



Gasconade County Multi-Jurisdiction Natural Hazard Mitigation Plan



Meramec Regional Planning Commission • December, 2021



CONTRIBUTORS

Gasconade County Hazard Mitigation Planning Committee

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

Jurisdictional Representatives

Name	Title	Department	Jurisdiction/Agency/Organization
Larry Miskel	Presiding Commissioner	County Commission	Gasconade County
Jim Holland	Associate Commissioner	County Commission	Gasconade County
Jerry Lairmore	Associate Commissioner	County Commission	Gasconade County
Lesa Lietzow	Gasconade County Clerk	County Clerk's Office	Gasconade County
Clyde Zelch	Emergency Management Director	Office of Emergency Mgt.	Gasconade County
Felisha Mendenhall	Office Manager	Sheriff's Department	Gasconade County
Greg Lara	Administrator	Gasconade County Health Department	Gasconade County
Scott Eiler	Sheriff	Sheriff Department	Gasconade County
Lee Medlock	Mayor	Administration	City of Bland
Carrie Krupp	City Clerk	Administration	City of Bland
Debbie Green	Mayor	Administration	City of Gasconade
Mark Wallace/Patricia Heaney*	Administrator	Administration	City of Hermann
Bruce Cox	Mayor	Administration	City of Hermann
Patricia Heaney/Corey Orr*	City Clerk	Administration	City of Hermann
Marlon Walker	Chief of Police	Police Department	City of Hermann
Kevin Speckhals	Fire Chief	Fire Department	City of Hermann
Melissa Strobe	Mayor	Administration	City of Morrison
John Kamler	Mayor	Administration	City of Owensville
Bobbi Limberg	City Clerk	Administration	City of Owensville
Randy Blaske	City Administrator	Administration	City of Owensville
Jeff Arnold	EMD/Coroner	EMD/Coroner	City of Owensville/Gasconade Co.
Shannon Grus	Mayor	Administration	City of Rosebud
Ann Parker	City Clerk	Administration	City of Rosebud
Dr. Scott Smith/ Dr. Geoff Neill*	Superintendent	Administration	Gasconade County R-I
Karen Morton	Asst. to Superintendent	Administration	Gasconade County R-I
Chuck Garner*	Superintendent	Administration	Gasconade County R-II

Name	Title	Department	Jurisdiction/Agency/Organization
Dr. Jeri Kay Hardy*	Superintendent	Administration	Gasconade County R-II
Dr. Lenice Basham	Superintendent	Administration	Maries County R-II

Sign in sheets from planning meetings are included in Appendix B.
 *Staff changes occurred during the course of the planning process.

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

Participating Stakeholder Representatives

Name	Title	Agency/Organization
Dan McKinney	Administrator	Hermann Area District Hospital
Brenda Gerlach	Region I SEMA Area Coordinator	MO State Emergency Management Agency
Doug Clark	EMS Chief	Hermann Area Ambulance District
Jessica Hinten	Children’s Service Specialist	Missouri Department of Social Services
Kent Kreftmeyer	Lieutenant	Missouri State Highway Patrol
Preston Kramer	District Engineer	Missouri Department of Transportation
Theresa Willimann	Administrator	Stonebridge Senior Living

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EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Gasconade 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. This plan is an update of a plan that was approved on January 30, 2017. The original plan was approved in 2004. 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 12 jurisdictions that participated in the planning process:

- Gasconade County
- City of Bland
- City of Gasconade
- City of Hermann
- City of Morrison
- City of Owensville
- City of Rosebud
- Gasconade County R-I School District
- Gasconade County R-II School District
- Maries County R-II School District

Gasconade County and the jurisdictions listed above have developed a multi-jurisdictional Hazard Mitigation Plan that was originally approved by FEMA in 2004 with updates approved by FEMA on January 30, 2017. This current planning effort serves as an update (hereafter referred to as the 2021 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 Gasconade County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to Gasconade 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 MCP reviewed goals for reducing risk from hazards. The goals are listed below:

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.

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

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.

- Gasconade County
- City of Bland
- City of Gasconade
- City of Hermann
- City of Morrison
- City of Owensville
- City of Rosebud
- Gasconade County R-I School District
- Gasconade County R-II School District
- Maries County R-II School District

Model Resolution

RESOLUTION NO. _____

A RESOLUTION TO ADOPT THE GASCONADE 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, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; 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 Gasconade 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 Gasconade 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

Gasconade County and nine 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 Gasconade 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 Gasconade 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 Gasconade County that do not adopt the 2021 plan will not be eligible for funding through these grant programs.

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

1.2 Background and Scope

The 2021 Gasconade Hazard Mitigation Plan is an update of the plan developed and approved in 2017. The second update of the original 2004 plan was approved by FEMA on January 30, 2017. 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 the 2004, 2012 and 2017 plan, including the following:

- Gasconade County
- City of Bland
- City of Gasconade
- City of Hermann
- City of Morrison
- City of Owensville
- City of Rosebud
- Gasconade County R-I School District
- Gasconade County R-II School District
- Maries County R-II 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. Gasconade 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

The plan contains a mitigation action listing, a discussion of the purpose and methodology used to develop the plan, a profile on Gasconade 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

Table 1.1. Changes Made in Plan Update

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

MRPC’s role in developing and updating the Gasconade 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 HMPC 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 Gasconade 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 insuring that the plan meets all requirements of the Disaster Mitigation Act as established by federal regulations. Changes made to the 2021 plan are detailed in **Table 1.1**.

The Gasconade County Multi-Hazard Mitigation Plan was developed as the result of a collaborative effort among Gasconade County, the City of Bland, City of Gasconade, City of Hermann, City of Morrison, City of Owensville, City of Rosebud, Gasconade County R-I School District, Gasconade County R-II School District, Maries County R-II 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 Gasconade County. Staff worked with the Gasconade County HMPC 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 HMPC were able to attend meetings. However, all 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 2020 planning process began with a meeting held via Zoom and conference call at on October 29, 2020. 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 four years. The group began the process of reviewing the list of action items - making note of those action items that had been accomplished, those that were no longer applicable and considered adding projects to the list. The group agreed to review plan chapters as they were completed through email or postings on the MRPC website. The second meeting was held on January 26, 2021, via Zoom and conference call. The HMPC received a report on the public survey and asked that the survey be promoted again in order to get more responses. They also completed their review and revision of the list of action items and applying the STAPLEE method (Social, Technical, Administrative, Political, Legal, Economic; Environmental) and applying 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 HMPC was held on August 31, 2021. The HMPC reviewed the public survey results, participation requirements and status of participation of jurisdictions; reviewed and discussed draft chapters;

reviewed plan maintenance and the adoption process. The HMPC were advised of the next steps – the public comment period and adoption of the plan document.

The final list of prioritized action items was mailed out to all jurisdictions and entities that had been invited to participate on the HMPC. Recipients were asked to review and provide feedback if they had concerns about how any of the projects were ranked, or if they had corrections or additions, they wanted incorporated. The draft plan was made available on-line and HMPC 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.

Gasconade County further assisted in the planning process by issuing public notice of the planning meetings as well as scheduling meeting times during the pandemic – via internet video and conference call. County officials attended and participated in meetings.

The HMPC 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 HMPC 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:

Lesia Lietzow, Lee Medlock, Carrie Krupp, Debbie Green, Kim Steiner, Bruce Cox, Patricia Heaney, Melissa Strobe, Doris Rost, John Kamler, Bobbi Limberg, Shannon Grus, Ann Parker, and Dr. Lenice Basham all participated indirectly by providing information, completing the community questionnaire, participating in phone calls and email discussions, providing feedback on action items, reviewing plan chapters and assisting with adoption of the plan.

Table 1.2 Jurisdictional Representatives Gasconade County Mitigation Planning Committee

Name	Title	Department	Jurisdiction/Agency/ Organization	Direct Participation	Indirect Participation
Larry Miskel	Presiding Commissioner	Admin.	Gasconade County	X	
Jerry Lairmore	Associate Commissioner	Admin.	Gasconade County		X
James Holland	Associate Commissioner	Admin.	Gasconade County		X
Lesa Lietzow	County Clerk	Admin.	Gasconade County		X
Clyde Zelch	EMD	Office of Emergency Management	Gasconade County	X	
Lee Medlock	Mayor	Admin.	City of Bland		X
Carrie Krupp	City Clerk	Admin.	City of Bland		X
Debbie Green	Mayor	Admin.	City of Gasconade		X
Kim Steiner	Clerk/Treasurer	Admin.	City of Gasconade		X
Bruce Cox	Mayor	Admin.	City of Hermann		X
Mark Wallace/ Patricia Heaney*	City Administrator	Admin.	City of Hermann	X	
Patricia Heaney/Corey Orr*	City Clerk	Admin.	City of Hermann	X	
Melissa Strope	Mayor	Admin.	City of Morrison		X
Doris Rost	City Clerk	Admin.	City of Morrison		X
John Kamler	Mayor	Admin.	City of Owensville		X
Randy Blaske	City/Finance Administrator	Admin.	City of Owensville	X	
Bobbi Limberg	City Clerk	Admin.	City of Owensville		X
Shannon Grus	Mayor	Admin.	City of Rosebud		X
Ann Parker	City Clerk	Admin.	City of Rosebud		X
Dr. Scott Smith /Dr. Geoff Neill*	Superintendent	Admin.	Gasconade County R- I	X	
Karen Morton	Secretary	Admin.	Gasconade County R- I	X	
Dr. Chuck Garner/ Dr. Jeri Kay Hardy*	Superintendent	Admin.	Gasconade County R- II	X	
Leslie Lause	Assoc. Supt.	Admin.	Gasconade R-II	X	
Dan McKinney	Administrator	Admin.	Hermann Area District Hospital	X	
Kent Kreftmeyer	Sargent	Troop F	Missouri State Highway Patrol	X	
Jeff Arnold	Gasconade County Coroner, Owensville EMD, Owensville Fire	Emergency Management	Gasconade County and City of Owensville	X	
Katie Scheer	LPN	Admin.	Hermann Area District Hospital	X	

Name	Title	Department	Jurisdiction/Agency/ Organization	Direct Participation	Indirect Participation
Jessica Henton	Social Worker	Children's Division	Missouri Department of Social Services – Gasconade County	X	
Theresa Williman	Administrator	Admin.	Stonebridge of Hermann	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

Community Department/Office	Preventive Measures	Structure and Infrastructure Projects		Natural Resource Protection	Public Information	Emergency Services
		Property Protection	Structural Flood Control Projects			
Larry Miskel, Presiding Commissioner	✓	✓	✓	✓	✓	✓
Jerry Lairmore, Associate Commissioner	✓	✓	✓	✓	✓	✓
James Holland, Associate Commissioner	✓	✓	✓	✓	✓	✓
Lesia Lietzow	✓	✓				
Clyde Zelch	✓	✓	✓	✓	✓	✓
Lee Medlock	✓	✓	✓		✓	✓
Carrie Krupp	✓	✓				
Debbie Green	✓	✓	✓		✓	✓
Kim Steiner	✓	✓				
Bruce Cox	✓	✓	✓		✓	✓
Mark Wallace	✓	✓	✓		✓	✓
Patricia Heaney	✓	✓				
Melissa Strobe	✓	✓			✓	
Doris Rost	✓	✓				
John Kamler	✓	✓			✓	✓
Randy Blaske	✓	✓	✓		✓	
Bobbi Limberg	✓	✓				
Shannon Grus	✓	✓			✓	
Ann Parker	✓	✓				
Dr. Scott Smith	✓	✓			✓	
Dr. Geoff Neill	✓	✓			✓	
Karen Morton	✓					
Dr. Chuck Garner	✓	✓			✓	
Dr. Jeri Kay Hardy	✓	✓			✓	
Dr. Lenice Basham	✓	✓			✓	

Community Department/Office	Preventive Measures	Structure and Infrastructure Projects		Natural Resource Protection	Public Information	Emergency Services
		Property Protection	Structural Flood Control Projects			
Dan McKinney	✓	✓			✓	✓
Kent Kreftmeyer	✓	✓		✓	✓	✓
Jeff Arnold	✓	✓	✓	✓	✓	✓
Katie Scheer	✓					✓
Jessica Henton	✓				✓	
Theresa Williman	✓	✓			✓	

1.4.1 Multi-Jurisdictional Participation

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

Gasconade 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. Letters and/or emails were sent to each of the following:

- Gasconade County
- City of Bland
- City of Gasconade
- City of Hermann
- City of Morrison
- City of Owensville
- City of Rosebud
- Gasconade County R-I School District
- Gasconade County R-II School District
- Maries County R-III School District
- Gasconade County Health Dept.
- Gasconade manor Nursing Home
- Victorian Place of Owensville
- Gasconade Terrace Assisted Living
- Frene Valley Health Center
- Victorian Place of Hermann
- Hermann Senior Housing
- Three Rivers Electric Cooperative
- Crawford Electric Cooperative
- American Red Cross
- USDA Natural Resources Conservation Service – Owensville
- Enbridge Energy
- Capital Region medical Clinic – Owensville
- Medical Clinic of Owensville
- Hermann Area District Hospital
- Gasconade County Division of Aging
- Missouri Department of Conservation
- Fidelity Communications
- Ameren UE
- Intercounty Electric Cooperative
- Stone Bridge Senior Living
- US Army Corps of Engineers
- MO Levy and Drainage District Association
- MoDOT
- Missouri State Highway Patrol
- MO SEMA

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 HMPC meetings. Most communities and school districts in Gasconade County are small and understaffed. It was not always feasible for representatives to participate in 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
Gasconade County	X	X	X		X	X	X
City of Bland					X	X	X
City of Gasconade					X	X	X
City of Hermann	X	X	X		X	X	X
City of Morrison					X	X	X
City of Owensville	X	X	X	X	X	X	X
City of Rosebud					X	X	X
Gasconade Co R-I		X	X		X	X	X
Gasconade Co R-II		X	X	X	X	X	X

Jurisdiction	Meet- ing #1	Meet- ing #2	Meet- ing #3	Interviews	Data Collection Questionnaire/ Call	Update/Develop/ Prioritize Mitigation Actions	Review/ Comment on Plan
Maries Co. R-II					X	X	X

1.4.2 The Planning Steps

Gasconade 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, Pre-Disaster Mitigation Program, Community Rating System and Flood Mitigation Assistance Program.

Table 1.5 Gasconade County Planning Process

Community Rating System (CRS) Planning Steps (Activity 510)	Local Mitigation Planning Handbook Tasks (44 CFR Part 201)
Step 1: Organize	Task 1: Determine the Planning Area and Resources Task 2: Build the Planning Team 44 CFR 201.6(c)(1)
Step 2: Involve the public	Task 3: Create an Outreach Strategy 44 CFR 201.6(b)(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 Gasconade 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 health departments 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. Due to the COVID-19 pandemic, the meetings were held via Zoom and conference call. The first meeting was held on October 29, 2020, and the second meeting was held on February 9, 2021. A third meeting was held on August 31, 2021, via Zoom and conference call for final review of the public survey and draft document.

At the first meeting on October 29, 2020, MRPC staff made introductions and provided an overview of the Gasconade 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 starting the review of action items. Staff offered to help those jurisdictions present with completion of their data collection surveys. Staff wrapped up the meeting by providing handouts on the current action items and asking the group to review them and come prepared to the next meeting to complete the review and update of action items. Staff also explained the process that would be used to prioritize the action items at the next meeting – using both the STAPLEE method and analyzing the cost benefit and provided handouts on both methods.

The second meeting was also held via Zoom and conference call due to COVID-19. At the second meeting on February 9, 2021, the group reviewed, edited and prioritized the complete list of action items. MRPC staff shared the results of the public survey and after reviewing the results, the committee asked that it be publicized again and the members would also work to get additional responses. Staff went on to provide an explanation of the prioritization process using both the STAPLEE and cost benefit scoring. The committee 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 planning committee with a request for feedback. All suggestions for changes were incorporated into the plan. The group also reviewed the list of critical facilities in the plan and provided feedback on any changes or additions to that list. It was decided that staff would share plan chapters with the committee as they were completed. If necessary, the group would meet again but no date was set.

