sullivan Fire Protection District	Debris	15
2002-00008-001348	12/02/2002	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	18
2004-10399-006650	02/27/2004	Washington	Puxico Fire Department	Debris	20
2004-11043-004073	02/29/2004	Washington	Potosi Fire Protection District	Debris	20
2005-11043-008754	04/08/2005	Washington	Potosi Fire Protection District	Debris	20
2005-11044-026700	04/02/2005	Washington	Richwoods Fire Protection District	Debris	20
2006-11044-026722	12/26/2006	Washington	Richwoods Fire Protection District	Debris	20
2007-03600-031756	11/04/2007	Washington	SULLIVAN FORESTRY	Debris	20
2007-11044-032493	03/26/2007	Washington	Richwoods Fire Protection District	Debris	20
2010-11040-058242	11/09/2010	Washington	Belgrade Volunteer Fire Department	Debris	20
2010-11044-051273	11/12/2010	Washington	Richwoods Fire Protection District	Debris	20
2012-11042-073801	07/11/2012	Washington	Irondale Fire Protection Distrct	Debris	20
2012-11044-068948	03/01/2012	Washington	Richwoods Fire Protection District	Debris	20
2017-11044-158220	04/04/2016	Washington	Richwoods Fire Protection District	Debris	20
2017-11044-158222	03/29/2016	Washington	Richwoods Fire Protection District	Debris	20
2004-03627-004110	03/13/2004	Washington	Sullivan Fire Protection District	Debris	25
2004-03627-004111	03/13/2004	Washington	Sullivan Fire Protection District	Debris	25
2004-03627-004112	03/12/2004	Washington	Sullivan Fire Protection District	Debris	25
2004-11043-004058	01/11/2004	Washington	Potosi Fire Protection District	Debris	25
2005-11043-007814	03/13/2005	Washington	Potosi Fire Protection District	Debris	25
2007-02813-032062	11/18/2007	Washington	Steelville Fire Protection District	Debris	25
2009-11040-041865	03/10/2009	Washington	Belgrade Volunteer Fire Department	Debris	25
2009-03600-039585	04/08/2009	Washington	SULLIVAN FORESTRY	Debris	26
2012-03600-067903	03/06/2012	Washington	SULLIVAN FORESTRY	Debris	26
2004-03600-003913	01/11/2004	Washington	SULLIVAN FORESTRY	Debris	28
2021-11044-323121	12/26/2020	Washington	Richwoods Fire Protection District	Debris	28.33
2018-09401-176319	03/04/2018	Washington	Bismarck City Fire Department	Debris	29.45
2004-09407-004932	04/18/2004	Washington	Desloge Vounteer Fire Department	Debris	30
2004-11040-005098	04/18/2004	Washington	Belgrade Volunteer Fire Department	Debris	30
					6.80

2005-11044-026699	04/03/2005	Washington	Richwoods Fire Protection District	Debris	30
2006-11044-026719	04/17/2006	Washington	Richwoods Fire Protection District	Debris	30
2009-02813-039386	02/25/2009	Washington	Steelville Fire Protection District	Debris	30
2009-03627-038992	03/23/2009	Washington	Sullivan Fire Protection District	Debris	30
2009-11041-041292	03/10/2009	Washington	Caledonia Fire Protection Dist.	Debris	30
2011-03600-055326	03/24/2011	Washington	SULLIVAN FORESTRY	Debris	30
2011-09411-056644	03/23/2011	Washington	Park Hills Fire Department	Debris	30
2011-11043-056011	03/23/2011	Washington	Potosi Fire Protection District	Debris	30
2009-11040-041843	02/25/2009	Washington	Belgrade Volunteer Fire Department	Debris	37
2005-11044-026703	03/12/2005	Washington	Richwoods Fire Protection District	Debris	40
2005-11044-026704	03/09/2005	Washington	Richwoods Fire Protection District	Debris	40
2005-03627-008719	04/03/2005	Washington	Sullivan Fire Protection District	Debris	46
2004-11043-004095	03/20/2004	Washington	Potosi Fire Protection District	Debris	50
2005-11043-007788	04/04/2005	Washington	Potosi Fire Protection District	Debris	60
2005-09600-008745	04/04/2005	Washington	ST LOUIS FORESTRY	Debris	63
2021-11044-323104	03/08/2020	Washington	Richwoods Fire Protection District	Debris	73.02
2005-11043-007802	03/31/2005	Washington	Potosi Fire Protection District	Debris	75
2013-03627-091355	11/15/2013	Washington	Sullivan Fire Protection District	Debris	75
2007-02810-032150	12/01/2007	Washington	Bourbon Fire Protection District	Debris	76
2009-03600-038915	03/23/2009	Washington	SULLIVAN FORESTRY	Debris	76
2011-11044-061899	11/01/2011	Washington	Richwoods Fire Protection District	Debris	85
2011-11044-061900	11/02/2011	Washington	Richwoods Fire Protection District	Debris	85
2007-09401-032946	08/14/2007	Washington	Bismarck City Fire Department	Debris	100
2007-09408-032947	08/14/2007	Washington	Doe Run Fire Protection District	Debris	100
2007-09412-032924	08/14/2007	Washington	Farmington Fire Department	Debris	100
2007-09421-032945	08/14/2007	Washington	Leadwood Fire Protection District	Debris	100
2007-09435-032908	08/15/2007	Washington	Wolf Creek Fire Protection Association	Debris	100
2010-11044-051267	10/23/2010	Washington	Richwoods Fire Protection District	Debris	100
2013-11044-091597	04/06/2013	Washington	Richwoods Fire Protection District	Debris	100
2010-03600-045314	03/31/2010	Washington	SULLIVAN FORESTRY	Debris	107
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2005-11043-008398	03/19/2005	Washington	Potosi Fire Protection District	Debris	150
2005-11043-007829	03/06/2005	Washington	Potosi Fire Protection District	Debris	200
2006-00008-012379	03/16/2006	Washington	MDC REPORTING REGION - ST. LOUIS	Debris	309
2011-09411-056633	03/23/2011	Washington	Park Hills Fire Department	Debris	350
2010-11044-051269	10/24/2010	Washington	Richwoods Fire Protection District	Debris	450
2004-11040-004038	03/14/2004	Washington	Belgrade Volunteer Fire Department	Debris	
2004-11043-004057	01/11/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004065	02/28/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004066	02/28/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004068	02/28/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004071	02/29/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004072	02/29/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004076	03/01/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004077	03/03/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004078	03/01/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004080	03/01/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004084	03/07/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004086	03/07/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004087	03/10/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004088	03/10/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004089	03/11/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004090	03/12/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004097	03/22/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004099	03/22/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004100	03/22/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004101	03/22/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004102	03/22/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-004103	03/24/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005115	04/02/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005121	04/03/2004	Washington	Potosi Fire Protection District	Debris	

2004-11043-005122	04/04/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005124	04/05/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005136	04/09/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005156	04/13/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005157	04/13/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005180	04/26/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005181	04/28/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005182	04/30/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005866	06/20/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005867	06/23/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005868	07/14/2004	Washington	Potosi Fire Protection District	Debris	
2004-11043-005869	07/19/2004	Washington	Potosi Fire Protection District	Debris	
2005-03627-008675	04/03/2005	Washington	Sullivan Fire Protection District	Debris	
2005-11043-010039	11/25/2005	Washington	Potosi Fire Protection District	Debris	
2015-11044-130680	07/04/2015	Washington	Richwoods Fire Protection District	Debris	
2017-05007-164231	09/29/2017	Washington	Desoto Rural Fire Protection District	Debris	
2012-03627-075889	08/19/2012	Washington	Sullivan Fire Protection District	Equipment	0.05
2013-11044-093204	12/02/2013	Washington	Richwoods Fire Protection District	Equipment	0.1
2014-11044-093580	01/26/2014	Washington	Richwoods Fire Protection District	Equipment	0.1
2014-11044-130663	04/09/2014	Washington	Richwoods Fire Protection District	Equipment	0.25
2021-11044-323109	07/21/2020	Washington	Richwoods Fire Protection District	Equipment	0.36
2012-11044-075900	07/27/2012	Washington	Richwoods Fire Protection District	Equipment	0.5
2014-11044-130667	09/20/2014	Washington	Richwoods Fire Protection District	Equipment	0.5
2017-05007-147211	01/31/2017	Washington	Desoto Rural Fire Protection District	Equipment	0.5
2021-11044-323118	11/19/2020	Washington	Richwoods Fire Protection District	Equipment	0.81
2004-11040-006254	10/04/2004	Washington	Belgrade Volunteer Fire Department	Equipment	1
2005-11040-008985	06/14/2005	Washington	Belgrade Volunteer Fire Department	Equipment	1
2005-11043-008382	01/22/2005	Washington	Potosi Fire Protection District	Equipment	1
2005-11043-009523	08/01/2005	Washington	Potosi Fire Protection District	Equipment	1
2005-11043-009526	07/26/2005	Washington	Potosi Fire Protection District	Equipment	1
					6.83

2005-11043-009808	08/08/2005	Washington	Potosi Fire Protection District	Equipment	1
2006-04718-023716	04/05/2006	Washington	Quad County Fire Protection District	Equipment	1
2006-04718-023717	04/04/2006	Washington	Quad County Fire Protection District	Equipment	1
2006-07250-011040	01/24/2006	Washington	Portageville Fire Department	Equipment	1
2006-11040-023759	04/04/2006	Washington	Belgrade Volunteer Fire Department	Equipment	1
2006-11043-011025	01/27/2006	Washington	Potosi Fire Protection District	Equipment	1
2006-11043-011042	01/24/2006	Washington	Potosi Fire Protection District	Equipment	1
2006-11043-013029	04/08/2006	Washington	Potosi Fire Protection District	Equipment	1
2007-11043-031418	10/14/2007	Washington	Potosi Fire Protection District	Equipment	1
2008-11043-036413	12/30/2008	Washington	Potosi Fire Protection District	Equipment	1
2008-11044-036465	03/29/2008	Washington	Richwoods Fire Protection District	Equipment	1
2008-11044-036466	03/30/2008	Washington	Richwoods Fire Protection District	Equipment	1
2008-11044-036468	03/30/2008	Washington	Richwoods Fire Protection District	Equipment	1
2010-11041-052714	04/10/2010	Washington	Caledonia Fire Protection Dist.	Equipment	1
2012-05007-065366	01/09/2012	Washington	Desoto Rural Fire Protection District	Equipment	1
2012-11042-073802	07/13/2012	Washington	Irondale Fire Protection Distrct	Equipment	1
2012-11044-075918	06/27/2012	Washington	Richwoods Fire Protection District	Equipment	1
2015-11044-130678	04/01/2015	Washington	Richwoods Fire Protection District	Equipment	1
2017-11044-158221	04/01/2016	Washington	Richwoods Fire Protection District	Equipment	1
2013-03627-086344	04/20/2013	Washington	Sullivan Fire Protection District	Equipment	1.1
2010-11044-051272	11/05/2010	Washington	Richwoods Fire Protection District	Equipment	1.5
2004-11040-006253	09/30/2004	Washington	Belgrade Volunteer Fire Department	Equipment	2
2012-11040-072429	05/24/2012	Washington	Belgrade Volunteer Fire Department	Equipment	2
2012-11044-075922	07/27/2012	Washington	Richwoods Fire Protection District	Equipment	2
2014-03627-097462	03/31/2014	Washington	Sullivan Fire Protection District	Equipment	2
2015-09407-120734	03/22/2015	Washington	Desloge Vounteer Fire Department	Equipment	2
2015-11044-130681	10/20/2015	Washington	Richwoods Fire Protection District	Equipment	2
2015-11044-130683	10/21/2015	Washington	Richwoods Fire Protection District	Equipment	2
2005-11040-009502	06/28/2005	Washington	Belgrade Volunteer Fire Department	Equipment	4
2005-11040-009950	06/28/2005	Washington	Belgrade Volunteer Fire Department	Equipment	4