The third meeting was held via Zoom and conference call on August 31, 2021, to review and discuss the results of the public survey and review the first draft of the plan document. Copies of the plan chapters had been shared with committee members as they were completed. MRPC staff also went over the public comment period and adoption process for the plan document.

Table 1.6 Schedule of Gasconade County Hazard Mitigation Planning Committee 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 Gasconade County Hazard Mitigation Planning Committee Meetings

Meeting	Topics	Date
Planning Meeting #1	Overview of hazard mitigation planning purpose and Gasconade County plan; grant programs linked to approved plan; participation requirements and public involvement; data collection questionnaires; discussion of hazards; critical facilities	October 29, 2020
Planning Meeting #2	Overview of hazard mitigation planning and Gasconade Co. HMP; 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	February 9, 2021
Planning Meeting #3	Review and discussion of the public survey. Review of the first draft of the plan document. Overview of the public comment process and plan adoption process.	August 31, 2021

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 HMPC followed the same process for public involvement and input as suggested by SEMA and FEMA and as was followed during earlier planning processes. Due to the COVID-19 pandemic, all three planning meetings were held via Zoom and conference call. Public notices were placed at the courthouse and the MRPC offices and press releases were done prior to the meetings 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 planning committee. A sample of the survey and the results of the survey are included in Appendix C: Public Survey. Planning committee members and public officials within the county as well as in surrounding counties were contacted, directed to the MRPC website (www.meramecregion.org) where a copy of the draft plan could be viewed or downloaded. The document was made available on the website on September 1, 2021. Hard copies of the final draft were placed at the Gasconade County Courthouse. A hard copy of the draft could be obtained directly from MRPC by request. Members of the local media, both radio, newspaper and online 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 Gasconade 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 Hermann Area District Hospital, Gasconade County Children's Division, Missouri State Highway Patrol, Medical Clinic of Owensville and the Owensville Area Ambulance District. 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.

Table 1.7 Jurisdictional Representatives Invited to Participate in the Planning Process

Name	Title	Department	Jurisdiction/Agency/Organization
Larry Miskel	Presiding Commissioner	County	Gasconade County
Jerry Lairmore	Associate Commissioner	County	Gasconade County
James Holland	Associate Commissioner	County	Gasconade County
Lesa Lietzow	County Clerk	County	Gasconade County
Scott Eiler	Sherriff	Sherriff's Department	Gasconade County
Clyde Zelch	EMD	Emergency Management	Gasconade County
Wayne Kottwitz	Supervisor	Gasconade Co. Road Dept.	Gasconade County
Lee Medlock	Mayor	City Admin.	City of Bland
Carrie Krupp	City Clerk	City Admin.	City of Bland
Patrick Boatman	City Marshall	Marshall's Office	City of Bland
Jason Lewis	Chief of Public Works	Public Works	City of Bland
Douglas Nochta	Fire Chief	Fire Department	City of Bland
Riley Lewis	Chief of Police	Police Dept.	City of Gasconade
Debbie Green	Mayor	City Admin.	City of Gasconade
Kim Steiner	City Clerk	City Admin.	City of Gasconade
Bruce Cox	Mayor	City Admin.	City of Hermann
Patricia Heaney	City Clerk	City Admin.	City of Hermann
Mark Wallace	City Administrator	City Admin.	City of Hermann
Marlon Walker	Chief of Police	Police Department	City of Hermann
Kevin Speckhals	Fire Chief	Fire Department	City of Hermann
Wayne Bruckerhoff	Public Works Supervisor	Public Works	City of Hermann
Marlon Walker	EMD	Emergency Mgt.	City of Hermann
Melissa Strobe	Mayor	City Admin.	City of Morrison
Doris Rost	City Clerk	City Admin.	City of Morrison
Rick Cramer	Fire Chief	Fire Department	City of Morrison
Delmar Mitchen	Supervisor	Public Works	City of Morrison
John Kamler	Mayor	City Admin.	City of Owensville
Bobbi Limberg	City Clerk	City Admin.	City of Owensville
Nathan Schauf	City Administrator	City Admin	City of Owensville
Robert Rickerd	City Marshall	Marshall's office	City of Owensville
Scott Stranghoener	Fire Chief	Fire Department	City of Owensville
Jeff Arnold	EMD	Emergency Mgt.	City of Owensville
Jeff Kuhne	Supervisor	Public Works	City of Owensville
Shannon Grus	Mayor	City Admin.	City of Rosebud
Ann Parker	City Clerk	City Admin.	City of Rosebud
Mason Griffith	Chief of Police	Police Department	City of Rosebud
Dennis Eilers	Supervisor	Public Works	City of Rosebud
Dr. Scott Smith/ Dr. Geoff Neill	Superintendent	Administration	Gasconade Co. R-I School District
Dr. Chuck Garner/ Dr. Jerri Kay Hardy	Superintendent	Administration	Gasconade Co. R-II School District
Dr. Lenise Basham	Superintendent	Administration	Maries Co. R-II School District
Greg Lara	Admin./Exec. Dir.	Gasconade Co. Health Dept.	Gasconade County

Table 1.8 Stakeholders Invited to Participate in the Planning Process

Name	Title	Agency/Organization
Clay Crawford	Owner	Victorian Place of Owensville
Crystal Ray, LNHA	Admin./Exec. Dir.	Gasconade Manor Nursing Home
Crystal Ray, LNHA	Admin./Exec. Dir.	Gasconade Terrace Assisted Living
Angie Scheidegger	Director	Frene Valley Health Center
Clay Crawford	Owner	Victorian Place of Hermann
		Hermann Senior Housing
Roger Kloeppe	CEO/General Manager	Three Rivers Electric Cooperative
Tony Mallory	CEO/General Manager	Crawford Electric Cooperative, Inc.
Abigail Anderson	Executive Director Central & Northern Missouri Chapter	American Red Cross
Mary Jane Thomsen	Executive Director Greater St. Louis Chapter	
Eric Niemeyer	County Executive Director	USDA Natural Resources
Todd Hendricks	Area Supervisor	Enbridge Energy
Ted Brandt	Vice President - Clinics	Capital Region Medical Clinic
Dan McKinney	Administrator	Medical Clinic of Owensville
Dan McKinney	Administrator	Hermann Area District Hospital
Preston Kramer	District Engineer	Missouri Department of Transportation
Sherry Smith	Administrator	Gasconade Co. Division of Aging
Jason Eikermann	Conservation Agent	Missouri Department of Conservation
Kent Kreftmeyer	MSHP Sergeant	Missouri State Highway Patrol
Tracy Carollo	Director of Information Services	Fidelity Communications
Barry Cox	Site Vice President	Ameren UE
Doug Lane	CEO	Intercounty Electric Cooperative
Bryan Smith	Deputy District Engineer	US Army Corps of Engineers
Tom Waters	Chairman	MO Levy and Drainage District Assoc.
Ashlee Jenkins	Administrator	Stonebridge Senior Living

Jurisdictional representatives on the HMPC 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).

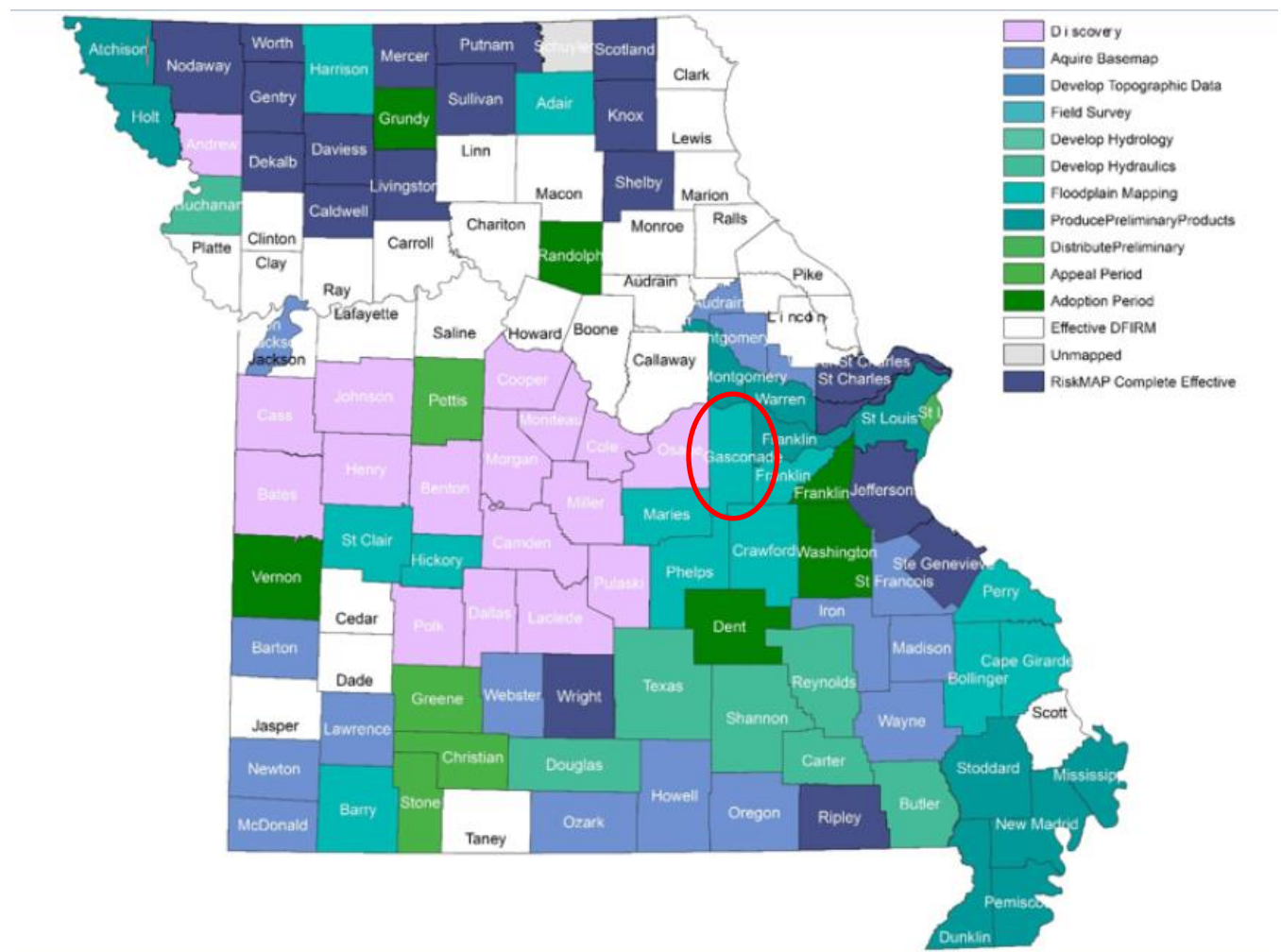
Coordination with FEMA Risk MAP Project

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 Discovery meeting for RiskMAP in Gasconade County was held on March 1, 2011. The project kick-off meeting was held on December 12, 2018. The first flood study review meeting was held on November 5, 2019. The second flood study review meeting was held on

January 23, 2021. The project is currently in the hydrologic and hydraulic modeling phase. SEMA anticipates having the third flood study review meeting in October of 2021.

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

Figure 1.1. Map of RiskMAP Projects



Source: mosema.maps.acrgis.com/apps/MapJournal/index.html?appid=c95675c3892c4b1aa870f202158d3098

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. Gasconade County is a rural area with the largest community's population at approximately 2,599. Not all 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 HMPC reviewed the hazards that affected Gasconade County at the first planning meeting on October 29, 2020, 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 HMPC 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 October 29, 2020. Those goals are as follows:

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.

Step 7: Review Possible Mitigation Actions and Activities

Mitigation strategy and specific action items were discussed at the first and second HMPC meetings. At the first and second HMPC meeting the group reviewed the list in the existing plan and decided which actions could be eliminated; 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.

No projects have been identified through the RiskMap process at this time.

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.

Step 8: Draft an Action Plan

The HMPC reviewed the final list of action items at the February 9, 2021 meeting and completed the prioritization process. The final list was then mailed out to all jurisdictions and members of the HMPC for review and approval as everyone was not able to attend the meeting. Staff was directed by the HMPC to take the finalized list after allowing time for comments and draft an action plan for the group to review.

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 insure 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)

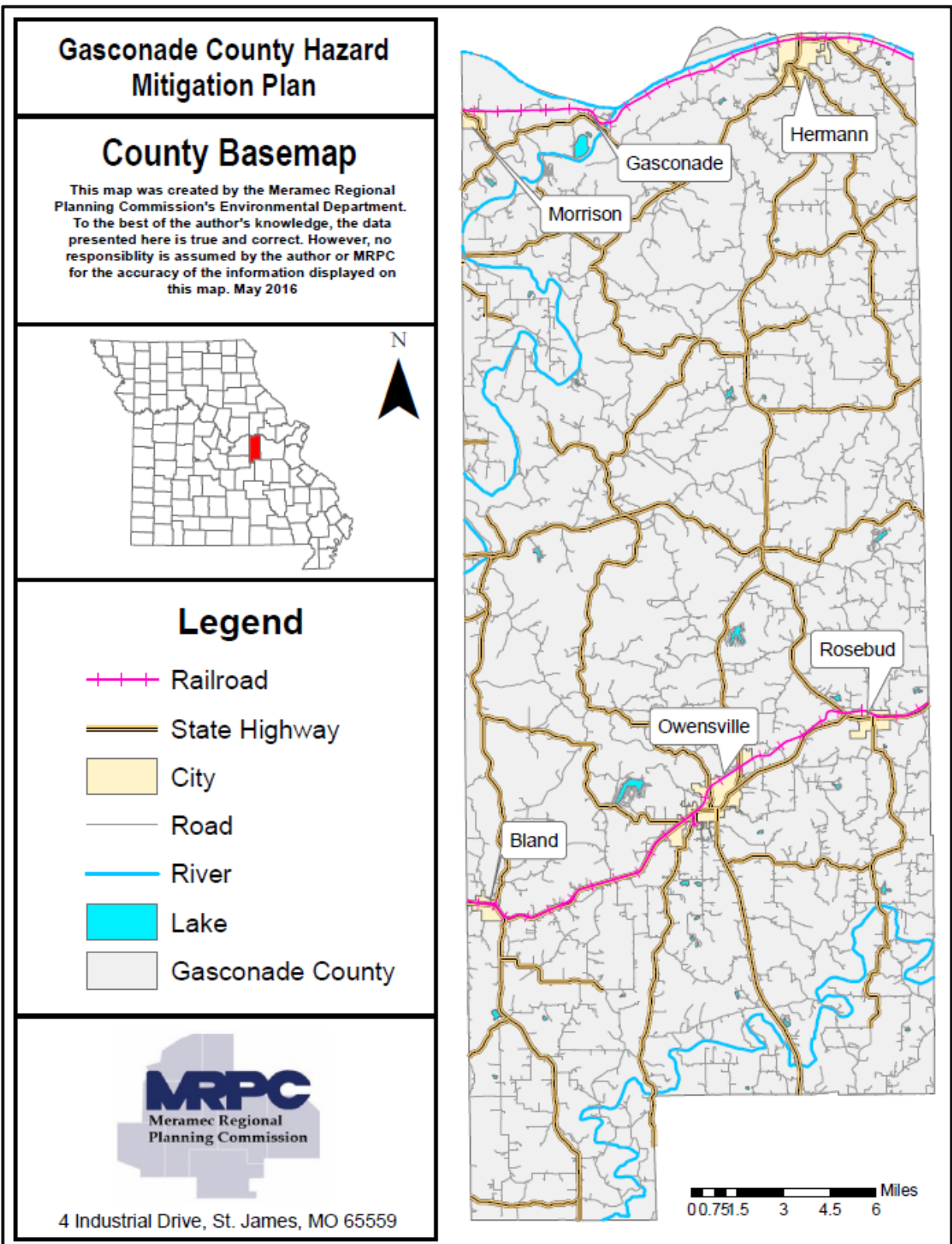
At all three planning meetings (October 29, 2020, February 9, 2021, and August 31, 2021) MRPC staff advised the HMPC and participating jurisdictions of the importance of continuing to meet periodically to discuss implementation of the plan as well as monitoring and maintaining the plan into the future. Chapter 5 provides details on Gasconade County's strategy for implementation, evaluation and revising the plan.

2 PLANNING AREA PROFILE AND CAPABILITIES

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2.1 Gasconade County Planning Area Profile

Figure 2.1. Map of Gasconade County



Gasconade County has a population of approximately 14,711 according to the most recent census data¹. **Error! Reference source not found.** illustrates the percentage population growth since 2010 as compared to the statewide and national population growth. The median household income and percentage growth since 2010, as compared to statewide and national figures can be found in **Table 2.2**. Furthermore, median house value percentage growth for Gasconade County, Missouri, and the United States is provided in **Table 2.3**.

Table 2.1 Percent Population Growth for County, State and Nation 2010-2019

Demographic Region	Total Population		Change Over Period	
	2010	2019	Change	Percent
Missouri	5,814,785	6,104,910	290,125	4.99
United States	300,758,215	324,697,795	23,939,580	7.96
Gasconade County	14,972	14,711	-261	-1.74

Source: U.S. Census Bureau, Census 2010; U.S. Census Bureau, 2015-2019 5-Year American Community Survey

Table 2.2. Median Household Income and Percentage Growth for County, State, and Nation 2010 - 2019

Demographic Region	Median Household Income (USD)		Change Over Period	
	2010	2019	Change	Percent
United States	\$51,914	\$62,843	\$10,929	21.1
Missouri	\$46,914	\$55,461	\$9,199	19.9
Gasconade County	\$40,837	\$54,885	\$14,048	34.4

Source: U.S. Census Bureau, 2006-2010 and 2015-2019 5-Year American Community Survey

Table 2.3. Median House Value Percentage Growth for County, State, and Nation 2010 - 2019

Demographic Region	Median House Value (USD)		Change Over Period	
	2010	2019	Change	Percent
United States	\$188,400	\$217,500	\$29,100	15.4
Missouri	\$137,700	\$157,200	\$19,500	14.2
Gasconade County	\$111,900	\$134,200	\$22,300	19.9

Source: U.S. Census Bureau, 2006-2010 and 2015-2019 5-Year American Community Survey

2.1.1 Geography, Geology and Topography

Gasconade County has a total land area of 524 square miles. The bulk land cover in the county is woodlands; however, there are areas of the county that are utilized for row crop production, particularly in the river valleys. The area has karst terrain, which is characterized by springs, caves, losing streams, and sinkholes. Additionally, the county is comprised of 6.6 square miles of total water area. Incorporated jurisdictions within the county include Bland, Gasconade, Hermann, Morrison, Owensville, and Rosebud.

¹ U.S. Census Bureau, 2013-2018 American Community Survey 5-Year Estimates

Gasconade County is located in south central Missouri, approximately 50 miles east of the state capital of Jefferson City, approximately 130 miles northeast of Springfield, Mo. and approximately 70 miles west of St. Louis, Mo. The county is bordered on the north by Montgomery and Warren Counties. On the east side the county is bordered by Osage and Maries Counties. To the south the county is bordered by Phelps and Pulaski Crawford. Franklin County shares a border with Gasconade to the west.

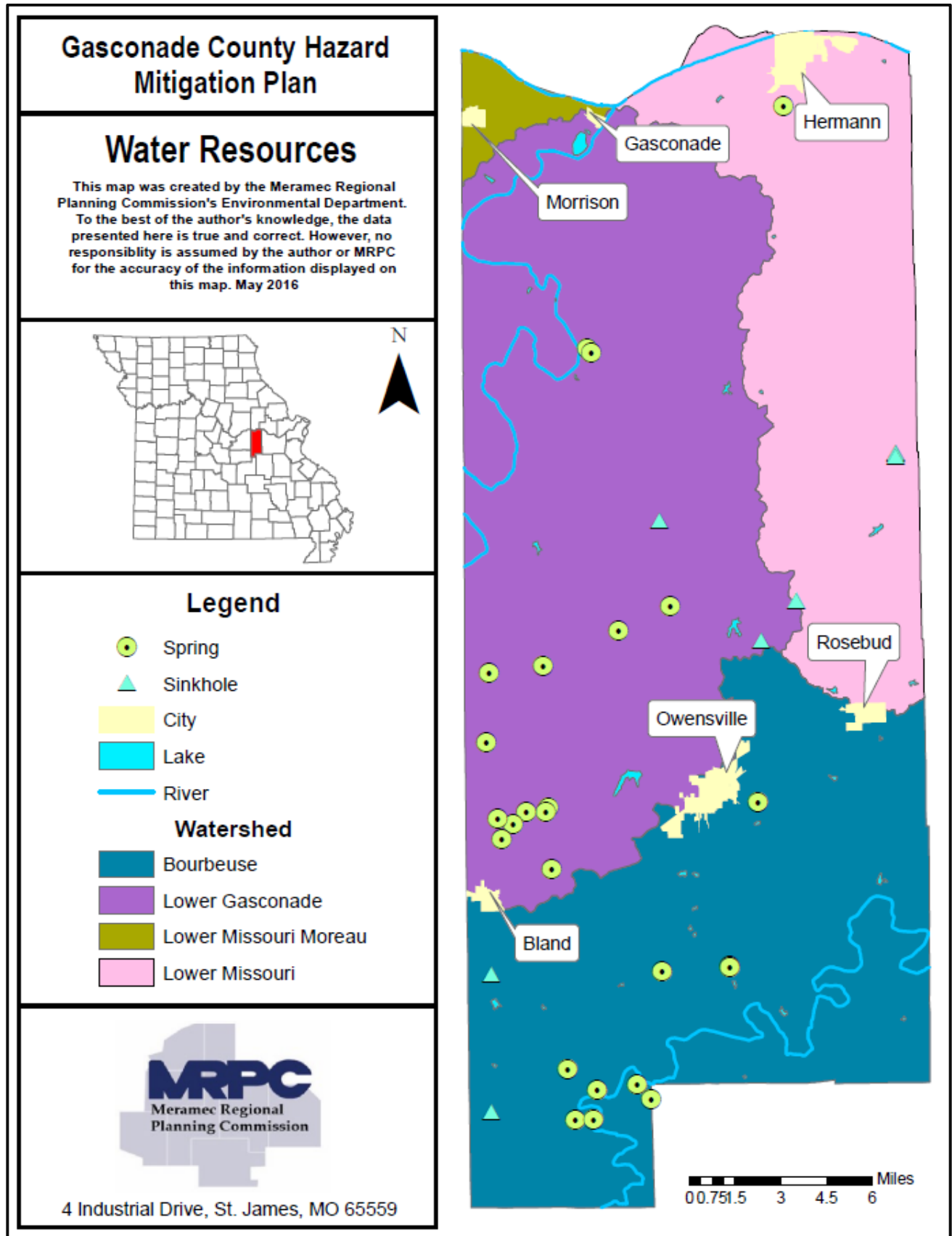
The topography in Gasconade County can be divided into two areas: the area to the south within the Bourbeuse Watershed; and the area to the north, which drains into the Gasconade and Missouri rivers. In the Bourbeuse Watershed, the topography is fairly gentle with rolling hills. North of Highway 28 the topography becomes rough with steep sided valleys and narrow ridges. The maximum relief in the county is approximately 500 feet, with the highest area being at the north edge of the Bourbeuse River Valley, and the lowest at the Missouri River.

A drainage basin is the total area drained by a river and all of its tributaries. A watershed is the area drained by a single stream. 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 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.

Gasconade County is located in three river basins: Gasconade, Bourbeuse, and Missouri. The Gasconade River watershed is located within the Ozark Plateau of the Interior Ozark Highlands. The river meanders north to northeast through Webster, Texas, Laclede, Pulaski, Dent, Maries, Osage, Phelps, and Gasconade counties to join the Missouri River. The Gasconade River is 271 miles long from mouth to headwaters with 263 miles having permanent flow. The Upper and Lower Gasconade River watersheds drain 2,806 square miles. The Upper Gasconade River watershed has an average gradient of 27.6 feet/mile, and the Lower Gasconade River watershed has an average gradient of 3.9 feet/mile. A number of springs within the middle Gasconade River portions are due to the karst geology of the Roubidoux and Gasconade Dolomite Formation and losing stream segments. The karst topography causes losing portions in the Osage Fork, Roubidoux, North Cobb, Little Piney, Spring, and Mill creeks, and Gasconade River. The entire Gasconade River watershed is reported to have 76 springs and the largest concentration of big springs in the state. **Figure 2.2** is a map showing the watersheds covering Gasconade County.

As a whole, the Gasconade River watershed is rural with low population. The most populated areas are Pulaski and Phelps counties, which are experiencing land development from growth surrounding Fort Leonard Wood and the City of Rolla. Lower watershed areas of Maries, Osage, and Gasconade counties have low population density. The Upper and Lower Gasconade River watersheds have 49% and 33%, respectively, grassland and cropland as land use. A general

Figure 2.2. Gasconade County Watershed/Water Resources



trend in the rural Gasconade River watershed toward increased cattle numbers per pastured acre has continued to the present. Forest comprises approximately 46% of the land cover within the Upper Gasconade River watershed and 66% within the Lower Gasconade River watershed. Forests are in good health and have sustainable forest production. Forest land is largely under private ownership with federally-owned forest having the second largest holdings, followed by state-owned lands having a smaller percentage. Public land is 12% or 221,040 acres within the entire watershed. To provide water-based recreational opportunities, 23 public stream accesses have been developed in the watershed.

The Gasconade River watershed annual precipitation ranges from 40.35 to 42.67 inches with an annual mean of 41.66 inches. This precipitation and the local geology provides good base flow conditions and lower variability in stream flow throughout major portions of the watershed. Average runoff had greater extremes from the late 1970s to the present than during the 1960s to the late 1970s.

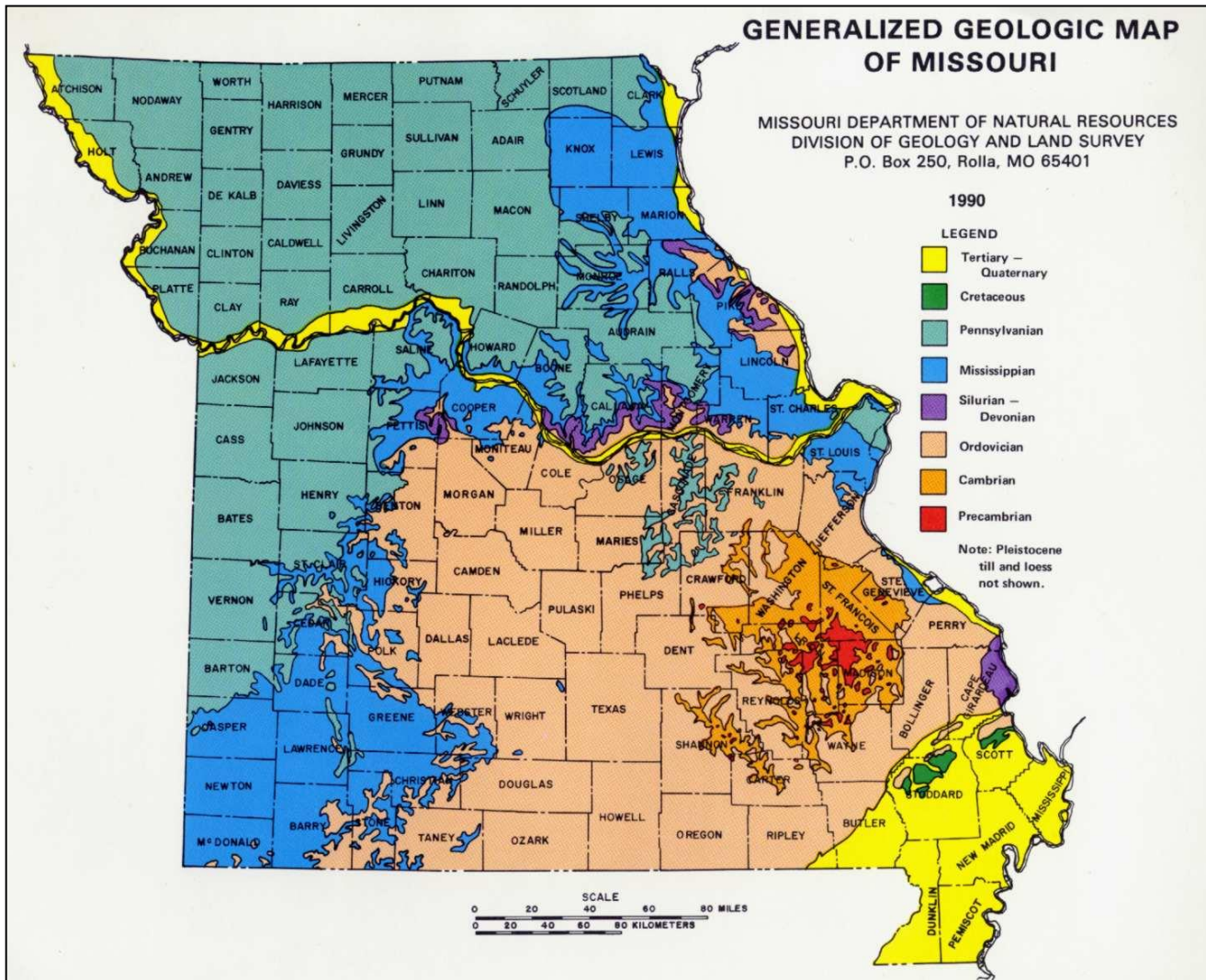
The Gasconade River watershed's designated stream uses, assigned by the Missouri Department of Natural Resources (MDNR) are warm water aquatic life protection and fishing, and livestock and wildlife watering. Threats to beneficial uses in the Gasconade River watershed are point and non-point sources of pollutants. The number of point pollution sources and flow from point pollution sources is low. In fact, improvements have been made to point source discharges through monitoring by the MDNR and sewage treatment upgrades. Also, the Gasconade River has recovered well from the December 1988 oil spill that released hundreds of thousands of gallons of crude oil into the main stem Gasconade River from a broken pipeline near Vienna. On the contrary, non-point source pollution remains a difficult challenge. Numerous MDNR Soil and Water Program Special Area Land Treatment projects in the Upper Gasconade River Hydrologic Unit (HU), and portions of the Upper Osage Fork HU are addressing nutrient problems that have cattle manure as their sources. Sand and gravel mining in sensitive areas can and has effected fisheries, especially sensitive cool- and cold-water fisheries. Runoff from farms, mining operations, construction sites, forest operations, residential septic's, and impervious surface in urbanized areas create a complex resource management challenge.

The Upper Gasconade River watershed was poorly forested along major segments of its tributaries and main stem compared to the Lower Gasconade River watershed. Thirty-eight percent of the major stream segments within the Upper Gasconade River watershed and 46% of the major segments of the Lower Gasconade River watershed had forested corridors. Results of the corridor quality ratio used to assess stream segments indicated that the Lower Gasconade River watershed had more stream segments rated as good (81%) than the Upper Gasconade River watershed (64%). Based on the land use/ land cover Geographic Information Systems (GIS) analysis, priority management should be given to those hydrologic units that were rated relatively low on the objective rating scale. The Lower Gasconade River HU was rated as poor due to the lack of forested stream corridor. In addition, the Lower Roubidoux Creek HU, should be given priority management attention because of its sensitive springs, growing human population, and urbanization.