2014-05007-095021	02/28/2014	Washington	Desoto Rural Fire Protection District	Equipment	5
2007-11044-032504	07/21/2007	Washington	Richwoods Fire Protection District	Equipment	10
2012-11044-075899	07/27/2012	Washington	Richwoods Fire Protection District	Equipment	10
2014-11044-093578	01/26/2014	Washington	Richwoods Fire Protection District	Equipment	10
2021-11044-323107	04/10/2020	Washington	Richwoods Fire Protection District	Equipment	13.68
2012-11042-074582	07/27/2012	Washington	Irondale Fire Protection District	Equipment	15
2012-11044-075921	07/27/2012	Washington	Richwoods Fire Protection District	Equipment	20
2007-11044-032491	03/21/2007	Washington	Richwoods Fire Protection District	Equipment	30
2012-11040-072426	03/06/2012	Washington	Belgrade Volunteer Fire Department	Equipment	325
2020-11040-230724	06/28/2020	Washington	Belgrade Volunteer Fire Department	Fireworks	21.55
2012-11044-091656	09/25/2012	Washington	Richwoods Fire Protection District	Lightning	0.1
2003-11044-000845	05/05/2003	Washington	Richwoods Fire Protection District	Lightning	1
2012-11040-078376	09/07/2012	Washington	Belgrade Volunteer Fire Department	Lightning	2
2006-03627-023765	04/15/2006	Washington	Sullivan Fire Protection District	Lightning	5
2006-11044-025272	08/07/2006	Washington	Richwoods Fire Protection District	Lightning	17
2015-09421-129543	03/16/2015	Washington	Leadwood Fire Protection District	Miscellaneous	0.05
2020-03627-230808	01/19/2018	Washington	Sullivan Fire Protection District	Miscellaneous	0.07
2008-03627-034428	04/29/2008	Washington	Sullivan Fire Protection District	Miscellaneous	0.1
2010-11044-051271	10/25/2010	Washington	Richwoods Fire Protection District	Miscellaneous	0.1
2006-11044-026720	04/19/2006	Washington	Richwoods Fire Protection District	Miscellaneous	0.25
2008-11040-036792	06/26/2008	Washington	Belgrade Volunteer Fire Department	Miscellaneous	0.25
2004-03627-006244	10/17/2004	Washington	Sullivan Fire Protection District	Miscellaneous	0.3
2005-11044-026697	04/04/2005	Washington	Richwoods Fire Protection District	Miscellaneous	0.5
2006-11044-026714	01/27/2006	Washington	Richwoods Fire Protection District	Miscellaneous	0.5
2002-11040-000846	09/06/2002	Washington	Belgrade Volunteer Fire Department	Miscellaneous	1
2003-11040-003126	07/16/2003	Washington	Belgrade Volunteer Fire Department	Miscellaneous	1
2003-11044-003200	11/26/2003	Washington	Richwoods Fire Protection District	Miscellaneous	1
2004-03627-004105	03/01/2004	Washington	Sullivan Fire Protection District	Miscellaneous	1
2004-03627-004107	03/02/2004	Washington	Sullivan Fire Protection District	Miscellaneous	1
2004-03627-004108	03/05/2004	Washington	Sullivan Fire Protection District	Miscellaneous	1

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2004-03627-004122	03/27/2004	Washington	Sullivan Fire Protection District	Miscellaneous	1
2005-03627-008668	04/17/2005	Washington	Sullivan Fire Protection District	Miscellaneous	1
2005-11043-008390	03/21/2005	Washington	Potosi Fire Protection District	Miscellaneous	1
2005-11043-009158	06/29/2005	Washington	Potosi Fire Protection District	Miscellaneous	1
2005-11044-026701	03/21/2005	Washington	Richwoods Fire Protection District	Miscellaneous	1
2005-11044-026707	01/24/2005	Washington	Richwoods Fire Protection District	Miscellaneous	1
2006-11040-027214	11/05/2006	Washington	Belgrade Volunteer Fire Department	Miscellaneous	1
2006-11043-024726	06/21/2006	Washington	Potosi Fire Protection District	Miscellaneous	1
2007-11040-029161	03/07/2007	Washington	Belgrade Volunteer Fire Department	Miscellaneous	1
2009-11043-038072	02/25/2009	Washington	Potosi Fire Protection District	Miscellaneous	1
2009-11043-039601	04/08/2009	Washington	Potosi Fire Protection District	Miscellaneous	1
2010-11043-045981	04/13/2010	Washington	Potosi Fire Protection District	Miscellaneous	1
2010-11043-049288	10/28/2010	Washington	Potosi Fire Protection District	Miscellaneous	1
2010-11043-051484	12/02/2010	Washington	Potosi Fire Protection District	Miscellaneous	1
2012-11043-072805	06/19/2012	Washington	Potosi Fire Protection District	Miscellaneous	1
2015-05007-121530	03/30/2015	Washington	Desoto Rural Fire Protection District	Miscellaneous	1
2017-11044-158225	03/21/2016	Washington	Richwoods Fire Protection District	Miscellaneous	1
2004-03627-004116	03/20/2004	Washington	Sullivan Fire Protection District	Miscellaneous	2
2005-03627-008667	04/17/2005	Washington	Sullivan Fire Protection District	Miscellaneous	2
2005-03627-008674	04/03/2005	Washington	Sullivan Fire Protection District	Miscellaneous	2
2005-11043-008727	04/09/2005	Washington	Potosi Fire Protection District	Miscellaneous	2
2005-11043-008750	04/17/2005	Washington	Potosi Fire Protection District	Miscellaneous	2
2005-11043-008752	04/17/2005	Washington	Potosi Fire Protection District	Miscellaneous	2
2005-11043-008753	04/08/2005	Washington	Potosi Fire Protection District	Miscellaneous	2
2005-11043-010044	11/23/2005	Washington	Potosi Fire Protection District	Miscellaneous	2
2007-11043-029308	04/23/2007	Washington	Potosi Fire Protection District	Miscellaneous	2
2009-03627-036989	01/22/2009	Washington	Sullivan Fire Protection District	Miscellaneous	2
2009-03627-038013	01/22/2009	Washington	Sullivan Fire Protection District	Miscellaneous	2
2011-05007-057872	02/17/2011	Washington	Desoto Rural Fire Protection District	Miscellaneous	2
2009-11043-038063	02/22/2009	Washington	Potosi Fire Protection District	Miscellaneous	3

2010-11043-049278	10/20/2010	Washington	Potosi Fire Protection District	Miscellaneous	3
2011-11040-066722	02/01/2011	Washington	Belgrade Volunteer Fire Department	Miscellaneous	3
2003-00008-003062	07/31/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Miscellaneous	4
2004-03627-004114	03/19/2004	Washington	Sullivan Fire Protection District	Miscellaneous	4
2004-03627-005105	06/03/2004	Washington	Sullivan Fire Protection District	Miscellaneous	4
2004-11040-005097	04/04/2004	Washington	Belgrade Volunteer Fire Department	Miscellaneous	4
2007-11043-027384	01/29/2007	Washington	Potosi Fire Protection District	Miscellaneous	5
2007-11044-032492	03/22/2007	Washington	Richwoods Fire Protection District	Miscellaneous	5
2010-11044-051253	11/06/2010	Washington	Richwoods Fire Protection District	Miscellaneous	5
2012-05007-068111	03/06/2012	Washington	Desoto Rural Fire Protection District	Miscellaneous	5
2010-09421-052316	11/10/2010	Washington	Leadwood Fire Protection District	Miscellaneous	6
2005-11043-010050	11/10/2005	Washington	Potosi Fire Protection District	Miscellaneous	7
2007-00008-029448	04/21/2007	Washington	MDC REPORTING REGION - ST. LOUIS	Miscellaneous	7
2017-05007-162472	11/23/2017	Washington	Desoto Rural Fire Protection District	Miscellaneous	7
2005-11044-026696	04/04/2005	Washington	Richwoods Fire Protection District	Miscellaneous	10
2009-11043-039458	04/04/2009	Washington	Potosi Fire Protection District	Miscellaneous	10
2010-05007-057907	10/24/2010	Washington	Desoto Rural Fire Protection District	Miscellaneous	10
2005-11043-008385	03/28/2005	Washington	Potosi Fire Protection District	Miscellaneous	15
2009-11043-038073	02/25/2009	Washington	Potosi Fire Protection District	Miscellaneous	22
2011-05007-057851	03/23/2011	Washington	Desoto Rural Fire Protection District	Miscellaneous	30
2011-11043-055987	03/23/2011	Washington	Potosi Fire Protection District	Miscellaneous	30
2004-03627-005106	06/03/2004	Washington	Sullivan Fire Protection District	Miscellaneous	65
2011-05007-057869	04/06/2011	Washington	Desoto Rural Fire Protection District	Miscellaneous	100
2003-00008-001524	04/02/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Miscellaneous	145
2011-05007-057849	03/23/2011	Washington	Desoto Rural Fire Protection District	Miscellaneous	300
2011-05007-057871	03/23/2011	Washington	Desoto Rural Fire Protection District	Miscellaneous	1000
2005-11040-009970	11/27/2005	Washington	Belgrade Volunteer Fire Department	Miscellaneous	
2010-03627-049266	10/30/2010	Washington	Sullivan Fire Protection District	Not Reported	0.05
2020-11040-220576	04/10/2020	Washington	Belgrade Volunteer Fire Department	Not Reported	0.63
2005-11043-008370	02/17/2005	Washington	Potosi Fire Protection District	Not Reported	1

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2005-11043-008391	03/20/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008393	03/20/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008396	03/20/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008723	04/10/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008724	04/16/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008725	04/10/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008726	04/09/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008728	04/09/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-008729	04/09/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-009156	07/05/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-009161	06/22/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-009162	06/13/2005	Washington	Potosi Fire Protection District	Not Reported	1
2005-11043-010052	11/12/2005	Washington	Potosi Fire Protection District	Not Reported	1
2006-09421-033041	08/31/2006	Washington	Leadwood Fire Protection District	Not Reported	1
2006-09421-033046	09/19/2006	Washington	Leadwood Fire Protection District	Not Reported	1
2006-09421-033049	11/27/2006	Washington	Leadwood Fire Protection District	Not Reported	1
2006-11040-026173	10/13/2006	Washington	Belgrade Volunteer Fire Department	Not Reported	1
2006-11040-026191	09/28/2006	Washington	Belgrade Volunteer Fire Department	Not Reported	1
2006-11043-011044	01/19/2006	Washington	Potosi Fire Protection District	Not Reported	1
2008-11044-036462	03/11/2008	Washington	Richwoods Fire Protection District	Not Reported	1
2008-11044-036463	03/11/2008	Washington	Richwoods Fire Protection District	Not Reported	1
2010-11040-058212	12/10/2010	Washington	Belgrade Volunteer Fire Department	Not Reported	1
2012-11040-066506	01/02/2012	Washington	Belgrade Volunteer Fire Department	Not Reported	1
2016-11042-134456	01/24/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1
2016-11042-134458	01/28/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1
2016-11042-134461	02/18/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1
2016-11042-134462	02/19/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1
2016-11042-134463	02/20/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1
2016-11042-134464	02/21/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1
2016-11042-134466	02/23/2016	Washington	Irondale Fire Protection Distrct	Not Reported	1

2016-11042-134467	02/27/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	1
2016-11042-134468	02/27/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	1
2016-11042-134470	02/28/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	1
2016-11042-134471	03/05/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	1
2016-11042-134472	03/05/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	1
2004-11043-005139	04/10/2004	Washington	Potosi Fire Protection District	Not Reported	1.5
2005-11043-008731	04/09/2005	Washington	Potosi Fire Protection District	Not Reported	2
2006-09421-033039	08/12/2006	Washington	Leadwood Fire Protection District	Not Reported	2
2006-09421-033040	08/06/2006	Washington	Leadwood Fire Protection District	Not Reported	2
2016-11042-134469	02/28/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	2
2005-11043-008395	03/20/2005	Washington	Potosi Fire Protection District	Not Reported	3
2010-09450-049002	10/20/2010	Washington	Big River Fire Protection, Inc.	Not Reported	3
2016-11042-134460	02/07/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	3
2016-11042-134473	03/08/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	3
2016-11042-134457	01/27/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	4
2016-11042-134465	02/22/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	4
2020-11040-241146	11/20/2020	Washington	Belgrade Volunteer Fire Department	Not Reported	4.75
2009-03627-042385	11/04/2009	Washington	Sullivan Fire Protection District	Not Reported	5
2016-11042-134459	01/29/2016	Washington	Irondale Fire Protection Distrcit	Not Reported	5
2005-11043-008397	03/20/2005	Washington	Potosi Fire Protection District	Not Reported	10
2005-11040-009951	11/12/2005	Washington	Belgrade Volunteer Fire Department	Not Reported	16
2005-11043-008400	03/18/2005	Washington	Potosi Fire Protection District	Not Reported	30
2005-11043-010054	11/12/2005	Washington	Potosi Fire Protection District	Not Reported	100
2001-11043-005172	04/18/2001	Washington	Potosi Fire Protection District	Not Reported	
2002-00008-001352	12/02/2002	Washington	MDC REPORTING REGION - ST. LOUIS	Not Reported	
2004-03655-005177	04/18/2004	Washington	Pacific Fire Protection District	Not Reported	
2004-11043-005112	04/02/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005117	04/02/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005127	04/06/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005133	04/07/2004	Washington	Potosi Fire Protection District	Not Reported	