The county is located in the Ozark Plateau – the largest outcrop area of Ordovician-age rocks in the United States. 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. 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 2.3** is a geologic map of Missouri.

Figure 2.3. Generalized Geologic Map of Missouri



Gasconade County has several soil types. The northern part of the county is located in the Missouri Alluvium soils, which are in the broad, nearly level to gently sloping bottom land area of the Missouri River. These soils formed in deep silty loamy and clayey alluvium. The Missouri Alluvium includes the Haynie-Blake-Booker soil association.

The Central Mississippi Valley Wooded Slopes soils are located on thick loess covered hills with rolling narrow ridgetops and steep valley sideslopes. These soils developed in deep loess deposits on ridgetops and valley slopes near the Missouri River along the northern part of Gasconade County. Soils formed in loess and cherty limestone and dolomite are on ridges at a greater distance from the Missouri River. Deep silty, loamy and clayey soils are on the benches and floodplains of small streams. The Central Mississippi Valley Wooded Slopes soils include

the Menfro-Winfield soil association.

The Ozark Border soils are located in an area of dissected plateau characterized by narrow ridgetops and narrow valleys. A thin mantle of loess caps the ridgetops. The steep sideslopes contain deep cherty, clayey, reddish-colored soils developed over dolomite or limestone. Sandy, loamy and gravelly alluvial soils are in the bottom lands. These soils are found throughout most of Gasconade County.

The Ozark Border soils include the Union-Goss-Gasconade Peridge and Hobson-Clarksville-Gasconade soil associations. Ozark Soils are found in the central part of Gasconade County. These 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 can be found on the ridges. Soils formed in loamy, sandy and cherty alluvium are in narrow bottom-land areas.

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 Gasconade County are subject to frequent changes in temperature. The average annual temperature is 53°F. The average annual high temperature is 65.2°F With the average annual low at 40.8°F. The average high and low in January is 40°F and 18°F, respectively. In July the average high and low are 87°F and 64°F, respectively. A high temperature of 114 degrees has been observed in Hermann.

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 degrees. 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 Gasconade County between 2000 and 2019

by jurisdiction. The unincorporated area of Gasconade County was determined by subtracting the populations of the incorporated areas from the overall county population.

Table 2.4. Gasconade County Population 2010-2019 by Jurisdiction

Jurisdiction	2000 Population	2010 Population	2019 Population	2010-2019 # Change	2010-2019 % Change
Unincorporated Gasconade County	8,849	8,805	8,255	-550	-6.25
Bland	565	539	481	-58	-10.76
Gasconade	267	223	334	111	49.78
Hermann	2,674	2,335	2,438	103	4.41
Morrison	123	139	85	-54	-38.85
Owensville	2,500	2,522	2,599	77	3.05
Rosebud	364	409	519	110	26.89

Source: U.S. Census Bureau, Census 2000; Census 2010; U.S. Bureau of the Census, 2015-2019 5-Year American Community Survey

Note: The smaller the town the larger the margin of error in ACS data. Large changes in Gasconade, Morrison, and Rosebud are most likely due to error.

Table 2.5 provides information in regards 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 Gasconade County, Missouri, and the U.S. In 2019 there were an estimated 8,178 households within the county².

Table 2.5. Percent of Individuals Under the Age of 5, and Over 65 for County, State, and Nation (2019)

Location	% Under Age of 5	% Over Age of 65
Gasconade County	5.1	22.3
Missouri	6.1	16.5
United States	6.1	15.6

Source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates

Table 2.6. 2019 Average Household Size for County, State, and Nation

Location	Average Household Size
Gasconade County	2.33
Missouri	2.41
United States	2.6

Source: U.S. Census Bureau, 2015-2019 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. **Table 2.7** depicts the Social Vulnerability Index for Gasconade County along with its national percentile.

² U.S. Census Bureau, 2013-2018 5-Year American Community Survey

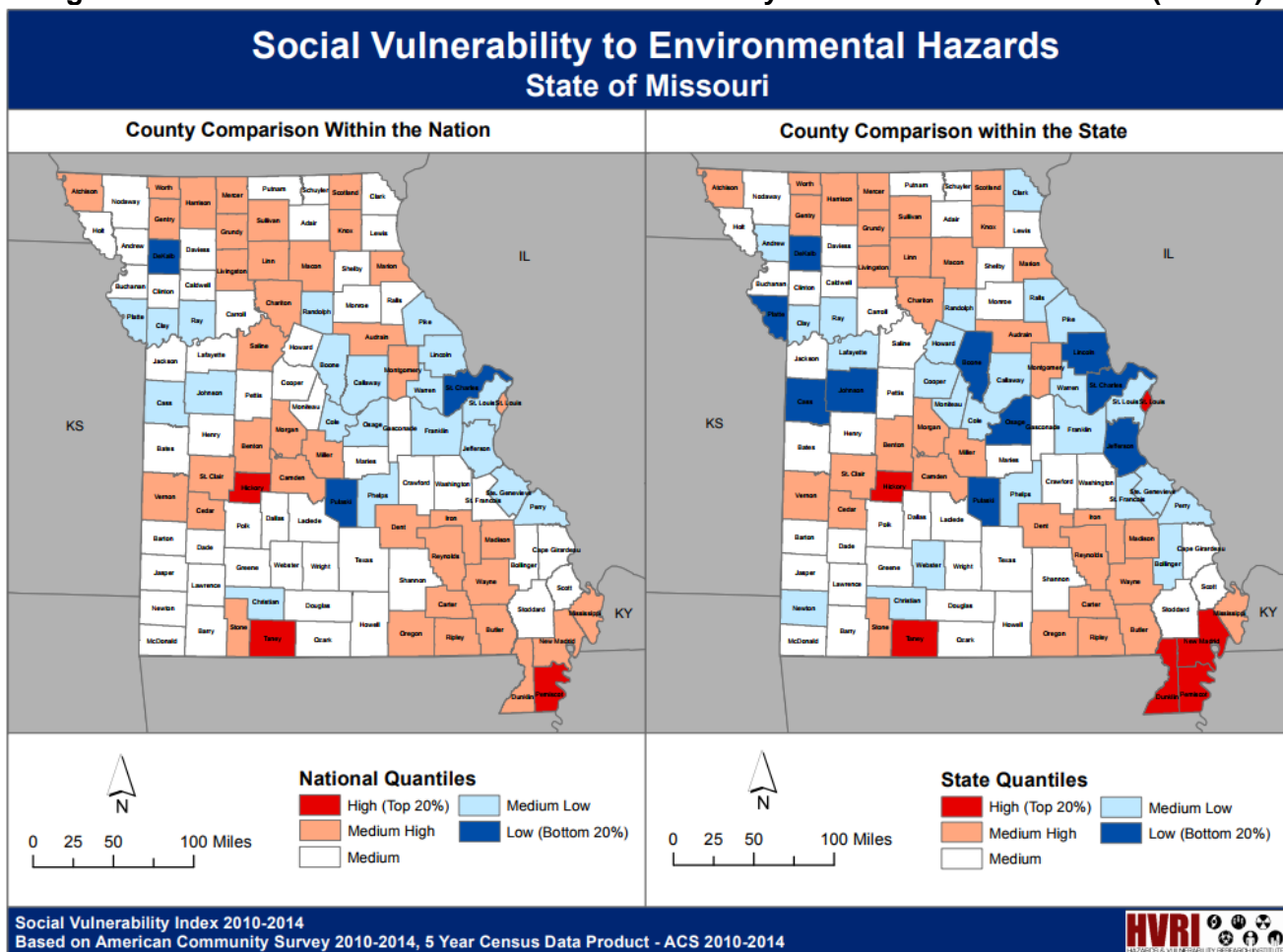
Table 2.7. Social Vulnerability Index (SoVI®)

State	County	SoVI Score (10 - 14)	National Percentile (10 - 14)
Missouri	Gasconade County	1.159999967	69.1%

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 resiliency³. Gasconade County's SoVI® Score illustrates a diminished resiliency to natural disasters. Additionally, Gasconade County is ranked 69.1 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.

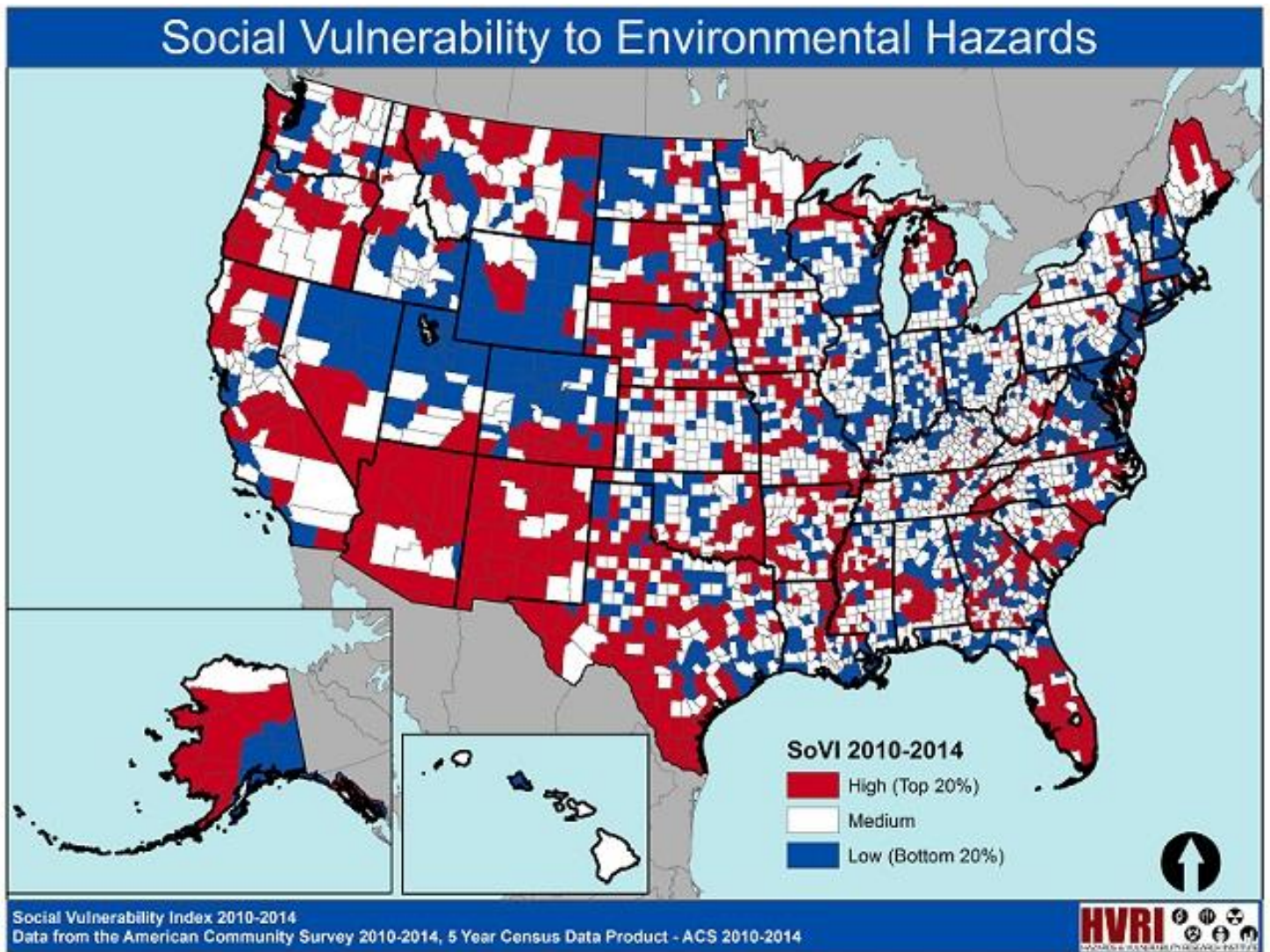
Figure 2.4. 2010 – 2014 Missouri Social Vulnerability to Environmental Hazards (SoVI®)



Source: http://artsandsciences.sc.edu/geog/hvri/sites/sc.edu.geog.hvri/files/attachments/MO_1014.pdf

³ <http://webra.cas.sc.edu/hvri/products/sovifaq.aspx>

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 Gasconade County.

Table 2.8. 2018 Unemployment, Poverty, Education, and Language Percentage Demographics, Gasconade 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)
Gasconade County	60.1	2.7	5.9	38.5	19.2	1.7
Bland	33.1	5.0	32.1	34.9	12.1	0.0

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)
Gasconade	51.7	5.0	7.9	41.1	2.6	5.4
Hermann	60.9	2.8	4.8	35.3	25.4	3.6
Morrison	41.4	0.0	33.3	56.9	13.8	0.0
Owensville	57.4	4.2	12.7	33.4	22.6	1.5
Rosebud	64.3	2.1	14.9	45.8	11.2	0.0

Source: U.S. Census Bureau, 2015-2019 American Community Survey, 5-Year American Community Survey

2.1.4 History

Organized in November 1820, Gasconade County was named for the Gasconade River. Gasconade City was elected as the first seat of the justice for the county. Gasconade City remained the county seat until 1825 when, because of a flood, it was deemed advisable to move the seat to Bartonville. Bartonville was located on the Gasconade River in what is now Osage County and remained the county seat until it, too, was flooded. The county seat was then moved a second time to Mount Sterling, located in a place known as Shockley's Bluff or Starky's Bluff. The county seat remained at Mount Sterling until 1842 when an election was held to determine if the seat should be moved to Hermann. Hermann had promised to render substantial financial assistance to the county if the county seat would be located there. As a result of the election held on March 14, 1842, the county seat moved to Hermann. The town paid for the courthouse, which was built in the center of a block on East Front Street. This site, high on a bluff above the Missouri River, is one of few courthouse sites that takes advantage of a natural vista. The square, two-story, brick building with hip roof cost about \$3,000. The County Court used this courthouse until 1896 when they ordered it razed.

The present courthouse, a gift to the county from Charles D. Eitzen, was built in 1896-98. Architects were J. B. Legg, St. Louis, and A. W. Elsner, Jefferson City, who originally presented plans calling for a 143-by-88-foot building. The two-story courthouse had a finished basement and a dome that rose 120 feet. Originally, the building was to be constructed of light-gray or medium-buff brick with matching terra cotta trim. The main roof was to be dark Pennsylvania slate, the dome roofs of tin, painted a copper color. The rotunda and corridors were to be tiled in Italian marble and mosaic. In February 1897 the court called for bids. Thirty contractors responded, but all bids for the Legg-Elsner design were too high. The architects then modified the plans, eliminating some of the more costly specifications. Red brick with white stone trim was substituted for the gray or buff brick. Again the court called for bids; H. J. Wallau received the building contract for \$41,500 and completed his work in 1898. On the first floor, offices open off a long east-west hall; the 41-by-44-foot Circuit Court room is located on the west end of the second story. The dedication of the building took place May 25, 1898. Fire damaged the building on February 3, 1905, but the building was repaired and continues to be used today.

The community of Gasconade grew up around a horse driven grist mill located near the mouth of the Gasconade River. The mill was established in 1811. The community of Gasconade was the first county seat and narrowly missed being selected as the capital city of Missouri in 1821. The Corps of Engineers has a boatyard in the community.

The history of the settlement of the City of Hermann is of particular interest. The selection of the location for the town site was originally made under the auspices of the Deutsche Ansiedlung Gesellschaft (German Settlement Society) of Philadelphia. In March 1837, the society sent a representative through Indiana, Michigan, Illinois, Wisconsin and Missouri to look for a suitable place for a proposed German settlement. By Oct. 5, 1837, the president of the society announced to the membership that a large piece of land had been purchased in Missouri. At the same meeting during which the announcement was made, the society resolved that the name of the new town would be Hermann. Mr. Bayer, who had investigated the town site, was made general agent of the society and agreed to accept the 80 acres of land in the new settlement and a salary of \$600 per year. Every member of the society arriving in the new town was to have the privilege of choosing one lot for himself.

The first storekeeper in Hermann was H.W.D. Widersprecher. The railroad was built through the town in 1854, and from that time until the Civil War, the town prospered.

Also located in Gasconade County were the cities of Bland and Owensville. Located in the southwest portion of the county, Bland was named after Congressman Richard P. Bland. A trading post was founded near a spring where William Haynes was the first settler in the Bland area in the 1850's. The community of Bland experienced the negative effects of the Civil War when in 1864, General Price's army robbed the stores, requisitioned livestock and destroyed what could not be carried away. In 1900, the railroad was being built through the region and the first station in Bland was a boxcar. In 1902 a station was built in the community, as well as the Bland Commercial Bank. In 1904, the Bland Courier's first newspaper edition was published and was printed twice weekly with 500 subscribers.

Owensville was laid out in 1886 by the Owensville Improvement Company, consisting of Robert Robyn, Dr. G. Etmueller, Michael Jordan, Dr. M.W. Hoge and George H. Buschmann. The first three were citizens of Hermann, while the other two founders were from the vicinity of Owensville. The company bought 280 acres of land and platted the town. According to legend, the town was named as a result of a game of horseshoes between storeowner Francis Owen and blacksmith Edward Luster, with the understanding that the settlement would be named after the winner. Although Luster won the game, legend has that he decided to name the settlement after Owen because Owensville sounded better than Lusterville.

The City of Morrison is named after Alfred William Morrison, a plantation owner and former state treasurer. The city was first organized in 1899. The City of Rosebud was established when the Rock Island Railroad built a depot in the area and named it after the wild rosebushes in bloom at the time. The city was formally organized in 1911. In 1915 John Watkins opened a clay mine southeast of Rosebud and built a miniature railroad consisting of a locomotive and five cars that each held two tons of clay to haul the clay to the Rock Island Railroad station in Rosebud. He named his locomotive Molly Watkins and the little train served the mine for several years.

2.1.5 Occupations

0 provides occupation statistics for the incorporated jurisdictions and incorporated county.

Table 2.9. Occupation Statistics, Gasconade County, Missouri

Place	Management, Business, Science, and Arts Occupations	Service Occupations	Sales and Office Occupations	Natural Resources, Construction, and Maintenance Occupations	Production, Transportation, and Material Moving Occupations
Gasconade County	2,002	1,123	1,293	1,005	1,596
Bland	32	34	13	0	53
Gasconade	3	32	30	21	29
Hermann	292	209	213	210	215
Morrison	9	4	4	7	5
Owensville	282	243	206	133	253
Rosebud	54	53	49	28	52

Source: U.S. Census, 2015-2019 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, Gasconade County had fallen to 859 farms encompassing 208,922 acres, with an average farm size of 243 acres⁴. According to the 2017 Census of Agriculture, Gasconade County had fallen to 823 farms encompassing 207,289 acres, with an average farm size of 252 acres⁵. Furthermore, there are only approximately 19 farms with 1,000 or more acres in the County. Due to the rugged nature of the region, row crop farming is for the most part limited to the river valleys. In 2017, 60,530 acres of cropland were harvested, with forage (hay, haylage, grass silage, and greenchop) being the top crop in the County. Moreover, 37,196 cattle and calves were raised⁶. The average sale per farm was \$39,273. Lastly, the total number of hired workers in the County was 173⁷ individuals comprising 2.45%⁸ 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.

⁴ 2012 Census of Agriculture, USDA, National Agriculture Statistics Service

⁵ Source: 2017 Census of Agriculture – County Data, USDA, National Agriculture Statistics Service

⁶ 2017 Census of Agriculture, Missouri Farm Commodity Sales, USDA, National Agriculture Statistics Service

⁷ http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_2_County_Level/Missouri/st29_2_007_007.pdf

⁸ U.S. Census Bureau, 2013-2018 American Community Survey

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 damages⁹. 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 (\$)
200.1: Acquisition of Private Real Property (Structures and Land) - Riverine	Hermann	07/09/1993	556,074
200.3: Acquisition of Public Real Property (Structures and Land) - Riverine	City of Hermann	06/28/2018	608,300
Total	-	-	1,164,374

Source: Missouri State Emergency Management Agency, <https://www.fema.gov/openfema-data-page/hazard-mitigation-assistance-projects-v2>

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 \$926,215.09

Table 2.11. FEMA PA Grants in Phelps County from 1999-2019

Disaster Declaration	Project Type	Project Size	Applicant	Project Total
1328	FLOOD GENERATED DEBRIS	Small	Gasconade County	\$1,323.04
1328	ROAD WASHOUT DAMAGES	Small	Gasconade County	\$9,775.85
1328	AGGREGATE ROAD SURFACE AND CMP WASHOUT	Small	Gasconade County	\$2,038.42
1328	AGGREGRATE WASHOUT	Small	Gasconade County	\$0.00
1328	ROAD WASHOUT	Small	Gasconade County	\$1,697.84
1328	ROAD AND CULVERT WASHOUTS	Small	Gasconade County	\$5,132.37
1328	FLASH FLOOD CAUSED SCOURING OF ROADWAYS	Small	Gasconade County	\$1,396.82

⁹ <https://www.fema.gov/media-library/assets/documents/103279>

Disaster Declaration	Project Type	Project Size	Applicant	Project Total
1328	ROAD WASHOUT	Small	Gasconade County	\$3,077.69
1328	COUNTY ROADS	Small	Gasconade County	\$44,418.58
1463	3.2 FLAGPOLE & PAVILLION REPAIR	Small	City of Owensville	\$6,072.00
1463	2.2 ELECTRICAL DISTRIBUTION SYSTEM REPAIR	Small	City of Owensville	\$22,717.91
1463	DONATED RESOURCES	Small	City of Owensville	\$416.39
1463	4.2 AGGREGATE ROAD REPAIR	Small	Gasconade County	\$2,953.30
1463	EMERGENCY PROTECTIVE MEASURES	Small	City of Owensville	\$1,249.18
1676	PUBLIC UTILITIES	Large	City of Owensville	\$57,048.32
1676	EMERGENCY PROTECTIVE MEASURES	Small	City of Owensville	\$3,184.50
1676	DEBRIS REMOVAL	Small	City of Owensville	\$13,148.00
1676	EMERGENCY PROTECTIVE MEASURES	Small	City of Owensville	\$7,976.65
1676	EMERGENCY PROTECTIVE MEASURES	Small	Gasconade County	\$2,921.47
1676	DEBRIS REMOVAL	Small	Gasconade County	\$9,100.50
1676	DEBRIS REMOVAL	Small	City of Owensville	\$8,550.35
1676	RECREATIONAL OR OTHER	Small	City of Owensville	\$1,742.42
1676	PUBLIC UTILITIES	Small	City of Owensville	\$1,063.27
1676	EMERGENCY PROTECTIVE MEASURES	Small	Gasconade County	\$31,677.87
1676	EMERGENCY PROTECTIVE MEASURES	Small	City of Bland	\$2,890.95
1676	DEBRIS REMOVAL	Small	City of Bland	\$2,000.00
1676	DEBRIS REMOVAL	Small	City of Rosebud	\$2,319.40
1676	DONATED RESOURCES	Small	City of Owensville	\$2,638.44
1749	ROAD WASHOUT	Small	Gasconade County	\$7,524.77
1749	EMERGENCY PROTECTIVE MEASURES	Small	Gasconade County	\$3,043.65
1749	ROAD WASHOUT	Small	Special Four Road District	\$8,145.55
1749	ROAD WASHOUT - REVISION 6/06/08	Small	Special Four Road District	\$9,291.90
1749	ROAD WASHOUT	Small	Gasconade County	\$12,234.42
1749	ROAD WASHOUT	Small	Gasconade County	\$6,768.25
1749	ROAD WASHOUT / EROSION	Small	Gasconade County	\$11,285.57
1749	ROAD WASHOUT/RUTTING	Small	Gasconade County	\$7,010.51
1749	LOW WATER CROSSING COLLAPSE	Small	Gasconade County	\$9,593.71
1749	EMERGENCY PROTECTIVE MEASURES	Small	Gasconade County	\$4,295.18
1749	ROAD BASE WASHED OUT	Small	City of Owensville	\$42,635.26
1749	ROAD / SHOULDER WASHOUT	Small	Special Four Road District	\$23,925.50
1749	ROAD/EMBANKMENT WASHOUT	Small	Special Four Road District	\$12,321.60
4250	073SB22 - Damaged Roads	Small	City of Gasconade	\$43,848.00
4250	073SB25B - Protective Measures	Small	City of Hermann	\$67,822.25
4250	076SB26G - Hermann Airport	Small	City of Hermann	\$20,519.35

Disaster Declaration	Project Type	Project Size	Applicant	Project Total
4250	073SB20C - County Road Repair	Small	Gasconade County	\$65,039.39
4250	073SB23 G - Gasconade Park	Small	City of Gasconade	\$17,284.04
4317	ST01886 - City of Gasconade Park	Small	City of Gasconade	\$34,591.87
4317	CP01251 - Gasconade County Roads	Small	Gasconade County	\$79,278.74
4317	CP01246 - Gasconade County Emergency Protective Measure	Small	Gasconade County	\$11,941.42
4451	118712 - City Amphitheater and Parking Lot	Small	City of Hermann	\$83,911.94
4451	118682 - City_wide Debris Removal	Small	City of Hermann	\$19,866.78
4451	118707 - Mozart Street - Flood Damage	Small	City of Hermann	\$29,738.47
4451	118709 - City of Hermann Airport Hangars/Office	Small	City of Hermann	\$31,705.76
4451	118683 - City-Wide Emergency Protective Measures	Small	City of Hermann	\$6,468.44
4451	136793 - HERMANN MANAGEMENT COSTS	Small	City of Hermann	\$7,591.24
			Total	\$926,215.09

Source: Federal Emergency Management Agency, 11/30/2020

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 Gasconade County

Overview

The jurisdiction of Gasconade County includes all unincorporated areas within the county boundaries. Gasconade 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 Thursday of each week. Other elected county officials include the county clerk, assessor, circuit clerk and recorder, collector, treasurer, prosecuting attorney, sheriff, county surveyor, public administrator and coroner.

The county government has the authority to administer county structures, infrastructure and finances as well as floodplain regulations. Third class counties do not have the authority to enforce building regulations. Gasconade County has staff resources in floodplain management, emergency management, and GIS. The county has a 9-1-1 central dispatch center. Additionally, there are no county sirens. A mass notification system is also utilized (Everbridge).

Technical and Fiscal Resources

There are four fire departments located in Gasconade County and one outside of the county that serves the City of Rosebud. Those departments include Bland Fire Protection District, Hermann Volunteer Fire Department, Morrison Volunteer Fire Department, Owensville Volunteer Fire Department, and Gerald-Rosebud Fire Protection District. Bland and Gerald-Rosebud fire districts are both tax supported. Hermann, Morrison, and Owensville are dues supported. The county is served by the Gasconade County Sheriff's Department. The county has a 9-1-1 Central Dispatch Center located at 216 W. Rosebud Ave., Rosebud, MO. The county is served by three ambulance districts – Gerald Area, Hermann Area, and Owensville Area Ambulance Districts. Peaceful Valley Lake Estates, a private housing community in the county, has two outdoor warning sirens that are activated by Central Dispatch in Rosebud. The county does not have any fixed or portable generators.

Existing Plans and Policies

Gasconade County participates in the National Flood Insurance Program. The County Emergency Management Director serves as the Floodplain Manager. Construction occurring in the floodplain in unincorporated areas of the county is required to obtain a permit from the county. The county has a Local Emergency Operations plan (LEOP), Hazard Mitigation Plan, Regional Transportation Plan (MRPC), and a Regional Comprehensive Economic Development Strategy (MRPC).

Other Mitigation Activities

The Office of Emergency Management, local fire departments, Sheriff's Department, Children's Division, Gasconade County Special Services, and the Gasconade 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, heat wave preparedness and DARE (Drug Abuse Resistance Education). Bicycle and car seat safety education is provided by the Coalition for Roadway Safety.

The county is currently in the process of reestablishing a phone alert system. In addition, the county has a BRO Project in progress to improve the low water crossing at Valentine Ford. The road along Frene Creek is also being paved as it is frequently washed-out during flood events.

Table 2.12. Demographic and Structure Risk Parameters For Unincorporated Gasconade County

Jurisdiction	Total Population	People With a Disability	Non-English Speaking People	People Below Poverty Level	Population Under 5 Yrs.	Population 65 Yrs. and Over	Residences Built Prior to 1939	Mobile Homes
Unincorporated Gasconade County	8,255	1,426	94	397	391	1,886	1,195	623

Source: Source: U.S. Census Bureau, 2015-2019 5-Year American Community Survey

Table 2.13. Unincorporated Gasconade County Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	n/a
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	n/a
County Mitigation Plan	Yes – 2017
Debris Management Plan	No
Economic Development Plan	Yes - Regional CEDS 2018
Transportation Plan	Yes – Regional 2019
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	Yes
Watershed Plan	No
Firewise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes – 2019
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
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes – 9/04/1987
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	Yes – MRPC
Land Use Program	No
Public Education/Awareness	Yes
Property Acquisition	No
Planning/Zoning Boards	No
Stream Maintenance Program	No
Tree Trimming Program	Yes
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	

Capabilities	Status Including Date of Document or Policy
Hazard Analysis/Risk Assessment (City)	n/a
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Evacuation Route Map	Yes
Critical Facilities Inventory	Yes – 2016 & 2020
Vulnerable Population Inventory	Yes
Land Use Map	Yes
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	Yes
Engineer	Contracted
Development Planner	No
Public Works Official	Yes
Emergency Management Director	Yes
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	Yes
Emergency Response Team	Yes
Hazardous Materials Expert	Yes
Local Emergency Planning Committee	MREPC
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	Yes
Economic Development Department	MRPC
Housing Department	Yes – Phelps County PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	Yes
Non-Governmental Organizations (NGOs)	
American Red Cross	Yes
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	Yes
Neighborhood Associations	Yes
Chamber of Commerce	Yes
Community Organizations (Lions, Kiwanis, etc.)	Yes
Local Funding Availability	
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	No
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, 2020-2021

2.2.2 City of Bland

Overview

Bland is located in the southwest portion of Gasconade County. The community was established in the 1850's and named in 1877. State highway 28 intersects the City of Bland. Bland is incorporated as a fourth class city (1902) with a four member board of aldermen and a mayor. The city employs a city clerk, city chief, court clerk, and public works director. According to the 2019 U.S. Census, the community has a population of 481, in 2010 it was 539 which shows a population decline of over 10 percent.

Technical and Fiscal Resources

Bland participates in the National Flood Insurance Program. The City of Bland has a police chief with a staff of one part-time officer and five reserve officer. The community has enhanced 9-1-1 through the Gasconade County 9-1-1 system, located in Rosebud. The city has one warning siren, which is controlled by the fire department.

Ambulance service is provided by the Ozark Central Ambulance District located in Belle (Maries County). Bland Fire Protection District serves the city for fire services. The City does not have any portable or fixed generators.

Public education programs are provided regionally by the Coalition for Roadway Safety and Gasconade County Health Department.

The City of Bland has the highest rate of population over 65, disabled, and living below the poverty level. These vulnerable populations could increase the amount of damages or injuries/deaths due to hazards.

Mitigation Actions

In the next five years the city plans on constructing a new water tower with new water lines throughout the community.