2004-11043-005134	04/07/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005138	04/09/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005155	04/10/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005160	04/14/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005161	04/15/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005165	04/16/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005166	04/16/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005168	04/16/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005169	04/16/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005171	04/18/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005173	04/18/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005174	04/18/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005175	04/18/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005176	04/18/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005178	04/19/2004	Washington	Potosi Fire Protection District	Not Reported	
2004-11043-005179	04/21/2004	Washington	Potosi Fire Protection District	Not Reported	
2005-07250-010047	11/16/2005	Washington	Portageville Fire Department	Not Reported	
2005-11043-010051	11/11/2005	Washington	Potosi Fire Protection District	Not Reported	
2006-11040-011037	01/27/2006	Washington	Belgrade Volunteer Fire Department	Not Reported	
2021-11044-323119	11/19/2020	Washington	Richwoods Fire Protection District	Power line	28.68
2006-11043-024725	07/04/2006	Washington	Potosi Fire Protection District	Railroad	1
2004-11043-005110	04/02/2004	Washington	Potosi Fire Protection District	Railroad	
2004-09421-007201	02/25/2004	Washington	Leadwood Fire Protection District	Smoking	0.1
2006-11044-026717	04/11/2006	Washington	Richwoods Fire Protection District	Smoking	0.1
2012-11044-075898	06/29/2012	Washington	Richwoods Fire Protection District	Smoking	0.1
2007-11044-032508	08/13/2007	Washington	Richwoods Fire Protection District	Smoking	0.25
2012-11044-075943	08/18/2012	Washington	Richwoods Fire Protection District	Smoking	0.25
2021-11044-323112	09/19/2020	Washington	Richwoods Fire Protection District	Smoking	0.47
2007-11044-032515	11/05/2007	Washington	Richwoods Fire Protection District	Smoking	0.5
2011-11044-061909	02/17/2011	Washington	Richwoods Fire Protection District	Smoking	0.5
					6.90

2005-11040-009955	11/24/2005	Washington	Belgrade Volunteer Fire Department	Smoking	1
2005-11044-026694	04/10/2005	Washington	Richwoods Fire Protection District	Smoking	1
2009-11044-039517	03/20/2009	Washington	Richwoods Fire Protection District	Smoking	1
2007-09412-032925	11/20/2007	Washington	Farmington Fire Department	Smoking	3
2010-03600-049495	11/08/2010	Washington	SULLIVAN FORESTRY	Smoking	3.6
2009-11043-039023	03/07/2009	Washington	Potosi Fire Protection District	Smoking	5
2010-09450-049489	11/08/2010	Washington	Big River Fire Protection, Inc.	Smoking	5
2006-11043-013023	04/13/2006	Washington	Potosi Fire Protection District	Smoking	10
2009-11040-041844	03/08/2009	Washington	Belgrade Volunteer Fire Department	Smoking	10
2014-11044-130654	03/11/2014	Washington	Richwoods Fire Protection District	Smoking	20
2012-11040-075487	07/25/2012	Washington	Belgrade Volunteer Fire Department	Smoking	23
2003-00008-003068	04/15/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Smoking	46
2017-11044-160311	03/17/2016	Washington	Richwoods Fire Protection District	Smoking	50
2010-03627-049125	10/23/2010	Washington	Sullivan Fire Protection District	Unknown	0.01
2012-03627-074286	07/22/2012	Washington	Sullivan Fire Protection District	Unknown	0.01
2017-11044-160332	02/20/2016	Washington	Richwoods Fire Protection District	Unknown	0.01
2017-11044-160334	02/19/2016	Washington	Richwoods Fire Protection District	Unknown	0.01
2017-11044-160335	02/07/2016	Washington	Richwoods Fire Protection District	Unknown	0.01
2017-11044-160340	01/30/2016	Washington	Richwoods Fire Protection District	Unknown	0.01
2017-11044-160341	01/29/2016	Washington	Richwoods Fire Protection District	Unknown	0.01
2021-11044-323105	04/07/2020	Washington	Richwoods Fire Protection District	Unknown	0.01
2021-11044-323120	11/19/2020	Washington	Richwoods Fire Protection District	Unknown	0.02
2020-11040-220575	04/28/2020	Washington	Belgrade Volunteer Fire Department	Unknown	0.08
2007-11044-032489	03/09/2007	Washington	Richwoods Fire Protection District	Unknown	0.1
2007-11044-032506	07/25/2007	Washington	Richwoods Fire Protection District	Unknown	0.1
2007-11044-032513	11/03/2007	Washington	Richwoods Fire Protection District	Unknown	0.1
2007-11044-032514	11/04/2007	Washington	Richwoods Fire Protection District	Unknown	0.1
2008-11040-036789	02/20/2008	Washington	Belgrade Volunteer Fire Department	Unknown	0.1
2010-09421-052314	10/31/2010	Washington	Leadwood Fire Protection District	Unknown	0.1
2010-11044-051244	08/31/2010	Washington	Richwoods Fire Protection District	Unknown	0.1

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2010-11044-051265	10/22/2010	Washington	Richwoods Fire Protection District	Unknown	0.1
2010-11044-051270	10/24/2010	Washington	Richwoods Fire Protection District	Unknown	0.1
2011-09421-062286	03/12/2011	Washington	Leadwood Fire Protection District	Unknown	0.1
2011-09421-062287	03/13/2011	Washington	Leadwood Fire Protection District	Unknown	0.1
2011-11044-061893	04/03/2011	Washington	Richwoods Fire Protection District	Unknown	0.1
2011-11044-061895	04/06/2011	Washington	Richwoods Fire Protection District	Unknown	0.1
2011-11044-061913	10/15/2011	Washington	Richwoods Fire Protection District	Unknown	0.1
2012-09421-069182	01/07/2012	Washington	Leadwood Fire Protection District	Unknown	0.1
2012-11044-068965	03/06/2012	Washington	Richwoods Fire Protection District	Unknown	0.1
2012-11044-075915	03/27/2012	Washington	Richwoods Fire Protection District	Unknown	0.1
2013-11044-091601	06/03/2013	Washington	Richwoods Fire Protection District	Unknown	0.1
2016-05004-134626	03/17/2016	Washington	Mapaville Fire Prot. Dist.	Unknown	0.1
2017-11044-158214	05/08/2016	Washington	Richwoods Fire Protection District	Unknown	0.1
2017-11044-158216	04/24/2016	Washington	Richwoods Fire Protection District	Unknown	0.1
2017-11044-160312	03/15/2016	Washington	Richwoods Fire Protection District	Unknown	0.1
2011-11044-061898	10/07/2011	Washington	Richwoods Fire Protection District	Unknown	0.2
2012-11044-075914	03/27/2012	Washington	Richwoods Fire Protection District	Unknown	0.2
2006-11043-024724	07/05/2006	Washington	Potosi Fire Protection District	Unknown	0.25
2008-11040-036797	12/08/2008	Washington	Belgrade Volunteer Fire Department	Unknown	0.25
2010-11044-051275	12/04/2010	Washington	Richwoods Fire Protection District	Unknown	0.25
2013-11044-091596	03/14/2013	Washington	Richwoods Fire Protection District	Unknown	0.25
2014-11043-104365	04/12/2014	Washington	Potosi Fire Protection District	Unknown	0.25
2014-11043-108486	08/04/2014	Washington	Potosi Fire Protection District	Unknown	0.25
2015-11043-121352	03/23/2015	Washington	Potosi Fire Protection District	Unknown	0.25
2015-11044-130679	05/17/2015	Washington	Richwoods Fire Protection District	Unknown	0.25
			Bismarck Rural Fire Protection		
2020-09402-241054	03/05/2020	Washington	Association, Inc.	Unknown	0.29
2007-03627-028757	03/13/2007	Washington	Sullivan Fire Protection District	Unknown	0.3
2011-11044-061911	05/07/2011	Washington	Richwoods Fire Protection District	Unknown	0.3
2020-11040-241139	08/23/2020	Washington	Belgrade Volunteer Fire Department	Unknown	0.34

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2007-03627-027981	03/04/2007	Washington	Sullivan Fire Protection District	Unknown	0.4
2011-09421-062289	03/22/2011	Washington	Leadwood Fire Protection District	Unknown	0.4
2003-03627-003129	09/22/2003	Washington	Sullivan Fire Protection District	Unknown	0.5
2003-03627-003130	09/22/2003	Washington	Sullivan Fire Protection District	Unknown	0.5
2003-03627-003139	03/16/2003	Washington	Sullivan Fire Protection District	Unknown	0.5
2006-11043-024723	07/07/2006	Washington	Potosi Fire Protection District	Unknown	0.5
2006-11043-024727	06/02/2006	Washington	Potosi Fire Protection District	Unknown	0.5
2007-03627-028758	03/18/2007	Washington	Sullivan Fire Protection District	Unknown	0.5
2008-03627-033770	02/09/2008	Washington	Sullivan Fire Protection District	Unknown	0.5
2010-03600-053082	04/01/2010	Washington	SULLIVAN FORESTRY	Unknown	0.5
2010-03627-045608	04/18/2010	Washington	Sullivan Fire Protection District	Unknown	0.5
2010-03627-049597	11/11/2010	Washington	Sullivan Fire Protection District	Unknown	0.5
2012-03627-074854	08/01/2012	Washington	Sullivan Fire Protection District	Unknown	0.5
2014-03627-095742	03/15/2014	Washington	Sullivan Fire Protection District	Unknown	0.5
2014-09432-093872	01/29/2014	Washington	Terre Du Lac Fire	Unknown	0.5
2014-11043-104364	04/12/2014	Washington	Potosi Fire Protection District	Unknown	0.5
2015-11043-121349	03/21/2015	Washington	Potosi Fire Protection District	Unknown	0.5
2015-11043-121353	03/23/2015	Washington	Potosi Fire Protection District	Unknown	0.5
2015-11043-129216	10/11/2015	Washington	Potosi Fire Protection District	Unknown	0.5
2015-11043-131131	12/10/2015	Washington	Potosi Fire Protection District	Unknown	0.5
2016-11043-133999	02/20/2016	Washington	Potosi Fire Protection District	Unknown	0.5
2016-11043-134001	02/20/2016	Washington	Potosi Fire Protection District	Unknown	0.5
2017-05007-164491	12/18/2017	Washington	Desoto Rural Fire Protection District	Unknown	0.5
2020-11040-241141	11/03/2020	Washington	Belgrade Volunteer Fire Department	Unknown	0.54
2003-00008-001359	03/21/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Unknown	1
2003-00008-001496	03/30/2003	Washington	MDC REPORTING REGION - ST. LOUIS	Unknown	1
2004-03627-004044	02/20/2004	Washington	Sullivan Fire Protection District	Unknown	1
2004-03627-004045	02/25/2004	Washington	Sullivan Fire Protection District	Unknown	1
2004-03627-006257	07/10/2004	Washington	Sullivan Fire Protection District	Unknown	1
2004-11040-004039	03/20/2004	Washington	Belgrade Volunteer Fire Department	Unknown	1

2004-11040-004040	03/20/2004	Washington	Belgrade Volunteer Fire Department	Unknown	1
2005-03627-008720	04/03/2005	Washington	Sullivan Fire Protection District	Unknown	1
2005-11040-009501	06/10/2005	Washington	Belgrade Volunteer Fire Department	Unknown	1
2005-11040-009949	07/10/2005	Washington	Belgrade Volunteer Fire Department	Unknown	1
2005-11040-009954	11/24/2005	Washington	Belgrade Volunteer Fire Department	Unknown	1
2005-11040-009969	11/21/2005	Washington	Belgrade Volunteer Fire Department	Unknown	1
2005-11043-007786	04/04/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-007811	03/14/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-007813	03/14/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-007818	03/12/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-007820	03/12/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-007822	03/12/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-009157	07/02/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-009159	06/26/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-009160	06/25/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-009804	10/06/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-010036	12/18/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-010037	12/05/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-010038	11/25/2005	Washington	Potosi Fire Protection District	Unknown	1
2005-11043-010055	11/12/2005	Washington	Potosi Fire Protection District	Unknown	1
2006-09421-033034	04/07/2006	Washington	Leadwood Fire Protection District	Unknown	1
2006-11040-012647	03/11/2006	Washington	Belgrade Volunteer Fire Department	Unknown	1
2006-11040-012648	03/04/2006	Washington	Belgrade Volunteer Fire Department	Unknown	1
2006-11040-025271	07/05/2006	Washington	Belgrade Volunteer Fire Department	Unknown	1
2006-11040-025307	07/03/2006	Washington	Belgrade Volunteer Fire Department	Unknown	1
2006-11040-026192	09/22/2006	Washington	Belgrade Volunteer Fire Department	Unknown	1
2006-11040-027215	11/04/2006	Washington	Belgrade Volunteer Fire Department	Unknown	1
2006-11043-011003	02/02/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011039	01/26/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011043	01/20/2006	Washington	Potosi Fire Protection District	Unknown	1

2006-11043-011047	01/26/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011399	02/27/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011401	02/27/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011857	03/03/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011861	03/03/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011864	03/03/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-011868	03/01/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-012841	03/19/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-012843	03/18/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-012865	03/16/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-012867	03/15/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-012872	03/15/2006	Washington	Potosi Fire Protection District	Unknown	1
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2006-11043-013024	04/12/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-013027	04/09/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-023760	04/28/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025170	07/24/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025171	07/24/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025173	07/23/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025174	07/23/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025175	07/16/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025275	08/07/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025276	08/06/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025285	08/06/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025286	08/06/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025288	08/05/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025289	08/05/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025290	08/02/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-025291	08/02/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026168	09/06/2006	Washington	Potosi Fire Protection District	Unknown	1