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 Bland

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
Bland	481	165	0	156	26	149	60	45

Source: Source: U.S. Census Bureau, 2018 5-Years American Community Survey

Table 2.15. City of Bland Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes - 2017
Debris Management Plan	No
Economic Development Plan	Yes – regional CEDS 2018
Transportation Plan	Yes – Regional 2019
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	Yes - International Property Maintenance Code
Floodplain Ordinance	Yes – 06/10/2008
Subdivision Ordinance	No
Tree Trimming Ordinance	Yes
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	Yes
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	No
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes – 08/24/1984
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	7
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
Studies/Reports/Maps	

Capabilities	Status Including Date of Document or Policy
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – 2016 & 2020
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	Yes – MRPC Contractor
Mapping Specialist (GIS)	No
Engineer	Yes
Development Planner	No
Public Works Official	Yes
Emergency Management Director	No
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes - MREPC
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	Yes - Phelps Co. PHA
Regional Planning Agencies	MRPC
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
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.)	No
Local Funding Availability	
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, 2020-2021

2.2.3 City of Gasconade

Overview

Gasconade is located in the north central portion of Gasconade County at the mouth of the Gasconade River. The community was established in 1811 and incorporated as a fourth class city in 1926. Gasconade was the first county seat of Gasconade County and missed being the capital of Missouri by two votes in 1821. State highway 100 intersects the City of Gasconade. Gasconade is incorporated as a fourth class city with four aldermen and the mayor who make decisions regarding city issues. Other city personnel include a city clerk and collector. According to the 2019 U.S. Census, the community has a population of 334, in 2010 the population was 223 indicating a growth of almost 50 percent. This is most likely explained by the large margin of error in ACS data when it comes to very small towns.

Technical and Fiscal Resources

The City of Gasconade participates in the National Flood Insurance Program (NFIP). Law enforcement is provided by the Gasconade County Sheriff's Office. The community has enhanced 9-1-1 through the Gasconade County 9-1-1 system, located in Rosebud. The city does not have an outdoor warning siren.

Ambulance service is provided through Hermann Area Ambulance District. Morrison volunteer fire department provides fire protection. The city does not have any fixed or portable generators.

Public education programs are provided regionally by the Coalition for Roadway Safety and Gasconade County Health Department.

The City of Gasconade has the highest rate of non-English speaking population of the county. This vulnerable population can be a challenge to reach during education and outreach programs.

Mitigation Actions

The city does not have any development plans for the next five years in any known hazard areas.

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 Gasconade

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
Gasconade	334	69	17	62	19	33	53	14

Source: Source: U.S. Census Bureau, 2018 5-Year American Community Survey

Table 2.17. City of Gasconade Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes - 2017
Debris Management Plan	No
Economic Development Plan	Yes – regional CEDS 2018
Transportation Plan	Yes – regional 2019
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes
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
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes – 12/18/1984
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready Firewise Community Certification	No
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	N/A
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	No

Capabilities	Status Including Date of Document or Policy
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	No
Emergency Management Director	No
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes - MREPC
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	Yes - Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
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.)	No
Local Funding Availability	
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	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
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, 2020-21

2.2.4 City of Hermann

Overview

Hermann is located in the north-northwest portion of Gasconade County on the bank of the Missouri River at the mouth of Frene Creek. The city was created on December 6, 1937 by a German Settlement Society from Philadelphia. State highways 100 and 19 intersect in Hermann. A bridge crosses the Missouri River on Highway 19. Hermann is incorporated as a fourth class city and has a four member board of aldermen and a mayor. The city employs a full-time city administrator, clerk, chief of police, street/parks superintendent, collector, treasurer, tourism/economic director, fire chief, city attorney, emergency management director, municipal judge. According to the 2019 U.S. Census, the community has a population of 2,438, in 2010 the population was 2,335 which is a growth of over four percent.

Technical and Fiscal Resources

Hermann participates in the National Flood Insurance Program. The City of Hermann is served by a Police Department with a fire chief, six officers and five dispatchers. The city is served by Gasconade County's Enhanced 9-1-1 system, located in Rosebud. Hermann has five warning sirens which are controlled by the city Police Department. In addition the City uses the Code Red app the citizens can download to their smartphones. Additional warning is provided through the local radio station KWWR, KWRE, KSLQ, KLPW and KMCR Radio and the local Channel 13 cable television station.

The city is served by the Hermann Area Ambulance District and Hermann Volunteer Fire Department. The EOC is located at the Police Department with the Hermann Area Ambulance Base serving as a backup location. Hermann has two portable generators for emergency use.

Public education programs are provided locally by the fire department and regionally by the Coalition for Roadway Safety and Gasconade County Health Department. The city has a Facebook page for use of public education and notification. In addition, Hermann has a public awareness plan for natural gas.

The City of Hermann has the second highest rate of population over 65 and non-English speaking. These vulnerable populations could increase the amount of damages or injuries/deaths due to hazards.

Mitigation Actions

Hermann has updated three of its five outdoor warning sirens. In the next five years the city plans on completing another floodplain buyout.

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 Hermann

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
Hermann	2,438	387	83	234	113	578	274	47

Source: Source: U.S. Census Bureau, 2019 5-Year American Community Survey

Table 2.19. City of Hermann Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes - 2017
Debris Management Plan	Yes
Economic Development Plan	Yes – regional CEDS 2018
Transportation Plan	Yes – regional 2019
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	Yes – IBC, 2015
Floodplain Ordinance	Yes – 1992
Subdivision Ordinance	Yes
Tree Trimming Ordinance	Yes
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	Yes
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	Yes
Landscape Ordinance	No
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
Hazard Awareness Program	No
National Flood Insurance Program	Yes – 03/05/1976
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

Capabilities	Status Including Date of Document or Policy
ISO Fire Rating	5.9
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	Yes
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – 2016
Evacuation Route Map	Yes
Critical Facilities Inventory	Yes – 2016 & 2020
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	Yes
Building Inspector	Yes – Part-time
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
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 - MREPC
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	Yes
Housing Department	Yes, Phelps Co. PHA
Regional Planning Agencies	MRPC
Historic Preservation	Yes
Non-Governmental Organizations (NGOs)	
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
Local Funding Availability	
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

Capabilities	Status Including Date of Document or Policy
Impact fees for new development	Yes
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	Yes

Source: Data Collection Questionnaire, 2020-2021

2.2.5 City of Morrison

Overview

Morrison is located in the northeast corner of Gasconade County on Highway 100. The city was first organized in 1899. Morrison is incorporated as a fourth-class city. There is a four member board of aldermen and a mayor. The city employs a part-time city clerk, a part-time street maintenance worker, a part-time water meter reader and a part-time city municipal worker. The city provides municipal services for water only. According to the 2019 US Census, the city has a population of 85, in 2010 the population was 139 showing a decrease of over 38 percent. This is most likely explained by the large margin of error in ACS data when it comes to very small towns.

Technical and Fiscal Resources

The city of Morrison participates in the National Flood Insurance Program (NFIP). Law enforcement is provided by the Gasconade County Sheriff's Office. Morrison has one warning siren that is activated by Ameren UE. The city is served by Gasconade County 9-1-1, located in Rosebud.

Ambulance service is provided through Hermann Area Ambulance District and the Osage Ambulance District in neighboring Osage County. The city is served by the Morrison Volunteer Fire Department. The city does not have any portable or fixed generators.

Public education programs are provided regionally by the Coalition for Roadway Safety and Gasconade County Health Department.

The City of Morrison has the highest percentage of homes built prior to 1939 in the county. This makes the city more vulnerable to residential damages due to many hazard types.

Mitigation Actions

The city does not anticipate any development in the next five years in known hazard areas.

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 Morrison

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
Morrison	85	10	0	17	3	14	25	7

Source: Source: U.S. Census Bureau, 2019 5-Years American Community Survey

Table 2.21. City of Morrison Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	No
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes - 2017
Debris Management Plan	No
Economic Development Plan	Yes – regional CEDS 2018
Transportation Plan	Yes – regional 2019
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	No
Building Code	No
Floodplain Ordinance	Yes – 12/18/84
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
Program	
Zoning/Land Use Restrictions	No
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	Yes – 09/18/1986
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No

Capabilities	Status Including Date of Document or Policy
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	N/A
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	No
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	No
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	No
Development Planner	No
Public Works Official	Yes
Emergency Management Director	No
NFIP Floodplain Administrator	Yes
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes - MREPC
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	Yes - Phelps Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
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.)	No
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	No

Capabilities	Status Including Date of Document or Policy
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	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, 2020-21

2.2.6 City of Owensville

Overview

Owensville is located in the south central portion of the county. The city sits at the crossroads of Highways 19 and 28. Owensville is a 4th class city with a four member board of aldermen and a mayor. The city also employs a city administrator, city clerk, deputy city clerk, attorney, collector, marshal, fire chief, public works director, and building commissioner. According to the 2019 US Census, the city has a population of 2,599, in 2010 the population was 2,522 showing growth of just over three percent.

Technical and Fiscal Resources

Owensville participates in the National Flood Insurance Program. The city is served by the Owensville City Police Department and the Gasconade County's enhanced 9-1-1 system, located in Rosebud. The city has three severe weather sirens that are activated the Gasconade County 9-1-1. Owensville also has a Facebook page to share education and notifications.

The city is served by the Owensville Volunteer Fire Department and the Owensville Area Ambulance District. The city has one portable generator and two fixed generators. The fixed generators are 20kw propane and located at the Owensville Police Department and Owensville Fire Department.

Public education programs are provided locally by the fire department and regionally by the Coalition for Roadway Safety and Gasconade County Health Department.

The City of Owensville has the highest rate of population under 5 years of age. This vulnerable population could increase threat to the community due to various hazards.

Mitigation Actions

In the last 5-6 years the city installed three new outdoor warning sirens and sold the old two to Peaceful Valley Lake Estates, a private community outside of city limits.

Table 2.22 below shows the demographic and structure statistics, and **Table 2.23** describes the mitigation capabilities of the city.

Table 2.22. Demographic and Structure Risk Parameters For Owensville

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
Owensville	2,599	479	37	343	167	569	279	36

Source: Source: U.S. Census Bureau, 2015-2019 5-Year American Community Survey

Table 2.23. City of Owensville Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Yes - 2013
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	Yes
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	N/A
City Mitigation Plan	No
County Mitigation Plan	Yes – 2017
Debris Management Plan	No
Economic Development Plan	Yes – Regional CEDS 2018
Transportation Plan	Yes – Regional 2019
Land-use Plan	Yes
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	Yes - IBC 2003
Floodplain Ordinance	Yes – 07/05/2011, City Code Chapter 415
Subdivision Ordinance	Yes – City Code Chapter 405
Tree Trimming Ordinance	Yes – City Code Chapter 520
Nuisance Ordinance	Yes
Storm Water Ordinance	No
Drainage Ordinance	No
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	No
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	Yes
Hazard Awareness Program	No
National Flood Insurance Program	Yes – 06/03/1978
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

Capabilities	Status Including Date of Document or Policy
ISO Fire Rating	5
Economic Development Program	No
Land Use Program	No
Public Education/Awareness	No
Property Acquisition	No
Planning/Zoning Boards	Yes
Stream Maintenance Program	No
Tree Trimming Program	No
Engineering Studies for Streams (Local/County/Regional)	No
Mutual Aid Agreements	Yes
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	Yes
Staff/Department	
Building Code Official	Yes – Part-Time
Building Inspector	Yes – Part-Time
Mapping Specialist (GIS)	No
Engineer	Contractor
Development Planner	No
Public Works Official	Yes – Full-Time
Emergency Management Director	Yes – Part-Time
NFIP Floodplain Administrator	Yes – Part-Time
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes - MREPC
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
Non-Governmental Organizations (NGOs)	
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
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	Yes

Capabilities	Status Including Date of Document or Policy
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
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	Yes
Ability to withhold spending in hazard prone areas	No

Source: Data Collection Questionnaire, 2020-2021

2.2.7 City of Rosebud

Overview

Rosebud is located on the eastern edge of Gasconade County on Highway 50. The community was established as a train stop along the Rock Island Railroad in 1911. Rosebud is a fourth class city. Rosebud has a four member board of aldermen and a mayor. The city also employs a part-time city clerk, attorney, collector, chief of police, patrolmen, code enforcer, general laborer, part-time street, water and sewer manager. According to the 2019 U.S. Census, the community has a population of 519, in 2010 the population was 409 showing growth of over 26 percent.

Technical and Fiscal Resources

The city of Rosebud does not participate in the National Flood Insurance Program (NFIP). The city has a Police Department. The community has enhanced 9-1-1 through the Gasconade County 9-1-1 system, located in Rosebud. The city has one warning siren which is controlled by the Gasconade County 9-1-1 center.

Ambulance service is provided by the Gerald Area Ambulance District in neighboring Franklin County. The community is served by the volunteer Gerald-Rosebud Fire Protection District which is located in Gerald. The city does not have any portable or fixed generators.

Public education programs are provided locally by the Gerald-Rosebud fire department and police department and regionally by the Coalition for Roadway Safety and Gasconade County Health Department.

The City of Rosebud has the highest rate of mobile homes in the county. These vulnerable structures make the community more susceptible to damages or injuries/deaths due to various hazards.

Mitigation Actions

As culverts are replaced, the city sizes them up as necessary to improve drainage and reduce flooding impacts.

Table 2.24 below shows the demographic and structure statistics, and **Table 2.25** describes the mitigation capabilities of the city.

Table 2.24. Demographic and Structure Risk Parameters For Rosebud

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
Rosebud	519	78	0	87	26	56	33	40

Source: Source: U.S. Census Bureau, 2018 5-Years American Community Survey

Table 2.25. City of Rosebud Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	No
Builder's Plan	No
Capital Improvement Plan	No
City Emergency Operations Plan	Yes – June 2015
County Emergency Operations Plan	Yes
Local Recovery Plan	No
County Recovery Plan	No
City Mitigation Plan	No
County Mitigation Plan	Yes - 2017
Debris Management Plan	No
Economic Development Plan	Yes – Regional CEDS 2018
Transportation Plan	Yes – Regional - 2019
Land-use Plan	No
Flood Mitigation Assistance (FMA) Plan	No
Watershed Plan	No
FireWise or other fire mitigation plan	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No
Policies/Ordinance	
Zoning Ordinance	Yes
Building Code	No
Floodplain Ordinance	No
Subdivision Ordinance	Yes
Tree Trimming Ordinance	No
Nuisance Ordinance	Yes
Storm Water Ordinance	Yes
Drainage Ordinance	Yes
Site Plan Review Requirements	Yes
Historic Preservation Ordinance	No
Landscape Ordinance	No
Program	
Zoning/Land Use Restrictions	Yes
Codes Building Site/Design	No
Hazard Awareness Program	No
National Flood Insurance Program	No
NFIP Community Rating System (CRS) Participating Community	No
National Weather Service (NWS) Storm Ready	No
Firewise Community Certification	No

Capabilities	Status Including Date of Document or Policy
Building Code Effectiveness Grading (BCEGs)	No
ISO Fire Rating	5
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
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (City)	No
Hazard Analysis/Risk Assessment (County)	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Evacuation Route Map	No
Critical Facilities Inventory	Yes – Hazard Mitigation (2016) & Hazardous Materials (annual) Plans
Vulnerable Population Inventory	No
Land Use Map	No
Staff/Department	
Building Code Official	Yes – Part-Time
Building Inspector	No
Mapping Specialist (GIS)	No
Engineer	Contractor
Development Planner	No
Public Works Official	Yes
Emergency Management Director	Yes
NFIP Floodplain Administrator	N/A
Bomb and/or Arson Squad	No
Emergency Response Team	No
Hazardous Materials Expert	No
Local Emergency Planning Committee	Yes – MREPC
County Emergency Management Commission	No
Sanitation Department	No
Transportation Department	No
Economic Development Department	No
Housing Department	Yes- Pulaski Co. PHA
Regional Planning Agencies	Yes - MRPC
Historic Preservation	No
Non-Governmental Organizations (NGOs)	
American Red Cross	Yes
Salvation Army	No
Veterans Groups	Yes
Environmental Organization	No
Homeowner Associations	No
Neighborhood Associations	No
Chamber of Commerce	No
Community Organizations (Lions, Kiwanis, etc.)	Yes
Local Funding Availability	
Ability to apply for Community Development Block Grants	Yes
Ability to fund projects through Capital Improvements funding	No

Capabilities	Status Including Date of Document or Policy
Authority to levy taxes for a specific purpose	Yes
Fees for water, sewer, gas, or electric services	Yes
Impact fees for new development	Yes
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, 2020-2021

Table 2.26 summarizes the mitigation capabilities of Gasconade County and its jurisdictions.