2006-11043-026170	09/04/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026176	10/15/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026177	10/14/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026178	10/14/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026181	10/14/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026184	10/07/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026186	09/26/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026187	09/26/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026188	09/22/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-026190	09/15/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027374	11/28/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027377	11/24/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027381	11/21/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027382	11/20/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027383	11/20/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027385	11/05/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027386	11/05/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027387	11/05/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027388	11/04/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027389	10/04/2006	Washington	Potosi Fire Protection District	Unknown	1
2006-11043-027390	10/30/2006	Washington	Potosi Fire Protection District	Unknown	1
2007-03627-027982	03/05/2007	Washington	Sullivan Fire Protection District	Unknown	1
2007-11042-028897	03/29/2007	Washington	Irondale Fire Protection District	Unknown	1
2007-11043-027351	01/03/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-027454	02/06/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-027834	02/23/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028207	03/07/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028208	03/08/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028241	03/07/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028289	03/10/2007	Washington	Potosi Fire Protection District	Unknown	1

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2007-11043-028376	03/11/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028377	03/12/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028381	03/12/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028523	03/19/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028524	03/18/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-028790	03/27/2007	Washington	Potosi Fire Protection District	Unknown	1
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2007-11043-028932	04/05/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029003	04/08/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029087	04/10/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029170	04/12/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029277	04/20/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029278	04/20/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029282	04/22/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029309	04/24/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029444	04/29/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029579	04/29/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-029580	04/29/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-030311	07/16/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-030546	07/25/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-030655	08/04/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-030780	08/08/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-030781	08/09/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-030834	08/14/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031051	09/01/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031170	09/14/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031417	10/12/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031760	11/10/2007	Washington	Potosi Fire Protection District	Unknown	1

2007-11043-031876	11/15/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031877	11/17/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031881	11/17/2007	Washington	Potosi Fire Protection District	Unknown	1
2007-11043-031882	11/17/2007	Washington	Potosi Fire Protection District	Unknown	1
2008-09421-033461	01/29/2008	Washington	Leadwood Fire Protection District	Unknown	1
2008-09421-036479	01/26/2008	Washington	Leadwood Fire Protection District	Unknown	1
2008-11043-032670	01/06/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-033193	01/25/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-033194	01/27/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-033232	01/30/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-033743	03/12/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-033926	03/25/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-034163	04/05/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-034164	04/06/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-034270	04/15/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-034272	04/16/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-034313	04/22/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-035029	07/06/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-035096	07/17/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-036257	12/08/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-036258	12/08/2008	Washington	Potosi Fire Protection District	Unknown	1
2008-11043-036349	12/23/2008	Washington	Potosi Fire Protection District	Unknown	1
2009-09421-038091	02/25/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-09421-038092	02/25/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-09421-039589	03/01/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-09421-039591	03/07/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-09421-039597	03/07/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-09421-039599	03/14/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-09421-039630	03/26/2009	Washington	Leadwood Fire Protection District	Unknown	1
2009-11040-041842	02/16/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1

2009-11040-041849	08/25/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1
2009-11040-041864	03/10/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1
2009-11040-041883	03/17/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1
2009-11040-042170	10/10/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1
2009-11040-042403	11/05/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1
2009-11040-043396	12/18/2009	Washington	Belgrade Volunteer Fire Department	Unknown	1
2009-11043-037130	01/21/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-037208	01/25/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-037612	02/15/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-037616	02/15/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-038059	02/22/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-038074	03/02/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-038075	03/02/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039016	02/25/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039019	03/02/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039020	03/02/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039024	03/07/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039025	03/07/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039027	03/08/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039028	03/13/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039029	03/14/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039031	03/15/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039032	03/15/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039033	03/15/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039034	03/16/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039035	03/16/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039036	03/16/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039038	03/23/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039040	03/23/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-039952	04/26/2009	Washington	Potosi Fire Protection District	Unknown	1

2009-11043-042386	11/04/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042387	11/05/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042456	11/07/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042457	11/08/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042459	11/10/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042462	11/07/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042463	11/11/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042557	11/13/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042572	11/12/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11043-042755	11/30/2009	Washington	Potosi Fire Protection District	Unknown	1
2009-11044-043092	03/08/2009	Washington	Richwoods Fire Protection District	Unknown	1
2010-03627-045232	03/31/2010	Washington	Sullivan Fire Protection District	Unknown	1
2010-09401-053027	04/20/2010	Washington	Bismarck City Fire Department	Unknown	1
2010-09421-052348	10/24/2010	Washington	Leadwood Fire Protection District	Unknown	1
2010-11040-058202	03/19/2010	Washington	Belgrade Volunteer Fire Department	Unknown	1
2010-11040-058206	05/08/2010	Washington	Belgrade Volunteer Fire Department	Unknown	1
2010-11040-058207	05/09/2010	Washington	Belgrade Volunteer Fire Department	Unknown	1
2010-11040-058208	07/03/2010	Washington	Belgrade Volunteer Fire Department	Unknown	1
2010-11040-058209	08/09/2010	Washington	Belgrade Volunteer Fire Department	Unknown	1
2010-11041-052718	07/03/2010	Washington	Caledonia Fire Protection Dist.	Unknown	1
2010-11041-052719	08/28/2010	Washington	Caledonia Fire Protection Dist.	Unknown	1
2010-11043-044911	03/07/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044912	03/07/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044913	03/07/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044914	03/08/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044921	03/06/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044922	03/07/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044923	03/07/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044927	03/06/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-044928	03/06/2010	Washington	Potosi Fire Protection District	Unknown	1

2010-11043-045838	03/30/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045840	04/03/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045863	03/31/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045865	04/01/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045871	04/12/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045873	04/13/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045881	04/04/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045884	04/07/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045885	04/09/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-045889	04/10/2010	Washington	Potosi Fire Protection District	Unknown	1
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2010-11043-049061	10/15/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-049280	10/23/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-049301	10/26/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-049302	10/27/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-049390	10/30/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050947	11/01/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050949	11/01/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050950	11/08/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050981	10/30/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050982	11/01/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050983	11/03/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-050987	11/08/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11043-051001	11/08/2010	Washington	Potosi Fire Protection District	Unknown	1
2010-11044-051257	11/10/2010	Washington	Richwoods Fire Protection District	Unknown	1
2010-11044-051264	04/20/2010	Washington	Richwoods Fire Protection District	Unknown	1
2011-05007-061347	09/30/2011	Washington	Desoto Rural Fire Protection District	Unknown	1
2011-09421-062272	04/07/2011	Washington	Leadwood Fire Protection District	Unknown	1
2011-11043-054561	02/16/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-054563	03/01/2011	Washington	Potosi Fire Protection District	Unknown	1

2011-11043-056007	03/12/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-056009	03/20/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-056010	03/22/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-061281	10/11/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-061282	10/05/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-062362	11/13/2011	Washington	Potosi Fire Protection District	Unknown	1
2011-11043-065300	12/31/2011	Washington	Potosi Fire Protection District	Unknown	1
2012-11040-072462	03/20/2012	Washington	Belgrade Volunteer Fire Department	Unknown	1
2012-11040-075457	07/05/2012	Washington	Belgrade Volunteer Fire Department	Unknown	1
2012-11040-078375	08/04/2012	Washington	Belgrade Volunteer Fire Department	Unknown	1
2012-11042-074601	07/24/2012	Washington	Irondale Fire Protection Distrct	Unknown	1
2012-11043-066842	02/02/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-068107	02/27/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-068108	02/29/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-069137	03/07/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-069139	03/10/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-069140	03/13/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-069169	03/07/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-069173	03/14/2012	Washington	Potosi Fire Protection District	Unknown	1
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2012-11043-070321	04/19/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-072842	06/25/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-074362	07/18/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-074381	07/13/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-074382	07/18/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-075686	08/15/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-076101	08/22/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-076346	08/24/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-076526	08/22/2012	Washington	Potosi Fire Protection District	Unknown	1
2012-11043-078863	11/10/2012	Washington	Potosi Fire Protection District	Unknown	1

2012-11043-078864	11/10/2012	Washington	Potosi Fire Protection District	Unknown	1
2013-05007-086164	04/14/2013	Washington	Desoto Rural Fire Protection District	Unknown	1
2013-11043-086031	04/05/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-086032	04/05/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-086033	04/06/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-086644	04/29/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-087382	05/11/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-088964	08/01/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-089543	09/04/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-089807	09/22/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-091891	11/27/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-091892	11/28/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-091893	11/28/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-091894	11/29/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-091966	11/29/2013	Washington	Potosi Fire Protection District	Unknown	1
2013-11043-092664	12/28/2013	Washington	Potosi Fire Protection District	Unknown	1
2014-04718-093969	01/22/2014	Washington	Quad County Fire Protection District	Unknown	1
2014-05007-098744	03/11/2014	Washington	Desoto Rural Fire Protection District	Unknown	1
2014-09432-096207	03/21/2014	Washington	Terre Du Lac Fire	Unknown	1
2014-11040-094222	01/25/2014	Washington	Belgrade Volunteer Fire Department	Unknown	1
2014-11040-094223	01/25/2014	Washington	Belgrade Volunteer Fire Department	Unknown	1
2014-11040-094224	01/28/2014	Washington	Belgrade Volunteer Fire Department	Unknown	1
2014-11040-094226	01/30/2014	Washington	Belgrade Volunteer Fire Department	Unknown	1
2014-11040-111210	09/13/2014	Washington	Belgrade Volunteer Fire Department	Unknown	1
2014-11040-111211	09/19/2014	Washington	Belgrade Volunteer Fire Department	Unknown	1
2014-11043-093272	01/20/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-093649	01/26/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-094162	01/26/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-094163	01/29/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-094517	01/29/2014	Washington	Potosi Fire Protection District	Unknown	1

2014-11043-095783	02/19/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-095785	02/22/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-095786	02/22/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-095787	02/22/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-095792	02/25/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-096617	02/28/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-096618	02/28/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-096619	03/11/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-096622	03/13/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-096623	03/13/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-099748	03/20/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-099751	03/20/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-099752	03/20/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-102742	03/23/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-102743	03/30/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-104366	04/17/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-104370	04/19/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-104373	04/23/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-104374	04/24/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-104375	04/24/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-106462	05/07/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11043-106463	05/08/2014	Washington	Potosi Fire Protection District	Unknown	1
2014-11044-130661	03/21/2014	Washington	Richwoods Fire Protection District	Unknown	1
2014-11044-130662	03/21/2014	Washington	Richwoods Fire Protection District	Unknown	1
2015-11043-117370	01/23/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11043-117371	01/23/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11043-120351	03/12/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11043-120352	03/12/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11043-120354	03/15/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11043-128010	09/06/2015	Washington	Potosi Fire Protection District	Unknown	1

2015-11043-128011	09/05/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11043-129487	10/20/2015	Washington	Potosi Fire Protection District	Unknown	1
2015-11044-130677	03/31/2015	Washington	Richwoods Fire Protection District	Unknown	1
2016-09401-138111	03/24/2016	Washington	Bismarck City Fire Department	Unknown	1
2016-11042-134453	01/06/2016	Washington	Irondale Fire Protection District	Unknown	1
2016-11043-133316	01/29/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-133317	01/31/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-133749	01/29/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-133998	02/19/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-134008	02/27/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-134010	03/06/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-134011	03/06/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-134012	03/06/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-135357	03/23/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-135360	04/03/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-135361	04/03/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-136091	04/23/2016	Washington	Potosi Fire Protection District	Unknown	1
2016-11043-141754	11/17/2016	Washington	Potosi Fire Protection District	Unknown	1
2017-03627-143371	12/31/2016	Washington	Sullivan Fire Protection District	Unknown	1
2017-11042-155872	04/03/2016	Washington	Irondale Fire Protection District	Unknown	1
2017-11042-155891	04/12/2016	Washington	Irondale Fire Protection District	Unknown	1
2017-11042-155893	04/17/2016	Washington	Irondale Fire Protection District	Unknown	1
2017-11042-155894	05/06/2016	Washington	Irondale Fire Protection District	Unknown	1
2017-11042-155911	08/11/2016	Washington	Irondale Fire Protection District	Unknown	1
2017-11043-145354	02/10/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-145355	02/11/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-145357	02/13/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-145999	02/17/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-147701	02/17/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-147702	03/03/2017	Washington	Potosi Fire Protection District	Unknown	1

2017-11043-148913	03/10/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-148915	03/18/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-148917	03/23/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-150331	04/15/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-150332	04/15/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-155391	07/09/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-156151	07/02/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-159371	09/21/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-159372	09/24/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-163631	11/28/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-163932	12/11/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-164651	12/15/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11043-164652	12/20/2017	Washington	Potosi Fire Protection District	Unknown	1
2017-11044-158219	04/12/2016	Washington	Richwoods Fire Protection District	Unknown	1
2017-11044-160292	03/17/2016	Washington	Richwoods Fire Protection District	Unknown	1
2018-11043-176585	03/15/2018	Washington	Potosi Fire Protection District	Unknown	1.01
2018-11043-176586	03/21/2018	Washington	Potosi Fire Protection District	Unknown	1.01
2018-11043-176532	03/14/2018	Washington	Potosi Fire Protection District	Unknown	1.02
2018-11043-165967	02/14/2018	Washington	Potosi Fire Protection District	Unknown	1.05
2018-11043-165965	02/09/2018	Washington	Potosi Fire Protection District	Unknown	1.09
2018-09401-176408	01/31/2018	Washington	Bismarck City Fire Department	Unknown	1.17
2020-11040-241143	11/07/2020	Washington	Belgrade Volunteer Fire Department	Unknown	1.43
2011-09421-062299	10/15/2011	Washington	Leadwood Fire Protection District	Unknown	1.5
2013-11043-086028	04/04/2013	Washington	Potosi Fire Protection District	Unknown	1.5
2014-03627-095987	03/20/2014	Washington	Sullivan Fire Protection District	Unknown	1.5
2014-11043-104362	04/06/2014	Washington	Potosi Fire Protection District	Unknown	1.5
2015-11043-120350	03/11/2015	Washington	Potosi Fire Protection District	Unknown	1.5
2015-11043-122190	04/12/2015	Washington	Potosi Fire Protection District	Unknown	1.5
2015-11043-130450	11/13/2015	Washington	Potosi Fire Protection District	Unknown	1.5
2015-11043-130451	11/14/2015	Washington	Potosi Fire Protection District	Unknown	1.5

2016-11043-133751	02/06/2016	Washington	Potosi Fire Protection District	Unknown	1.5
2016-11043-134003	02/21/2016	Washington	Potosi Fire Protection District	Unknown	1.5
2017-11043-149834	04/12/2017	Washington	Potosi Fire Protection District	Unknown	1.5
2017-11043-162972	11/24/2017	Washington	Potosi Fire Protection District	Unknown	1.5
2017-11043-162973	11/24/2017	Washington	Potosi Fire Protection District	Unknown	1.5
2018-11043-176587	04/09/2018	Washington	Potosi Fire Protection District	Unknown	1.5
2018-05007-176851	05/07/2018	Washington	Desoto Rural Fire Protection District	Unknown	1.74
2003-11040-000852	04/14/2003	Washington	Belgrade Volunteer Fire Department	Unknown	2
2004-11043-005137	04/09/2004	Washington	Potosi Fire Protection District	Unknown	2
2005-11040-007775	04/04/2005	Washington	Belgrade Volunteer Fire Department	Unknown	2
2005-11040-007777	04/18/2005	Washington	Belgrade Volunteer Fire Department	Unknown	2
2005-11040-009968	11/24/2005	Washington	Belgrade Volunteer Fire Department	Unknown	2
2005-11043-007810	03/14/2005	Washington	Potosi Fire Protection District	Unknown	2
2006-11043-011404	02/24/2006	Washington	Potosi Fire Protection District	Unknown	2
2006-11043-013026	04/11/2006	Washington	Potosi Fire Protection District	Unknown	2
2006-11043-025168	07/29/2006	Washington	Potosi Fire Protection District	Unknown	2
2006-11043-025274	08/07/2006	Washington	Potosi Fire Protection District	Unknown	2
2006-11043-026185	10/03/2006	Washington	Potosi Fire Protection District	Unknown	2
2007-03627-027493	02/06/2007	Washington	Sullivan Fire Protection District	Unknown	2
2007-09421-032984	04/23/2007	Washington	Leadwood Fire Protection District	Unknown	2
2007-09421-032986	03/04/2007	Washington	Leadwood Fire Protection District	Unknown	2
2007-09421-032987	03/07/2007	Washington	Leadwood Fire Protection District	Unknown	2
2007-11043-027375	11/06/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-027907	03/01/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-028290	03/10/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-028378	03/12/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-028789	03/27/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-028844	04/01/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-029004	04/08/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-029079	04/09/2007	Washington	Potosi Fire Protection District	Unknown	2

2007-11043-030307	07/14/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-030645	07/06/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-030782	08/10/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-031066	09/03/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-031349	10/04/2007	Washington	Potosi Fire Protection District	Unknown	2
2007-11043-031515	10/19/2007	Washington	Potosi Fire Protection District	Unknown	2
2008-11043-033233	01/30/2008	Washington	Potosi Fire Protection District	Unknown	2
2008-11043-034273	04/17/2008	Washington	Potosi Fire Protection District	Unknown	2
2008-11043-034297	04/17/2008	Washington	Potosi Fire Protection District	Unknown	2
2008-11043-034298	04/21/2008	Washington	Potosi Fire Protection District	Unknown	2
2008-11043-036259	12/08/2008	Washington	Potosi Fire Protection District	Unknown	2
2009-09421-038088	02/25/2009	Washington	Leadwood Fire Protection District	Unknown	2
2009-09421-040342	04/25/2009	Washington	Leadwood Fire Protection District	Unknown	2
2009-09421-040344	04/26/2009	Washington	Leadwood Fire Protection District	Unknown	2
2009-11040-041847	03/14/2009	Washington	Belgrade Volunteer Fire Department	Unknown	2
2009-11043-037207	01/24/2009	Washington	Potosi Fire Protection District	Unknown	2
2009-11043-038076	02/25/2009	Washington	Potosi Fire Protection District	Unknown	2
2009-11043-039015	02/25/2009	Washington	Potosi Fire Protection District	Unknown	2
2009-11043-039017	02/25/2009	Washington	Potosi Fire Protection District	Unknown	2
2009-11043-039030	03/14/2009	Washington	Potosi Fire Protection District	Unknown	2
2009-11043-042458	11/08/2009	Washington	Potosi Fire Protection District	Unknown	2
2009-11043-042556	11/08/2009	Washington	Potosi Fire Protection District	Unknown	2
2010-09421-052312	10/20/2010	Washington	Leadwood Fire Protection District	Unknown	2
2010-11040-058201	03/30/2010	Washington	Belgrade Volunteer Fire Department	Unknown	2
2010-11043-044544	02/26/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-044924	03/08/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-045076	03/23/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-045862	03/31/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-045866	04/04/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-045872	04/13/2010	Washington	Potosi Fire Protection District	Unknown	2

2010-11043-045891	04/10/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-049402	10/29/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-050948	11/01/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-051003	11/15/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11043-051021	11/22/2010	Washington	Potosi Fire Protection District	Unknown	2
2010-11044-051308	11/08/2010	Washington	Richwoods Fire Protection District	Unknown	2
2011-11043-054342	02/18/2011	Washington	Potosi Fire Protection District	Unknown	2
2011-11043-056008	03/13/2011	Washington	Potosi Fire Protection District	Unknown	2
2011-11043-063076	11/19/2011	Washington	Potosi Fire Protection District	Unknown	2
2012-11040-072425	03/06/2012	Washington	Belgrade Volunteer Fire Department	Unknown	2
2012-11043-074190	07/10/2012	Washington	Potosi Fire Protection District	Unknown	2
2012-11043-076102	08/23/2012	Washington	Potosi Fire Protection District	Unknown	2
2013-11043-086026	04/01/2013	Washington	Potosi Fire Protection District	Unknown	2
2013-11043-086027	04/01/2013	Washington	Potosi Fire Protection District	Unknown	2
2013-11043-086030	04/05/2013	Washington	Potosi Fire Protection District	Unknown	2
2013-11043-092762	12/31/2013	Washington	Potosi Fire Protection District	Unknown	2
2013-11043-092843	12/31/2013	Washington	Potosi Fire Protection District	Unknown	2
2014-09432-096208	03/21/2014	Washington	Terre Du Lac Fire	Unknown	2
2014-11043-093643	01/24/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-093646	01/25/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-093650	01/26/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-095788	02/22/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-095789	02/22/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-095790	02/22/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-099756	03/21/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-099758	03/21/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-099759	03/21/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-099760	03/21/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-102722	03/22/2014	Washington	Potosi Fire Protection District	Unknown	2
2014-11043-104367	04/18/2014	Washington	Potosi Fire Protection District	Unknown	2

2014-11043-104372	04/20/2014	Washington	Potosi Fire Protection District	Unknown	2
2015-11040-130553	11/10/2015	Washington	Belgrade Volunteer Fire Department	Unknown	2
2015-11043-117372	01/24/2015	Washington	Potosi Fire Protection District	Unknown	2
2015-11043-120353	03/15/2015	Washington	Potosi Fire Protection District	Unknown	2
2015-11043-129483	10/19/2015	Washington	Potosi Fire Protection District	Unknown	2
2015-11043-129484	10/19/2015	Washington	Potosi Fire Protection District	Unknown	2
2015-11043-129486	10/20/2015	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-133314	01/28/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-133315	01/28/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-133318	01/28/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-134005	02/22/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-135671	04/13/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-135855	04/14/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-135856	04/18/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-137652	05/07/2016	Washington	Potosi Fire Protection District	Unknown	2
2016-11043-141712	11/13/2016	Washington	Potosi Fire Protection District	Unknown	2
2017-05007-144812	02/04/2017	Washington	Desoto Rural Fire Protection District	Unknown	2
2017-05007-165022	12/05/2017	Washington	Desoto Rural Fire Protection District	Unknown	2
2017-09421-156994	02/22/2016	Washington	Leadwood Fire Protection District	Unknown	2
2017-11043-146000	02/17/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11043-146001	02/19/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11043-148911	03/09/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11043-149711	04/09/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11043-156152	07/30/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11043-164434	12/11/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11043-164653	12/20/2017	Washington	Potosi Fire Protection District	Unknown	2
2017-11044-158218	04/14/2016	Washington	Richwoods Fire Protection District	Unknown	2
2020-11040-241140	10/17/2020	Washington	Belgrade Volunteer Fire Department	Unknown	2
2020-11040-220577	03/07/2020	Washington	Belgrade Volunteer Fire Department	Unknown	2.21
2012-09421-069206	03/06/2012	Washington	Leadwood Fire Protection District	Unknown	2.5

2013-11043-091428	11/18/2013	Washington	Potosi Fire Protection District	Unknown	2.5
2015-11040-130551	10/24/2015	Washington	Belgrade Volunteer Fire Department	Unknown	2.5
2016-11043-133996	02/07/2016	Washington	Potosi Fire Protection District	Unknown	2.5
2004-09421-007205	02/28/2004	Washington	Leadwood Fire Protection District	Unknown	3
2005-03627-009903	11/25/2005	Washington	Sullivan Fire Protection District	Unknown	3
2006-11043-011041	01/24/2006	Washington	Potosi Fire Protection District	Unknown	3
2006-11043-012860	03/18/2006	Washington	Potosi Fire Protection District	Unknown	3
2006-11043-013019	04/16/2006	Washington	Potosi Fire Protection District	Unknown	3
2007-11043-029280	04/21/2007	Washington	Potosi Fire Protection District	Unknown	3
2007-11043-030838	08/17/2007	Washington	Potosi Fire Protection District	Unknown	3
2008-11043-033379	02/09/2008	Washington	Potosi Fire Protection District	Unknown	3
2008-11043-034271	04/15/2008	Washington	Potosi Fire Protection District	Unknown	3
2008-11043-034360	04/29/2008	Washington	Potosi Fire Protection District	Unknown	3
2008-11043-036256	12/08/2008	Washington	Potosi Fire Protection District	Unknown	3
2009-11043-039021	03/07/2009	Washington	Potosi Fire Protection District	Unknown	3
2010-03627-049321	11/02/2010	Washington	Sullivan Fire Protection District	Unknown	3
2010-09421-052350	10/29/2010	Washington	Leadwood Fire Protection District	Unknown	3
2010-11040-058204	03/06/2010	Washington	Belgrade Volunteer Fire Department	Unknown	3
2010-11040-058221	04/13/2010	Washington	Belgrade Volunteer Fire Department	Unknown	3
2010-11041-052722	08/29/2010	Washington	Caledonia Fire Protection Dist.	Unknown	3
2010-11043-045839	03/31/2010	Washington	Potosi Fire Protection District	Unknown	3
2010-11043-045870	04/12/2010	Washington	Potosi Fire Protection District	Unknown	3
2010-11043-045883	04/06/2010	Washington	Potosi Fire Protection District	Unknown	3
2010-11043-045887	04/10/2010	Washington	Potosi Fire Protection District	Unknown	3
2010-11043-050951	11/09/2010	Washington	Potosi Fire Protection District	Unknown	3
2010-11043-050953	11/11/2010	Washington	Potosi Fire Protection District	Unknown	3
2010-11043-050985	11/07/2010	Washington	Potosi Fire Protection District	Unknown	3
2011-03627-062269	11/12/2011	Washington	Sullivan Fire Protection District	Unknown	3
2011-11043-065359	12/30/2011	Washington	Potosi Fire Protection District	Unknown	3
2012-05007-073264	07/04/2012	Washington	Desoto Rural Fire Protection District	Unknown	3