Table 2.26. Mitigation Capabilities Summary Table

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Planning Capabilities							
Comprehensive Plan	No	No	No	No	No	Yes - 2013	No
Builder's Plan	No	No	No	No	No	No	No
Capital Improvement Plan	No	No	No	No	No	No	No
City Emergency Operations Plan	n/a	No	No	No	No	Yes	Yes – 06/2015
County Emergency Operations Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local Recovery Plan	No	No	No	No	No	No	No
County Recovery Plan	No	No	No	No	No	N/A	No
City Mitigation Plan	n/a	No	No	No	No	No	No
County Mitigation Plan	Yes - 2017	Yes - 2017	Yes - 2017	Yes - 2017	Yes - 2017	Yes - 2017	Yes - 2017
Debris Management Plan	No	No	No	Yes	No	No	No
Economic Development Plan	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018	Yes – CEDS 2018
Transportation Plan	Yes – Regional 2019	Yes – Regional 2019	Yes – Regional 2019	Yes – Regional 2019	Yes – Regional 2019	Yes – Regional 2019	Yes – Regional 2019
Land-use Plan	No	No	No	No	No	Yes	No
Flood Mitigation Assistance (FMA) Plan	Yes	No	No	No	No	No	No
Watershed Plan	No	No	No	No	No	No	No

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Firewise or other fire mitigation plan	No	No	No	No	No	No	No
Critical Facilities Plan (Mitigation/Response/Recovery)	No	No	No	No	No	No	No
Policies/Ordinances							
Zoning Ordinance	No	Yes	No	Yes	No	Yes	Yes
Building Code	No	Yes - International Property Maintenance Code	No	Yes – IBC 2015	No	Yes – IBC 2003	No
Floodplain Ordinance	Yes - 2019	Yes – 06/10/2008	Yes – 12/18/84	Yes – 1992	Yes – 09/18/1986	Yes – 07/05/2011	No
Subdivision Ordinance	No	No	No	Yes	No	Yes	Yes
Tree Trimming Ordinance	No	Yes	No	Yes	No	Yes	No
Nuisance Ordinance	No	Yes	No	Yes	No	Yes	Yes
Storm Water Ordinance	No	Yes	No	Yes	No	No	Yes
Drainage Ordinance	No	Yes	No	Yes	No	No	Yes
Site Plan Review Requirements	No	Yes	No	Yes	No	Yes	Yes
Historic Preservation Ordinance	No	No	No	Yes	No	No	No
Landscape Ordinance	No	No	No	No	No	No	No
Program							
Zoning/Land Use Restrictions	No	Yes	No	Yes	No	Yes	Yes

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Codes Building Site/Design	No	No	No	Yes	No	Yes	No
Hazard Awareness Program	No	No	No	No	No	No	No
National Flood Insurance Program	Yes – 09/04/87	Yes – 08/24/84	Yes – 12/18/1984	Yes – 03/05/76	Yes – 09/18/1986	Yes – 06/03/78	No
NFIP Community Rating System (CRS) Participating Community	No	No	No	No	No	No	No
National Weather Service (NWS) Storm Ready	No	No	No	No	No	No	No
Firewise Community Certification	No	No	No	No	No	No	No
Building Code Effectiveness Grading (BCEGs)	No	No	No	No	No	No	No
ISO Fire Rating	9	7	N/A	5.9	N/A	5	5
Economic Development Program	Yes - MRPC	No	No	No	No	Yes	No
Land Use Program	No	No	No	No	No	No	No
Public Education/Awareness	Yes	No	No	No	No	No	No
Property Acquisition	No	No	No	No	No	No	No
Planning/Zoning Boards	No	No	No	Yes	No	Yes	No
Stream Maintenance Program	No	No	No	No	No	No	No
Tree Trimming Program	Yes	No	No	Yes	No	No	No

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Engineering Studies for Streams (Local/County/Regional)	No	No	No	No	No	No	No
Mutual Aid Agreements	Yes	Yes	No	Yes	No	Yes	Yes
Studies/Reports/Maps							
Hazard Analysis/Risk Assessment (City)	n/a	No	No	No	No	No	No
Hazard Analysis/Risk Assessment (County)	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020
Evacuation Route Map	Yes	No	No	Yes	No	No	No
Critical Facilities Inventory	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020	Yes – 2016 & 2020
Vulnerable Population Inventory	Yes	No	No	No	No	No	No
Land Use Map	Yes	No	No	No	No	Yes	No
Staff/Department							
Building Code Official	No	No	No	Yes	No	Yes	Yes
Building Inspector	No	MRPC Contractor	No	Yes – Part-Time	No	Yes	No
Mapping Specialist (GIS)	Yes	No	No	No	No	No	No
Engineer	Contracted	Contracted	No	No	No	Yes	Contracted
Development Planner	No	No	No	No	No	No	No
Public Works Official	Yes	Yes	No	Yes	Yes	Yes	Yes
Emergency Management Director	Yes	No	No	Yes	No	Yes	Yes
NFIP Floodplain Administrator	Yes	Yes	Yes	Yes	Yes	Yes	N/A

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Bomb and/or Arson Squad	Yes	No	No	No	No	No	No
Emergency Response Team	Yes	No	No	No	No	No	No
Hazardous Materials Expert	Yes	No	No	No	No	No	No
Local Emergency Planning Committee	Yes - MREPC	Yes - MREPC	Yes - MREPC	Yes - MREPC	Yes - MREPC	Yes - MREPC	Yes - MREPC
County Emergency Management Commission	No	N/A	No	N/A	No	N/A	N/A
Sanitation Department	No	No	No	No	No	No	No
Transportation Department	Yes	No	No	No	No	No	No
Economic Development Department	MRPC	No	No	Yes	No	No	No
Housing Department	Yes - Phelps Co. PHA	Yes - Phelps Co. PHA	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	Yes - MRPC	Yes - MRPC
Historic Preservation	Yes	No	No	Yes	No	No	No
Non-Governmental Organizations (NGOs)							
American Red Cross	Yes	No	No	No	No	No	Yes
Salvation Army	No	No	No	No	No	No	No
Veterans Groups	Yes	No	No	Yes	No	Yes	Yes
Environmental Organization	No	No	No	No	No	No	No

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Homeowner Associations	Yes	No	No	No	No	No	No
Neighborhood Associations	Yes	No	No	No	No	No	No
Chamber of Commerce	Yes	No	No	Yes	No	Yes	No
Community Organizations (Lions, Kiwanis, etc.)	Yes	No	No	Yes	No	Yes	Yes
Financial Resources							
Ability to apply for Community Development Block Grants	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Ability to fund projects through Capital Improvements funding	Yes	Yes	No	Yes	No	Yes	No
Authority to levy taxes for a specific purpose	Yes	Yes	Yes	Yes	No	Yes	Yes
Fees for water, sewer, gas, or electric services	No	Yes	Yes	Yes	Yes	Yes	Yes
Impact fees for new development	No	No	Yes	No	No	Yes	Yes
Ability to incur debt through general obligation bonds	Yes	Yes	Yes	Yes	No	Yes	Yes
Ability to incur debt through special tax bonds	No	Yes	No	Yes	No	Yes	Yes

CAPABILITIES	Unincorporated Gasconade County	Bland	Gasconade	Hermann	Morrison	Owensville	Rosebud
Ability to incur debt through private activities	No	No	No	No	No	Yes	No
Ability to withhold spending in hazard prone areas	No	No	No	Yes	No	No	No

Source: Data Collection Questionnaires, 2020-2021

2.2.8 Public School District Profiles and Mitigation Capabilities

The following school districts are participating jurisdictions in this plan: Gasconade County R-I School District, Gasconade County R-II School District and Maries County R-II School District. As public institutions responsible for the care and education of the county’s children, these school districts share an interest with Gasconade County in public safety and hazard mitigation planning. **0** provides the boundaries of the school districts participating in this planning process.

Technical and Fiscal Resources

Gasconade R-I and Gasconade R-II school districts have NOAA all hazard radios on site to provide early warning of hazard events. All school districts have fire alarms and intercom systems capable of providing specific instructions in the event of an emergency. In addition, Gasconade R-I and Gasconade R-II school districts have automated text and voice messaging system.

Existing Plans and Policies

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

Other Mitigation Activities

All school districts participating in the plan conduct regular fire, earthquake and tornado drills on a quarterly basis or semi-annual basis. All districts practice lock-down security training at least once a year. None of the school districts have a certified tornado safe room that meets FEMA standards.

New Construction

Gasconade County R-I School District plans to add secondary entrances to the elementary, middle, and high school buildings in the next five years. Gasconade County R-II School District built new additions to the south wing of the elementary school and the south east of Gerald Elementary since the last plan. In the upcoming five years the district plans to construct a new bus road at Gerald Elementary. Maries County R-II School District does not have any plans for construction or renovation in the next five years. None of the planned construction is within a known hazard area.

Table 2.27. School District Buildings and Enrollment Data, 2020

District Name	Building Name	Enrollment
Gasconade County R-I		
	Hermann Elem.	279
	Hermann Middle School	312
	Hermann High	339
Gasconade County R-II		
	Gerald Elem.	229
	Owensville Elem.	551
	Owensville Middle School	445
	Owensville High	562
Maries County R-II		
	Maries County Middle	235

Source: <https://ogl.oa.mo.gov/DESE/schoolSearch/index.html>

Figure 2.6. Gasconade County School Districts

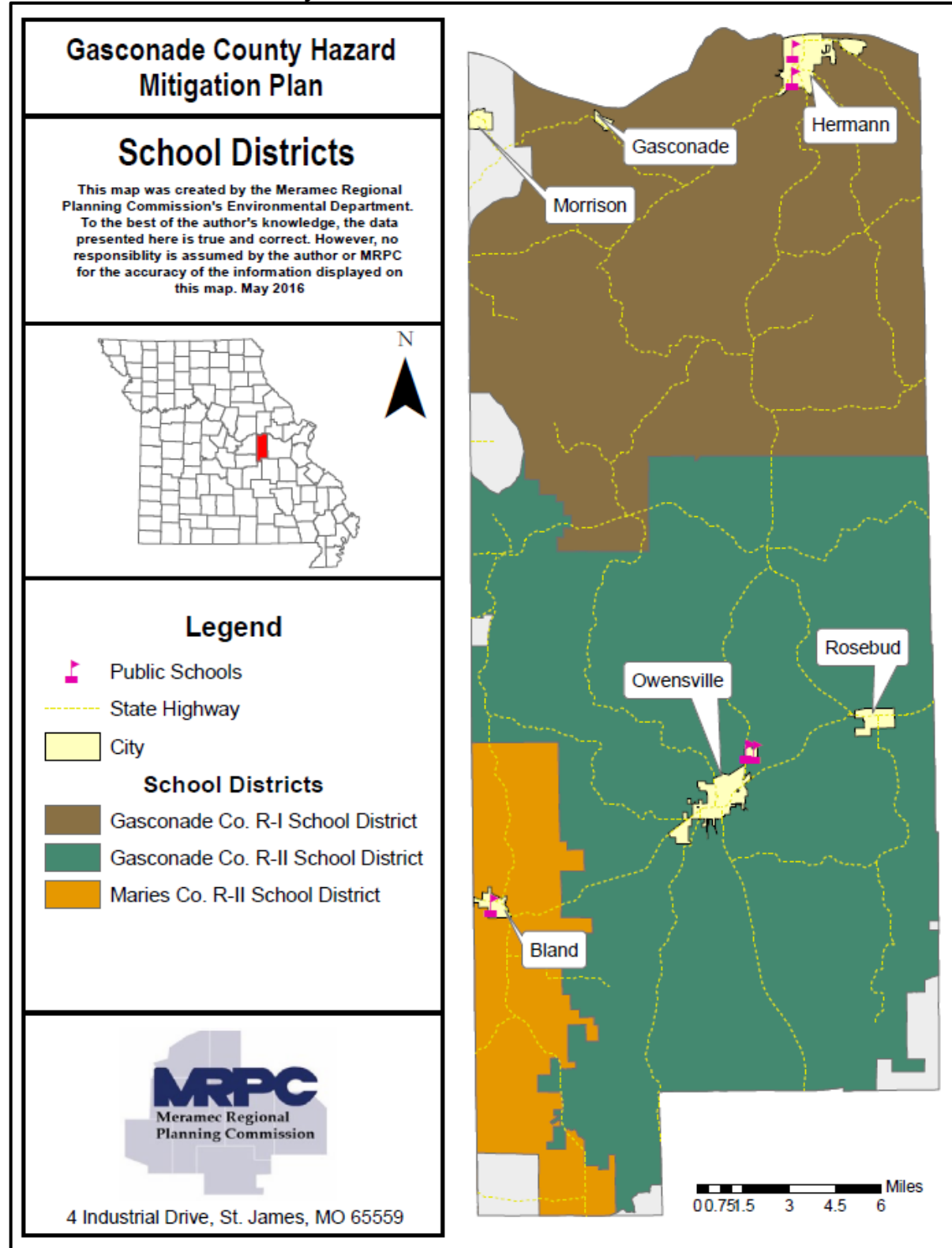


Table 2.28. Summary of Mitigation Capabilities for School Districts

Capability	Gasconade County R-I	Gasconade County R-II	Maries County R-II
Planning Elements			
Master Plan/Date	Yes	Yes – 2020	Yes – 2016
Capital Improvement	Yes - 2020	Yes – 2018	No
School Emergency Plan/Date	Yes - 2018	Yes - 2020	Yes – 2020
Weapons Policy/Date	Yes - 2001	Yes - 2020	Yes – 2020
Personnel Resources			
Full-Time Building Official (Principal)	Yes	Yes	Yes
Emergency Manager	Yes	Yes	Yes
Grant Writer	No	No	No
Public Information Officer	Yes	No	Yes
Financial Resources			
Capital Improvements Project Funding	Yes	Yes	Yes
Local Funds	Yes	Yes	Yes
General Obligation	Yes	No	No
Special Tax Bonds	Yes	No	No
Private Activities/Donations	Yes	Yes	No
State and Federal Funds/Grants	Yes	Yes	Yes
Other			
Privately or Self-Insured?	MUSIC	MUSIC	Privately
Fire Evacuation Training	Yes – Biannually to Quarterly	Yes – Quarterly	Yes - Quarterly
Tornado Sheltering Exercises	Yes – Biannually (Minimum)	Yes - Quarterly	Yes - Quarterly
Public Address/Emergency Alert System	Intercom and Alarms	Intercom and Alarms	Yes
NOAA Weather Radios	Yes	Yes	No
Lock-Down Security Training	Yes – Biannually (Minimum)	Yes - Quarterly	Yes - Annually
Mitigation Programs	Secondary entry ways and locks to all buildings planned for 21 & 22	New bus road at Gerald Elementary, Fences at Owensville and Gerald Elementary playgrounds	Fire, Tornado, Earthquake, Active Intruder Training
Tornado Shelter/Safe-room	Yes have designated areas - but not FEMA certified	Yes have designated areas - but not FEMA certified	Yes have designated areas - but not FEMA certified
Campus Police	No – City of Hermann PD or Gasconade County Sherriff's Department	No – City of Owensville PD or Gasconade County Sherriff's Department	No