2012-11040-072428	04/11/2012	Washington	Belgrade Volunteer Fire Department	Unknown	3
2012-11040-075456	06/22/2012	Washington	Belgrade Volunteer Fire Department	Unknown	3
2012-11043-066841	02/01/2012	Washington	Potosi Fire Protection District	Unknown	3
2012-11043-068106	02/26/2012	Washington	Potosi Fire Protection District	Unknown	3
2013-11043-086643	04/22/2013	Washington	Potosi Fire Protection District	Unknown	3
2013-11043-091427	11/18/2013	Washington	Potosi Fire Protection District	Unknown	3
2014-11040-096564	02/22/2014	Washington	Belgrade Volunteer Fire Department	Unknown	3
2014-11043-095784	02/21/2014	Washington	Potosi Fire Protection District	Unknown	3
2014-11043-099746	03/15/2014	Washington	Potosi Fire Protection District	Unknown	3
2014-11044-130655	03/11/2014	Washington	Richwoods Fire Protection District	Unknown	3
2014-11044-130668	11/04/2014	Washington	Richwoods Fire Protection District	Unknown	3
2015-09432-121447	03/31/2015	Washington	Terre Du Lac Fire	Unknown	3
2015-11043-118098	02/08/2015	Washington	Potosi Fire Protection District	Unknown	3
2015-11043-121351	03/21/2015	Washington	Potosi Fire Protection District	Unknown	3
2016-11042-134454	01/11/2016	Washington	Irondale Fire Protection District	Unknown	3
2016-11043-141753	11/10/2016	Washington	Potosi Fire Protection District	Unknown	3
2017-09421-156993	02/21/2016	Washington	Leadwood Fire Protection District	Unknown	3
2017-11042-155873	04/04/2016	Washington	Irondale Fire Protection District	Unknown	3
2017-11043-145346	02/05/2017	Washington	Potosi Fire Protection District	Unknown	3
2017-11043-148914	03/18/2017	Washington	Potosi Fire Protection District	Unknown	3
2017-11043-148918	03/23/2017	Washington	Potosi Fire Protection District	Unknown	3
2017-11043-150571	04/14/2017	Washington	Potosi Fire Protection District	Unknown	3
2017-11043-159373	10/02/2017	Washington	Potosi Fire Protection District	Unknown	3
2018-11043-176588	04/09/2018	Washington	Potosi Fire Protection District	Unknown	3.02
2018-11043-176589	04/10/2018	Washington	Potosi Fire Protection District	Unknown	3.09
2011-03600-053040	01/06/2011	Washington	SULLIVAN FORESTRY	Unknown	3.5
2011-11043-052737	01/06/2011	Washington	Potosi Fire Protection District	Unknown	3.5
2014-11043-093648	01/25/2014	Washington	Potosi Fire Protection District	Unknown	3.5
2014-11044-130652	02/28/2014	Washington	Richwoods Fire Protection District	Unknown	3.5
2007-11043-028135	03/04/2007	Washington	Potosi Fire Protection District	Unknown	4

2007-11043-028424	03/05/2007	Washington	Potosi Fire Protection District	Unknown	4
2007-11043-028791	03/27/2007	Washington	Potosi Fire Protection District	Unknown	4
2007-11043-031878	11/17/2007	Washington	Potosi Fire Protection District	Unknown	4
2008-11040-036796	12/07/2008	Washington	Belgrade Volunteer Fire Department	Unknown	4
2010-04718-048062	08/09/2010	Washington	Quad County Fire Protection District	Unknown	4
2010-11043-044961	03/05/2010	Washington	Potosi Fire Protection District	Unknown	4
2010-11043-045886	04/10/2010	Washington	Potosi Fire Protection District	Unknown	4
2010-11043-049279	10/23/2010	Washington	Potosi Fire Protection District	Unknown	4
2012-11043-069164	03/06/2012	Washington	Potosi Fire Protection District	Unknown	4
2012-11043-069166	03/06/2012	Washington	Potosi Fire Protection District	Unknown	4
2012-11043-072806	06/20/2012	Washington	Potosi Fire Protection District	Unknown	4
2013-11043-091425	11/14/2013	Washington	Potosi Fire Protection District	Unknown	4
2013-11043-091890	11/27/2013	Washington	Potosi Fire Protection District	Unknown	4
2014-11040-096565	02/22/2014	Washington	Belgrade Volunteer Fire Department	Unknown	4
2014-11043-099757	03/21/2014	Washington	Potosi Fire Protection District	Unknown	4
2015-11043-129218	10/11/2015	Washington	Potosi Fire Protection District	Unknown	4
2016-11043-135854	04/14/2016	Washington	Potosi Fire Protection District	Unknown	4
2017-05007-146939	01/30/2017	Washington	Desoto Rural Fire Protection District	Unknown	4
2017-11044-160313	03/05/2016	Washington	Richwoods Fire Protection District	Unknown	4
2018-11043-165969	02/15/2018	Washington	Potosi Fire Protection District	Unknown	4.91
2004-03627-004043	02/18/2004	Washington	Sullivan Fire Protection District	Unknown	5
2005-11043-007816	03/14/2005	Washington	Potosi Fire Protection District	Unknown	5
2006-09421-033035	04/05/2006	Washington	Leadwood Fire Protection District	Unknown	5
2006-11043-011028	01/27/2006	Washington	Potosi Fire Protection District	Unknown	5
2006-11043-012649	03/26/2006	Washington	Potosi Fire Protection District	Unknown	5
2006-11043-012871	03/15/2006	Washington	Potosi Fire Protection District	Unknown	5
2006-11043-013032	04/01/2006	Washington	Potosi Fire Protection District	Unknown	5
2006-11043-025167	08/01/2006	Washington	Potosi Fire Protection District	Unknown	5
2006-11043-026179	10/14/2006	Washington	Potosi Fire Protection District	Unknown	5
2006-11043-026189	09/17/2006	Washington	Potosi Fire Protection District	Unknown	5

2007-09421-032964	11/17/2007	Washington	Leadwood Fire Protection District	Unknown	5
2007-09421-032965	11/17/2007	Washington	Leadwood Fire Protection District	Unknown	5
2007-09421-032966	11/17/2007	Washington	Leadwood Fire Protection District	Unknown	5
2007-09421-032982	04/19/2007	Washington	Leadwood Fire Protection District	Unknown	5
2007-09421-032983	04/02/2007	Washington	Leadwood Fire Protection District	Unknown	5
2007-09421-032985	04/28/2007	Washington	Leadwood Fire Protection District	Unknown	5
2007-09450-032551	11/07/2007	Washington	Big River Fire Protection, Inc.	Unknown	5
2007-11043-027517	02/08/2007	Washington	Potosi Fire Protection District	Unknown	5
2007-11043-028238	03/05/2007	Washington	Potosi Fire Protection District	Unknown	5
2007-11043-028880	04/02/2007	Washington	Potosi Fire Protection District	Unknown	5
2007-11043-029276	04/19/2007	Washington	Potosi Fire Protection District	Unknown	5
2007-11043-031880	11/17/2007	Washington	Potosi Fire Protection District	Unknown	5
2008-03627-036503	12/30/2008	Washington	Sullivan Fire Protection District	Unknown	5
2008-11043-034317	04/23/2008	Washington	Potosi Fire Protection District	Unknown	5
2008-11043-034414	05/05/2008	Washington	Potosi Fire Protection District	Unknown	5
2009-09421-038085	01/14/2009	Washington	Leadwood Fire Protection District	Unknown	5
2009-09421-038089	02/25/2009	Washington	Leadwood Fire Protection District	Unknown	5
2009-11043-039026	03/08/2009	Washington	Potosi Fire Protection District	Unknown	5
2009-11043-042405	11/04/2009	Washington	Potosi Fire Protection District	Unknown	5
2010-05007-059262	03/19/2010	Washington	Desoto Rural Fire Protection District	Unknown	5
2010-05007-059266	04/10/2010	Washington	Desoto Rural Fire Protection District	Unknown	5
2010-05007-059268	10/23/2010	Washington	Desoto Rural Fire Protection District	Unknown	5
2010-05007-059287	10/23/2010	Washington	Desoto Rural Fire Protection District	Unknown	5
2010-05007-059342	11/06/2010	Washington	Desoto Rural Fire Protection District	Unknown	5
2010-09401-053029	04/13/2010	Washington	Bismarck City Fire Department	Unknown	5
2010-09401-053052	03/31/2010	Washington	Bismarck City Fire Department	Unknown	5
2010-11041-052708	03/06/2010	Washington	Caledonia Fire Protection Dist.	Unknown	5
2010-11043-045102	03/24/2010	Washington	Potosi Fire Protection District	Unknown	5
2010-11043-045890	04/10/2010	Washington	Potosi Fire Protection District	Unknown	5
2010-11043-049285	10/23/2010	Washington	Potosi Fire Protection District	Unknown	5

2010-11043-049286	10/24/2010	Washington	Potosi Fire Protection District	Unknown	5
2010-11044-051254	11/09/2010	Washington	Richwoods Fire Protection District	Unknown	5
2012-09421-069187	03/06/2012	Washington	Leadwood Fire Protection District	Unknown	5
2012-09421-076258	07/10/2012	Washington	Leadwood Fire Protection District	Unknown	5
2012-09421-076259	07/10/2012	Washington	Leadwood Fire Protection District	Unknown	5
2012-11043-069175	03/20/2012	Washington	Potosi Fire Protection District	Unknown	5
2012-11044-075919	07/04/2012	Washington	Richwoods Fire Protection District	Unknown	5
2012-11044-075942	08/08/2012	Washington	Richwoods Fire Protection District	Unknown	5
2013-11043-086642	04/20/2013	Washington	Potosi Fire Protection District	Unknown	5
2014-03627-107602	07/16/2014	Washington	Sullivan Fire Protection District	Unknown	5
2014-05007-093780	01/30/2014	Washington	Desoto Rural Fire Protection District	Unknown	5
2014-05007-098742	03/11/2014	Washington	Desoto Rural Fire Protection District	Unknown	5
2014-05007-101803	04/18/2014	Washington	Desoto Rural Fire Protection District	Unknown	5
2014-09407-093542	01/25/2014	Washington	Desloge Vounteer Fire Department	Unknown	5
2014-09432-096210	03/21/2014	Washington	Terre Du Lac Fire	Unknown	5
2014-11043-099744	03/15/2014	Washington	Potosi Fire Protection District	Unknown	5
2014-11043-099753	03/20/2014	Washington	Potosi Fire Protection District	Unknown	5
2014-11043-102744	03/30/2014	Washington	Potosi Fire Protection District	Unknown	5
2016-11043-135364	04/04/2016	Washington	Potosi Fire Protection District	Unknown	5
2017-03627-143372	12/31/2016	Washington	Sullivan Fire Protection District	Unknown	5
2017-11044-160342	01/28/2016	Washington	Richwoods Fire Protection District	Unknown	5
2020-11040-241144	11/18/2020	Washington	Belgrade Volunteer Fire Department	Unknown	5.47
2018-05007-176592	04/19/2018	Washington	Desoto Rural Fire Protection District	Unknown	5.6
2005-11040-008623	02/27/2005	Washington	Belgrade Volunteer Fire Department	Unknown	6
2007-03627-027492	01/12/2007	Washington	Sullivan Fire Protection District	Unknown	6
2007-11043-031879	11/17/2007	Washington	Potosi Fire Protection District	Unknown	6
2009-11043-037128	01/21/2009	Washington	Potosi Fire Protection District	Unknown	6
2009-11043-037206	01/19/2009	Washington	Potosi Fire Protection District	Unknown	6
2010-02810-051884	11/06/2010	Washington	Bourbon Fire Protection District	Unknown	6
2010-11040-058241	11/07/2010	Washington	Belgrade Volunteer Fire Department	Unknown	6

2010-11043-050986	11/08/2010	Washington	Potosi Fire Protection District	Unknown	6
2012-11043-076653	08/30/2012	Washington	Potosi Fire Protection District	Unknown	6
2015-11043-120355	03/16/2015	Washington	Potosi Fire Protection District	Unknown	6
2015-11044-130686	11/15/2015	Washington	Richwoods Fire Protection District	Unknown	6
2016-02813-135937	04/14/2016	Washington	Steelville Fire Protection District	Unknown	6
2016-09421-140448	03/19/2016	Washington	Leadwood Fire Protection District	Unknown	6
2016-11043-134009	03/05/2016	Washington	Potosi Fire Protection District	Unknown	6
2016-11043-142011	11/21/2016	Washington	Potosi Fire Protection District	Unknown	6
2006-11043-011046	01/07/2006	Washington	Potosi Fire Protection District	Unknown	7
2007-09421-032989	03/21/2007	Washington	Leadwood Fire Protection District	Unknown	7
2009-09421-040340	04/09/2009	Washington	Leadwood Fire Protection District	Unknown	7
2009-11043-041901	09/17/2009	Washington	Potosi Fire Protection District	Unknown	7
2010-11043-049287	10/25/2010	Washington	Potosi Fire Protection District	Unknown	7
2011-09407-054812	03/13/2011	Washington	Desloge Vounteer Fire Department	Unknown	7
2012-05007-073648	07/11/2012	Washington	Desoto Rural Fire Protection District	Unknown	7
2012-11043-066931	02/20/2012	Washington	Potosi Fire Protection District	Unknown	7
2014-11043-094518	01/30/2014	Washington	Potosi Fire Protection District	Unknown	7
2009-11040-042404	11/05/2009	Washington	Belgrade Volunteer Fire Department	Unknown	8
2010-11040-058211	08/29/2010	Washington	Belgrade Volunteer Fire Department	Unknown	8
2011-11043-055984	03/13/2011	Washington	Potosi Fire Protection District	Unknown	8
2012-11043-069181	03/24/2012	Washington	Potosi Fire Protection District	Unknown	8
2015-11043-118097	02/07/2015	Washington	Potosi Fire Protection District	Unknown	8
2015-11043-129485	10/20/2015	Washington	Potosi Fire Protection District	Unknown	8
2005-11040-008788	05/07/2005	Washington	Belgrade Volunteer Fire Department	Unknown	10
2006-09421-033026	03/16/2006	Washington	Leadwood Fire Protection District	Unknown	10
2006-09421-033031	03/02/2006	Washington	Leadwood Fire Protection District	Unknown	10
2006-09421-033043	09/16/2006	Washington	Leadwood Fire Protection District	Unknown	10
2006-11043-013030	04/05/2006	Washington	Potosi Fire Protection District	Unknown	10
2006-11043-026171	08/24/2006	Washington	Potosi Fire Protection District	Unknown	10
2007-00008-029995	05/24/2007	Washington	MDC REPORTING REGION - ST. LOUIS	Unknown	10

2007-09421-032963	11/17/2007	Washington	Leadwood Fire Protection District	Unknown	10
2007-09421-032988	03/12/2007	Washington	Leadwood Fire Protection District	Unknown	10
2007-11043-028204	03/05/2007	Washington	Potosi Fire Protection District	Unknown	10
2007-11043-029279	04/21/2007	Washington	Potosi Fire Protection District	Unknown	10
2007-11043-029281	04/21/2007	Washington	Potosi Fire Protection District	Unknown	10
2008-11043-034296	04/16/2008	Washington	Potosi Fire Protection District	Unknown	10
2009-02813-039377	01/21/2009	Washington	Steelville Fire Protection District	Unknown	10
2009-09421-039596	03/07/2009	Washington	Leadwood Fire Protection District	Unknown	10
2009-09450-043368	04/23/2009	Washington	Big River Fire Protection, Inc.	Unknown	10
2009-11044-039512	03/08/2009	Washington	Richwoods Fire Protection District	Unknown	10
2010-05007-059265	04/10/2010	Washington	Desoto Rural Fire Protection District	Unknown	10
2010-05007-059343	11/09/2010	Washington	Desoto Rural Fire Protection District	Unknown	10
2010-05007-059344	11/10/2010	Washington	Desoto Rural Fire Protection District	Unknown	10
2010-05007-059362	11/03/2010	Washington	Desoto Rural Fire Protection District	Unknown	10
2010-05007-059363	11/08/2010	Washington	Desoto Rural Fire Protection District	Unknown	10
2010-09421-046166	04/11/2010	Washington	Leadwood Fire Protection District	Unknown	10
2010-09421-046168	04/10/2010	Washington	Leadwood Fire Protection District	Unknown	10
2010-11043-045868	04/10/2010	Washington	Potosi Fire Protection District	Unknown	10
2010-11043-050954	11/12/2010	Washington	Potosi Fire Protection District	Unknown	10
2010-11044-051268	10/23/2010	Washington	Richwoods Fire Protection District	Unknown	10
2011-09407-061851	10/25/2011	Washington	Desloge Vounteer Fire Department	Unknown	10
2011-11043-061348	10/15/2011	Washington	Potosi Fire Protection District	Unknown	10
2012-09421-076269	07/11/2012	Washington	Leadwood Fire Protection District	Unknown	10
2012-11043-074853	07/23/2012	Washington	Potosi Fire Protection District	Unknown	10
2013-11043-091426	11/17/2013	Washington	Potosi Fire Protection District	Unknown	10
2014-09432-093874	01/30/2014	Washington	Terre Du Lac Fire	Unknown	10
2014-11043-093651	01/26/2014	Washington	Potosi Fire Protection District	Unknown	10
2014-11043-094516	01/26/2014	Washington	Potosi Fire Protection District	Unknown	10
2014-11043-096620	03/11/2014	Washington	Potosi Fire Protection District	Unknown	10
2014-11043-104369	04/19/2014	Washington	Potosi Fire Protection District	Unknown	10

2015-05007-120731	03/16/2015	Washington	Desoto Rural Fire Protection District	Unknown	10
2015-09407-121290	03/30/2015	Washington	Desloge Vounteer Fire Department	Unknown	10
2015-11043-117373	01/24/2015	Washington	Potosi Fire Protection District	Unknown	10
2015-11043-118099	02/08/2015	Washington	Potosi Fire Protection District	Unknown	10
2015-11043-120791	03/16/2015	Washington	Potosi Fire Protection District	Unknown	10
2015-11043-130452	11/15/2015	Washington	Potosi Fire Protection District	Unknown	10
2015-11044-130671	01/24/2015	Washington	Richwoods Fire Protection District	Unknown	10
2016-09411-139398	03/17/2016	Washington	Park Hills Fire Department	Unknown	10
2016-11043-135355	03/17/2016	Washington	Potosi Fire Protection District	Unknown	10
2017-05007-146942	02/17/2017	Washington	Desoto Rural Fire Protection District	Unknown	10
2017-05007-165028	11/28/2017	Washington	Desoto Rural Fire Protection District	Unknown	10
2017-05008-155046	02/17/2017	Washington	Hillsboro Fire Protection District	Unknown	10
2017-11042-155871	03/26/2016	Washington	Irondale Fire Protection Distrct	Unknown	10
2017-11042-155892	04/14/2016	Washington	Irondale Fire Protection Distrct	Unknown	10
2017-11043-145340	01/21/2017	Washington	Potosi Fire Protection District	Unknown	10
2017-11043-145356	02/13/2017	Washington	Potosi Fire Protection District	Unknown	10
2017-11043-148919	03/24/2017	Washington	Potosi Fire Protection District	Unknown	10
2018-03627-177952	04/11/2018	Washington	Sullivan Fire Protection District	Unknown	10.08
2018-11043-176590	04/11/2018	Washington	Potosi Fire Protection District	Unknown	10.11
2016-11043-133752	02/06/2016	Washington	Potosi Fire Protection District	Unknown	11
2009-11043-039457	03/30/2009	Washington	Potosi Fire Protection District	Unknown	12
2012-05007-074903	07/27/2012	Washington	Desoto Rural Fire Protection District	Unknown	12
2012-11043-075138	08/06/2012	Washington	Potosi Fire Protection District	Unknown	12
2017-09421-156992	02/20/2016	Washington	Leadwood Fire Protection District	Unknown	12
2017-11043-150873	04/24/2017	Washington	Potosi Fire Protection District	Unknown	12
2005-11040-008624	03/21/2005	Washington	Belgrade Volunteer Fire Department	Unknown	14
2016-11043-143052	12/29/2016	Washington	Potosi Fire Protection District	Unknown	14
2006-11043-012864	03/16/2006	Washington	Potosi Fire Protection District	Unknown	15
2006-11043-013031	04/01/2006	Washington	Potosi Fire Protection District	Unknown	15
2006-11043-025287	08/05/2006	Washington	Potosi Fire Protection District	Unknown	15

2007-02813-032056	11/07/2007	Washington	Steelville Fire Protection District	Unknown	15
2007-11043-028239	03/05/2007	Washington	Potosi Fire Protection District	Unknown	15
2008-11043-034415	05/05/2008	Washington	Potosi Fire Protection District	Unknown	15
2010-11041-052724	11/09/2010	Washington	Caledonia Fire Protection Dist.	Unknown	15
2010-11043-049389	10/29/2010	Washington	Potosi Fire Protection District	Unknown	15
2010-11043-050984	11/03/2010	Washington	Potosi Fire Protection District	Unknown	15
2012-11043-072841	06/22/2012	Washington	Potosi Fire Protection District	Unknown	15
2013-05007-091651	11/17/2013	Washington	Desoto Rural Fire Protection District	Unknown	15
2013-11044-091608	11/17/2013	Washington	Richwoods Fire Protection District	Unknown	15
2015-09432-130724	10/19/2015	Washington	Terre Du Lac Fire	Unknown	15
2016-05008-135001	03/18/2016	Washington	Hillsboro Fire Protection District	Unknown	15
2016-11043-135356	03/22/2016	Washington	Potosi Fire Protection District	Unknown	15
2017-09421-145431	02/16/2017	Washington	Leadwood Fire Protection District	Unknown	15
2017-09421-159972	02/16/2017	Washington	Leadwood Fire Protection District	Unknown	15
2017-11043-145344	02/01/2017	Washington	Potosi Fire Protection District	Unknown	15
2017-11043-145998	02/17/2017	Washington	Potosi Fire Protection District	Unknown	15
2017-11043-148912	03/09/2017	Washington	Potosi Fire Protection District	Unknown	15
2017-09407-162276	11/28/2017	Washington	Desloge Vounteer Fire Department	Unknown	16
2006-11043-011859	03/03/2006	Washington	Potosi Fire Protection District	Unknown	18
2009-03627-038156	03/05/2009	Washington	Sullivan Fire Protection District	Unknown	18
2015-09421-129537	01/24/2015	Washington	Leadwood Fire Protection District	Unknown	18
2005-11040-008984	06/17/2005	Washington	Belgrade Volunteer Fire Department	Unknown	20
2005-11043-010040	11/20/2005	Washington	Potosi Fire Protection District	Unknown	20
2006-11043-011403	02/25/2006	Washington	Potosi Fire Protection District	Unknown	20
2007-11043-028379	03/12/2007	Washington	Potosi Fire Protection District	Unknown	20
2007-11043-030784	08/13/2007	Washington	Potosi Fire Protection District	Unknown	20
2007-11043-030785	08/13/2007	Washington	Potosi Fire Protection District	Unknown	20
2007-11043-030835	08/14/2007	Washington	Potosi Fire Protection District	Unknown	20
2009-09421-040343	04/26/2009	Washington	Leadwood Fire Protection District	Unknown	20
2010-09401-053038	02/27/2010	Washington	Bismarck City Fire Department	Unknown	20

2010-09421-046163	04/10/2010	Washington	Leadwood Fire Protection District	Unknown	20
2010-11041-052723	11/07/2010	Washington	Caledonia Fire Protection Dist.	Unknown	20
2010-11043-045075	03/23/2010	Washington	Potosi Fire Protection District	Unknown	20
2010-11043-045077	03/24/2010	Washington	Potosi Fire Protection District	Unknown	20
2010-11043-045888	04/10/2010	Washington	Potosi Fire Protection District	Unknown	20
2011-11043-061349	10/16/2011	Washington	Potosi Fire Protection District	Unknown	20
2012-09411-069809	03/06/2012	Washington	Park Hills Fire Department	Unknown	20
2012-11043-069136	03/07/2012	Washington	Potosi Fire Protection District	Unknown	20
2014-11043-104371	04/19/2014	Washington	Potosi Fire Protection District	Unknown	20
2015-09411-130454	11/15/2015	Washington	Park Hills Fire Department	Unknown	20
2015-09432-130726	11/15/2015	Washington	Terre Du Lac Fire	Unknown	20
2016-11043-135358	04/02/2016	Washington	Potosi Fire Protection District	Unknown	20
2016-11043-135363	04/04/2016	Washington	Potosi Fire Protection District	Unknown	20
2017-11043-145996	02/16/2017	Washington	Potosi Fire Protection District	Unknown	20
2017-11044-160333	02/20/2016	Washington	Richwoods Fire Protection District	Unknown	20
2016-09421-140441	01/27/2016	Washington	Leadwood Fire Protection District	Unknown	21
2010-05007-059267	10/22/2010	Washington	Desoto Rural Fire Protection District	Unknown	25
2010-05007-059285	04/10/2010	Washington	Desoto Rural Fire Protection District	Unknown	25
2010-05007-059341	10/24/2010	Washington	Desoto Rural Fire Protection District	Unknown	25
2010-09407-049478	11/07/2010	Washington	Desloge Vounteer Fire Department	Unknown	25
2010-09421-052313	10/24/2010	Washington	Leadwood Fire Protection District	Unknown	25
2010-11040-058203	03/06/2010	Washington	Belgrade Volunteer Fire Department	Unknown	25
2010-11043-051002	11/12/2010	Washington	Potosi Fire Protection District	Unknown	25
2011-09421-062276	10/25/2011	Washington	Leadwood Fire Protection District	Unknown	25
2017-09421-156832	02/19/2016	Washington	Leadwood Fire Protection District	Unknown	25
2012-11043-069165	03/06/2012	Washington	Potosi Fire Protection District	Unknown	26
			Bismarck Rural Fire Protection		
2020-09402-230894	10/14/2020	Washington	Association, Inc.	Unknown	26.91
2010-11043-045893	04/15/2010	Washington	Potosi Fire Protection District	Unknown	27

2020-09402-230893	10/17/2020	Washington	Bismarck Rural Fire Protection Association, Inc.	Unknown	29.43
2003-11044-000844	03/10/2003	Washington	Richwoods Fire Protection District	Unknown	30
2006-11043-011027	01/27/2006	Washington	Potosi Fire Protection District	Unknown	30
2006-11043-013025	04/11/2006	Washington	Potosi Fire Protection District	Unknown	30
2007-11043-028788	03/24/2007	Washington	Potosi Fire Protection District	Unknown	30
2008-09421-036483	04/17/2008	Washington	Leadwood Fire Protection District	Unknown	30
2008-09421-036484	04/17/2008	Washington	Leadwood Fire Protection District	Unknown	30
2008-11043-033927	03/25/2008	Washington	Potosi Fire Protection District	Unknown	30
2009-09606-039220	03/23/2009	Washington	Eureka Fire Protection District	Unknown	30
2010-09421-052351	11/07/2010	Washington	Leadwood Fire Protection District	Unknown	30
2010-11043-045892	04/11/2010	Washington	Potosi Fire Protection District	Unknown	30
2011-11044-061894	04/04/2011	Washington	Richwoods Fire Protection District	Unknown	30
2013-09421-091692	11/17/2013	Washington	Leadwood Fire Protection District	Unknown	30
2015-09432-130725	10/20/2015	Washington	Terre Du Lac Fire	Unknown	30
2016-11043-134000	02/20/2016	Washington	Potosi Fire Protection District	Unknown	30
2016-09421-140447	03/18/2016	Washington	Leadwood Fire Protection District	Unknown	31
2012-04718-070022	03/06/2012	Washington	Quad County Fire Protection District	Unknown	35
2012-11043-069172	03/13/2012	Washington	Potosi Fire Protection District	Unknown	35
2016-05007-135378	04/04/2016	Washington	Desoto Rural Fire Protection District	Unknown	36
2016-05007-135379	04/04/2016	Washington	Desoto Rural Fire Protection District	Unknown	36
2017-09421-156999	03/19/2016	Washington	Leadwood Fire Protection District	Unknown	36
2006-11043-011855	02/28/2006	Washington	Potosi Fire Protection District	Unknown	40
2006-11043-026182	10/13/2006	Washington	Potosi Fire Protection District	Unknown	40
2007-03600-031900	11/19/2007	Washington	SULLIVAN FORESTRY	Unknown	40
2007-11043-029442	04/29/2007	Washington	Potosi Fire Protection District	Unknown	40
2009-11043-039022	03/07/2009	Washington	Potosi Fire Protection District	Unknown	40
2010-11043-050952	11/10/2010	Washington	Potosi Fire Protection District	Unknown	40
2011-11043-062364	11/13/2011	Washington	Potosi Fire Protection District	Unknown	40
2013-04718-085423	02/06/2013	Washington	Quad County Fire Protection District	Unknown	40

2009-11043-039037	03/19/2009	Washington	Potosi Fire Protection District	Unknown	45
2010-11043-045869	04/10/2010	Washington	Potosi Fire Protection District	Unknown	45
2020-02220-241056	11/19/2020	Washington	CLEARWATER FPD	Unknown	45.76
2021-11044-323116	11/18/2020	Washington	Richwoods Fire Protection District	Unknown	49.9
2006-11043-023761	04/22/2006	Washington	Potosi Fire Protection District	Unknown	50
2006-11043-023763	04/19/2006	Washington	Potosi Fire Protection District	Unknown	50
2007-11043-028793	03/27/2007	Washington	Potosi Fire Protection District	Unknown	50
2007-11043-031759	11/07/2007	Washington	Potosi Fire Protection District	Unknown	50
2007-11044-032516	11/11/2007	Washington	Richwoods Fire Protection District	Unknown	50
2009-09421-038086	01/21/2009	Washington	Leadwood Fire Protection District	Unknown	50
2009-11040-041882	03/14/2009	Washington	Belgrade Volunteer Fire Department	Unknown	50
2010-09421-046165	04/13/2010	Washington	Leadwood Fire Protection District	Unknown	50
2010-09421-046169	02/27/2010	Washington	Leadwood Fire Protection District	Unknown	50
2010-11041-052715	04/13/2010	Washington	Caledonia Fire Protection Dist.	Unknown	50
2010-11043-045867	04/05/2010	Washington	Potosi Fire Protection District	Unknown	50
2010-11044-051266	10/22/2010	Washington	Richwoods Fire Protection District	Unknown	50
2011-11044-061908	03/23/2011	Washington	Richwoods Fire Protection District	Unknown	50
2014-09407-093772	01/30/2014	Washington	Desloge Vounteer Fire Department	Unknown	50
2014-09411-098607	03/15/2014	Washington	Park Hills Fire Department	Unknown	50
2015-11040-130555	11/15/2015	Washington	Belgrade Volunteer Fire Department	Unknown	50
2016-05007-134551	03/17/2016	Washington	Desoto Rural Fire Protection District	Unknown	50
2016-09411-139391	02/20/2016	Washington	Park Hills Fire Department	Unknown	50
2018-11043-165963	01/26/2018	Washington	Potosi Fire Protection District	Unknown	50.25
2006-11043-011854	02/28/2006	Washington	Potosi Fire Protection District	Unknown	55
2006-11043-011865	03/02/2006	Washington	Potosi Fire Protection District	Unknown	60
2006-11043-013018	04/17/2006	Washington	Potosi Fire Protection District	Unknown	60
2011-11043-056430	04/06/2011	Washington	Potosi Fire Protection District	Unknown	60
2014-11043-104363	04/10/2014	Washington	Potosi Fire Protection District	Unknown	60
2016-11043-134002	02/20/2016	Washington	Potosi Fire Protection District	Unknown	60
2010-11043-044900	02/27/2010	Washington	Potosi Fire Protection District	Unknown	68

2011-05007-061861	11/01/2011	Washington	Desoto Rural Fire Protection District	Unknown	68
2005-03626-008813	04/04/2005	Washington	St Clair Fire Protection District	Unknown	70
2006-11043-011400	02/27/2006	Washington	Potosi Fire Protection District	Unknown	75
2008-11043-033744	03/12/2008	Washington	Potosi Fire Protection District	Unknown	75
2010-09401-053057	11/09/2010	Washington	Bismarck City Fire Department	Unknown	75
2013-03600-085962	04/06/2013	Washington	SULLIVAN FORESTRY	Unknown	77.5
2008-11043-036019	11/13/2008	Washington	Potosi Fire Protection District	Unknown	80
2009-11043-039014	02/24/2009	Washington	Potosi Fire Protection District	Unknown	80
2011-11044-061914	11/01/2011	Washington	Richwoods Fire Protection District	Unknown	85
2010-11041-052710	03/06/2010	Washington	Caledonia Fire Protection Dist.	Unknown	90
2010-11043-044910	03/06/2010	Washington	Potosi Fire Protection District	Unknown	90
2014-05007-095515	03/15/2014	Washington	Desoto Rural Fire Protection District	Unknown	90
2006-09407-027043	01/28/2006	Washington	Desloge Vounteer Fire Department	Unknown	100
2007-11043-030836	08/14/2007	Washington	Potosi Fire Protection District	Unknown	100
2007-11044-032507	08/12/2007	Washington	Richwoods Fire Protection District	Unknown	100
2007-11044-032509	08/15/2007	Washington	Richwoods Fire Protection District	Unknown	100
2009-02810-038412	01/22/2009	Washington	Bourbon Fire Protection District	Unknown	100
2009-11043-037131	01/22/2009	Washington	Potosi Fire Protection District	Unknown	100
2010-09401-053033	10/31/2010	Washington	Bismarck City Fire Department	Unknown	100
2010-09407-044481	02/27/2010	Washington	Desloge Vounteer Fire Department	Unknown	100
2010-09450-049121	10/24/2010	Washington	Big River Fire Protection, Inc.	Unknown	100
2010-11041-052712	03/31/2010	Washington	Caledonia Fire Protection Dist.	Unknown	100
2011-05008-055720	03/23/2011	Washington	Hillsboro Fire Protection District	Unknown	100
			Ste. Genevieve Volunteer Fire		
2012-09540-071163	03/06/2012	Washington	Department	Unknown	100
2012-11044-068949	03/06/2012	Washington	Richwoods Fire Protection District	Unknown	100
2013-09432-091552	11/17/2013	Washington	Terre Du Lac Fire	Unknown	100
2014-05004-095512	03/15/2014	Washington	Mapaville Fire Prot. Dist.	Unknown	100
2014-09432-096206	03/15/2014	Washington	Terre Du Lac Fire	Unknown	100

2014-09540-103523	03/15/2014	Washington	Ste. Genevieve Volunteer Fire Department	Unknown	100
2016-09407-133516	02/20/2016	Washington	Desloge Vounteer Fire Department	Unknown	100
2010-11043-045864	03/31/2010	Washington	Potosi Fire Protection District	Unknown	107
2009-11043-039018	02/25/2009	Washington	Potosi Fire Protection District	Unknown	150
2010-02813-045539	04/11/2010	Washington	Steelville Fire Protection District	Unknown	150
2014-04718-099985	03/30/2014	Washington	Quad County Fire Protection District	Unknown	150
2014-11043-099747	03/15/2014	Washington	Potosi Fire Protection District	Unknown	150
2014-11044-130658	03/15/2014	Washington	Richwoods Fire Protection District	Unknown	150
2007-03600-030803	08/14/2007	Washington	SULLIVAN FORESTRY	Unknown	155
2010-11040-058205	04/01/2010	Washington	Belgrade Volunteer Fire Department	Unknown	175
2006-09421-033021	01/28/2006	Washington	Leadwood Fire Protection District	Unknown	200
2020-05013-230914	10/16/2020	Washington	Goldman Fire	Unknown	218.48
2006-11043-011004	01/28/2006	Washington	Potosi Fire Protection District	Unknown	250
2006-11043-012862	03/16/2006	Washington	Potosi Fire Protection District	Unknown	300
2012-04718-070041	03/06/2012	Washington	Quad County Fire Protection District	Unknown	300
2011-11043-055986	03/23/2011	Washington	Potosi Fire Protection District	Unknown	350
2021-11044-323114	10/17/2020	Washington	Richwoods Fire Protection District	Unknown	357.52
2012-05008-068136	03/07/2012	Washington	Hillsboro Fire Protection District	Unknown	450
2007-09421-032971	08/14/2007	Washington	Leadwood Fire Protection District	Unknown	500
2011-09421-062270	03/23/2011	Washington	Leadwood Fire Protection District	Unknown	500
2012-02813-070154	03/06/2012	Washington	Steelville Fire Protection District	Unknown	500
2016-11043-135362	04/04/2016	Washington	Potosi Fire Protection District	Unknown	800
2012-05004-067937	03/06/2012	Washington	Mapaville Fire Prot. Dist.	Unknown	1000
2012-05007-068532	03/06/2012	Washington	Desoto Rural Fire Protection District	Unknown	1000
2012-09407-067910	03/06/2012	Washington	Desloge Vounteer Fire Department	Unknown	1000
2012-09421-069207	03/06/2012	Washington	Leadwood Fire Protection District	Unknown	1000
2004-09407-004931	04/18/2004	Washington	Desloge Vounteer Fire Department	Unknown	1320
2020-11111-241082	11/19/2020	Washington	GREENVILLE F&R	Unknown	10142.16
2004-11040-004041	03/24/2004	Washington	Belgrade Volunteer Fire Department	Unknown	

2004-11040-006245	11/21/2004	Washington	Belgrade Volunteer Fire Department	Unknown	
2004-11043-004060	01/16/2004	Washington	Potosi Fire Protection District	Unknown	
2004-11043-004067	02/28/2004	Washington	Potosi Fire Protection District	Unknown	
2004-11043-004091	03/12/2004	Washington	Potosi Fire Protection District	Unknown	
2004-11043-004096	03/20/2004	Washington	Potosi Fire Protection District	Unknown	
2004-11043-005111	04/02/2004	Washington	Potosi Fire Protection District	Unknown	
2006-11043-011026	01/27/2006	Washington	Potosi Fire Protection District	Unknown	
2010-09421-052317	11/10/2010	Washington	Leadwood Fire Protection District	Unknown	
2014-11044-130659	03/15/2014	Washington	Richwoods Fire Protection District	Unknown	
2015-11044-130670	01/10/2015	Washington	Richwoods Fire Protection District	Unknown	
2015-11044-130673	03/15/2015	Washington	Richwoods Fire Protection District	Unknown	
2015-11044-130674	03/16/2015	Washington	Richwoods Fire Protection District	Unknown	
2015-11044-130688	11/15/2015	Washington	Richwoods Fire Protection District	Unknown	
2015-11044-130689	11/15/2015	Washington	Richwoods Fire Protection District	Unknown	
2015-11044-130690	11/15/2015	Washington	Richwoods Fire Protection District	Unknown	
2018-11043-176591	04/19/2018	Washington	Potosi Fire Protection District	Unknown	
2013-11043-091429	11/18/2013	Washington	Potosi Fire Protection District		1
2016-11043-133997	02/19/2016	Washington	Potosi Fire Protection District		1
2015-11043-128792	09/24/2015	Washington	Potosi Fire Protection District		1.5