Source: Data Collection Questionnaires, 2020-2021

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

3 RISK ASSESSMENT

3.1 Hazard Identification	3.4
3.1.1 <i>Review of Existing Mitigation Plans</i>	3.4
3.1.2 <i>Review Disaster Declaration History</i>	3.7
3.1.3 <i>Research Additional Sources</i>	3.8
3.1.4 <i>Hazards Identified</i>	3.10
3.1.5 <i>Multi-Jurisdictional Risk Assessment</i>	3.11
3.2 Assets at Risk	3.11
3.2.1 <i>Total Exposure of Population and Structures</i>	3.11
3.2.2 <i>Critical and Essential Facilities and Infrastructure</i>	3.133
3.2.3 <i>Other Assets</i>	3.19
3.3 Land Use and Development	3.22
3.3.1 <i>Development Since Previous Plan Update</i>	3.22
3.3.2 <i>Future Land Use and Development</i>	3.23
3.4 Hazard Profiles, Vulnerability, and Problem Statements	3.266
Hazard Profiles	3.266
Vulnerability Assessments.....	3.277
Problem Statements	3.288
3.4.1 <i>Dam Failure</i>	3.299
Hazard Profile	3.299
Vulnerability.....	3.455
Problem Statement.....	3.50
3.4.2 <i>Drought</i>	3.511
Hazard Profile	3.511
Vulnerability.....	3.6060
Problem Statement.....	3.655
3.4.3 <i>Earthquakes</i>	3.666
Hazard Profile	3.666
Vulnerability.....	3.788
Problem Statement.....	3.80
3.4.4 <i>Extreme Temperatures</i>	3.811
Hazard Profile	3.81
Vulnerability.....	3.911
Problem Statement.....	3.988
3.4.5 <i>Flooding (Riverine and Flash)</i>	3.100
Hazard Profile	3.100
	3.1

Vulnerability.....	3.1155
Problem Statement.....	3.1233
<i>3.4.6 Land Subsidence/Sinkholes</i>	<i>3.1244</i>
Hazard Profile	3.1244
Vulnerability.....	3.1288
Problem Statement.....	3.1333
<i>3.4.7 Levee Failure</i>	<i>3.1344</i>
Hazard Profile	3.1344
Vulnerability.....	3.1388
Problem Statement.....	3.1404
<i>3.4.8 Severe Thunderstorms Including High Winds, Hail, and Lightning</i>	<i>3.1411</i>
Hazard Profile	3.1411
Vulnerability.....	3.1522
Problem Statement.....	3.1611
<i>3.4.9 Severe Winter Weather</i>	<i>3.1622</i>
Hazard Profile	3.1622
Vulnerability.....	3.1688
Problem Statement.....	3.1733
<i>3.4.10 Tornado.....</i>	<i>3.1744</i>
Hazard Profile	3.1744
Vulnerability.....	3.1808
Problem Statement.....	3.1866
<i>3.4.11 Wildfires.....</i>	<i>3.1877</i>
Hazard Profile	3.1877
Vulnerability.....	3.1911
Problem Statement.....	3.1999

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

3.1 Hazard Identification

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

The 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 Gasconade County. These selected natural hazards are further profiled and analyzed in this plan.

3.1.1 Review of Existing Mitigation Plans

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 Gasconade County Hazard Mitigation Plan:

- Dam Failure
- Drought
- Earthquake
- Extreme Temperatures
- Wildfires
- Flooding (Riverine and Flash)
- Land Subsidence/Sinkholes
- Levee Failure
- Severe Thunderstorms Including High Winds, Lightning, and Hail
- 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 Gasconade County Plan to match the hazards listed in the Missouri State Hazard Mitigation Plan.

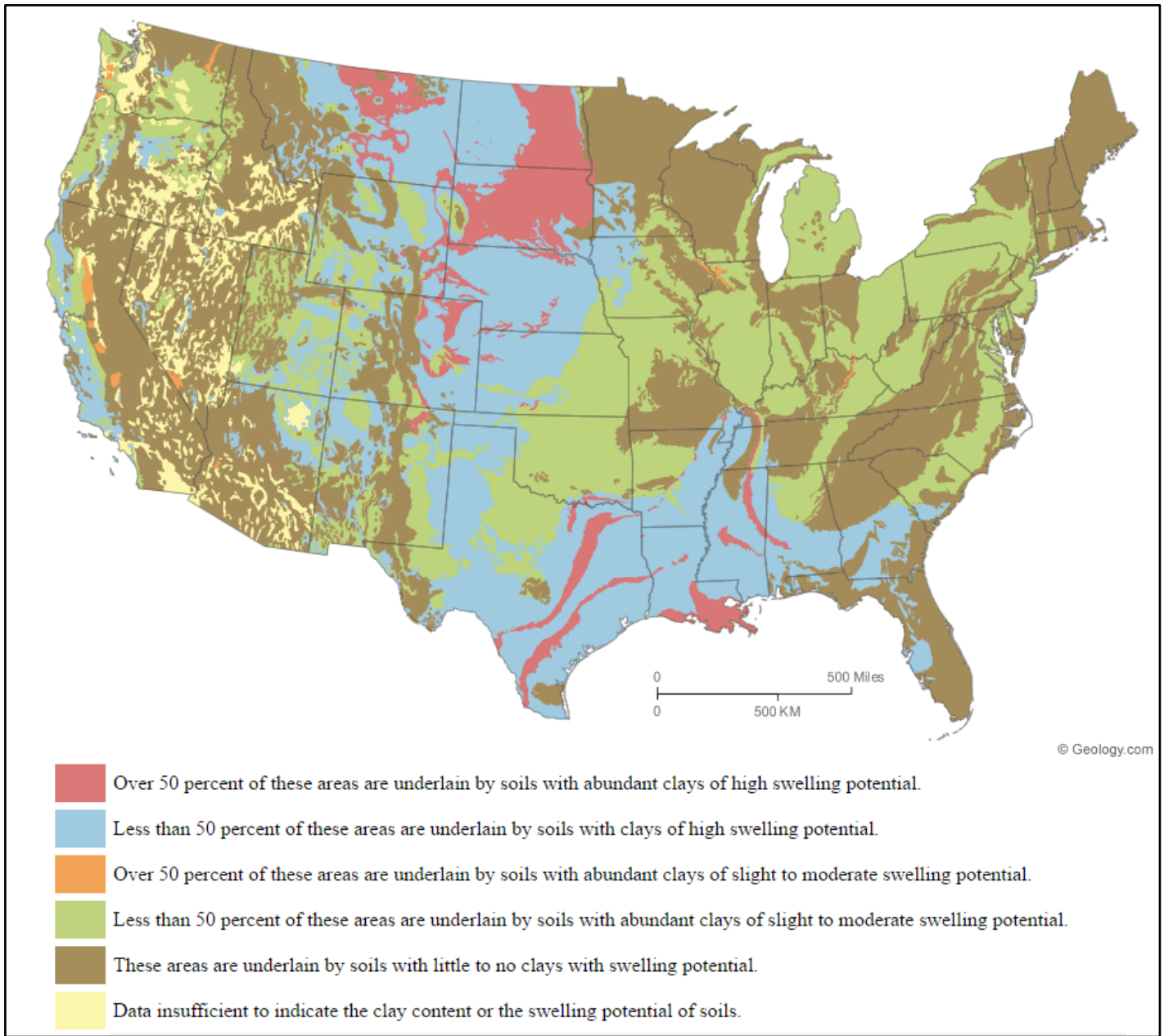
Table 3.1. Table 3.1 Hazards Not Profiled in the Plan

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.

Hazard	Reason for Omission
Debris Flow	There are no mountainous areas in the planning area where this type of event occurs.
Expansive Soils	No expansive soils exist within the planning area. According to the USGS National Geologic Map Database ¹ , the planning area is underlain by soils with little to no clays with swelling potential (Figure 3.1).
Hurricane	Planning area is located in the Midwest, not on any coast.
Volcano	There are no volcanic areas in the county.

¹ http://ngmdb.usgs.gov/Prodesc/proddesc_10014.htm

Figure 3.1. Swelling clays map of the conterminous United States



Source: 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 Gasconade 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 73 federally declared disasters since 1953. Of those, 45 have occurred between 2000 and 2019. All but two of these disasters have been weather related – severe wind and rain storms, tornadoes, flooding, hail, ice storms and winter storms. **Table 3.2** lists the federal disaster declarations for Gasconade County from 1990 through 2019.

Table 3.2. FEMA Disaster Declarations that included Gasconade County, Missouri, 1999-2019

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)
DR-1328	Thunderstorms and Flash Flooding	Declaration Date: May 12, 2000 Incident Period: May 6, 2000 to May 7, 2000	IA, PA
DR-1463	Severe Storms, Tornadoes, Flooding	Declaration Date: May 6, 2003 Incident Period: May 4, 2003 to May 30, 2003	IA, PA
DR-1676	Severe Winter Storms, Flooding	Declaration Date: January 15, 2007 Incident Period: January 12, 2007 to January 22, 2007	PA

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)
DR-1749	Severe Storms, Flooding	Declaration Date: March 19, 2008 Incident Period: March 17, 2008 to May 9, 2008	IA, PA
DR-4250	Severe Storms, Tornadoes, Straight-line Winds, Flooding	Declaration Date: January 21, 2016 Incident Period: December 23, 2015 to January 9, 2016	IA, PA
DR-4317	Severe Storms, Tornadoes, Straight-line Winds, and Flooding	Declaration Date: June 2, 2017 Incident Period: April 28, 2017 to May 11, 2017	IA, PA
DR-4451	Severe Storms, Tornadoes, And Flooding	Declaration Date: July 9, 2019 Incident Date: April 29, 2019 to July 5, 2019	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 present, 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. However, not all hazards impact every jurisdiction such as dam failure. “X” indicates the jurisdiction is impacted by the hazard, and a “-” indicates the hazard is not applicable to that jurisdiction. As Gasconade 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 Heat	Fires (Urban/Structural and wild)	Flooding (River and Flash)	Land Subsidence/Sinkholes	Levee Failure	Thunderstorms/High Winds/Lightning/Hail	Tornado	Severe Winter Weather
Gasconade Co.	x	x	x	x	x	x	x	x	x	x	x
Bland	x	x	x	x	x	x	x	-	x	x	x
Gasconade	x	x	x	x	x	x	x	x	x	x	x
Hermann	x	x	x	x	x	x	x	x	x	x	x
Morrison	x	x	x	x	x	x	x	x	x	x	x
Owensville	x	x	x	x	x	x	x	-	x	x	x
Rosebud	x	x	x	x	x	x	x	-	x	x	x
School Districts											
Gasconade Co. R-I	x	x	x	x	x	x	x	-	x	x	x
Gasconade Co. R-II	x	x	x	x	x	x	x	-	x	x	x
Maries Co. R-II	x	x	x	x	x	x	x	-	x	x	x

3.1.5 Multi-Jurisdictional Risk Assessment

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. Gasconade 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 are widespread in the county, but more localized in their effects. Areas of urbanization include Bland, Gasconade, Hermann, Morrison, Owensville, and Rosebud. These 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

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

Unincorporated County and Incorporated Cities

In the following three tables, population data is based on 2019 Census Bureau data. Building counts and building exposure values are based on parcel data developed by the State of Missouri Geographic Information Systems (GIS) database.

Table 3.4 shows the total population, building count, estimated value of buildings, estimated value of contents, and estimated total exposure to parcels for the unincorporated county and each incorporated city. For multi-county communities, the population and building data may include data on assets located outside the planning area. While Error! Reference source not found. provides the building count total for the county and each city in the planning area broken out by building usage types (residential, commercial, industrial, and agricultural).

Table 3.4. Maximum Population and Building Exposure by Jurisdiction

Jurisdiction	2019 Population	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Unincorporated Gasconade County	8,255	10,075	\$652,451,000	\$348,056,000	\$1,000,507,000
Bland	481	219	\$43,786,000	\$25,523,000	\$69,309,000
Gasconade	334	-	-	-	-
Hermann	2,438	919	\$219,568,000	\$145,559,000	\$365,127,000
Morrison	85	98	\$17,642,000	\$11,424,000	\$29,066,000
Owensville	2,599	1,051	\$226,334,000	\$120,129,000	\$346,463,000
Rosebud	519	124	\$25,225,000	\$15,156,000	\$40,381,000
Total	14,711	12,486	\$1,185,006,000	\$292,268,000	\$1,850,853,000

Sources: U.S. Census Bureau, 2015-2019 5-Year American Community Survey; Building Count and Building Exposure, Missouri GIS Database from SEMA Mitigation Management; Contents Exposure derived by applying multiplier to Building Exposure based on Hazus MH 2.1 standard contents multipliers per usage type as follows: Residential (50%), Commercial (100%), Industrial (150%), Agricultural (100%). For purposes of these calculations, government, school, and utility were calculated at the commercial contents rate.

Table 3.5. Building Counts by Usage Type

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Other (Govt./ Education)	Total
Gasconade County	3,017	77	29	6,943	9	10,075
Bland	174	27	-	13	5	219
Gasconade	-	-	-	-	-	-
Hermann	687	185	26	4	17	919
Morrison	63	18		16	1	98
Owensville	917	85	4	4	26	1,051
Rosebud	106	11	1	3	3	124
Total	4,964	403	60	6,983	61	12,471

Source: Missouri GIS Database, SEMA Mitigation Management Section

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

Public School District	Enrollment	Building Count	Building Exposure (\$)	Contents Exposure (\$)	Total Exposure (\$)
Gasconade County R-I	930	3	39,908,690.28	9,272,935.01	49,181,625.29
Gasconade County R-II	1,857	4	58,893,697.10	9,051,816.33	67,945,513.43
Maries County R-II	235	1	5,635,626.00	1,240,984	6,876,610

Source: <https://oji.oe.mo.gov/DESE/schoolSearch/index.html>; 2020 Data Collection Questionnaire

3.2.2 Critical and Essential Facilities and Infrastructure

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

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

The table below (**Table 3.7**) 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 departments, law enforcement, medical and schools.

Table 3.7 Gasconade County Critical Facilities by Type and Jurisdiction

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
Emergency Facilities						
	Gasconade County	Gasconade Co. E-911	216 W. Rosebud Ave.	Rosebud	MO	63091
	Gasconade County	Emergency Management Director	3546 Hwy T	Rosebud	MO	63091
Fire Department Facilities						
MO000260	Morrison	Morrison Volunteer Fire Dept. #1	524 Hwy 100	Morrison	MO	65061
MO000261	Owensville	Owensville Fire Dept. #1	819 Franklin Ave.	Owensville	MO	65066
MO000754	Bland	Bland Fire Protection Dist. #1	104 W Colorado Ave	Bland	MO	65014
	Hermann	Hermann Volunteer FD #1	214 E. 2 nd St.	Hermann	MO	65041
	Hermann	Hermann Volunteer FD #2	103 Hwy. 100	Hermann	MO	65041
	Hermann	Hermann Volunteer FD #3	2063 Hwy 19	Hermann	MO	65041
	Mt. Sterling	Owensville Fire Dept. #2	2710 Hwy. A	Mt. Sterling	MO	65062
	Owensville	Owensville Fire Dept. #3	600 Springfield Rd.	Owensville	MO	65066
Law Enforcement Facilities						
MO000095	Owensville	Owensville City Police Dept.	109 N 2 nd St.	Owensville	MO	65066
MO000150	Gasconade County	Gasconade Co. Sheriff	119 E 1 st St. #22	Hermann	MO	65041
MO000189	Hermann	Hermann Police Dept.	1902 Jefferson	Hermann	MO	65041
MO000453	Gasconade	Gasconade City Police Dept.	480 Oak St.	Morrison	MO	65061
	Rosebud	Rosebud Police Dept.	307 N. Cedar	Rosebud	MO	63091
Medical Facilities						
MO000001	Hermann	Hermann Area Dist. Hospital	509 West 18 th St.	Hermann	MO	65041
	Hermann	Hermann Medical Arts Clinic	509 West 18 th St.	Hermann	MO	65041
	Hermann	Frene Valley Health Center	403 Market St.	Hermann	MO	65041
	Hermann	Southwest Medical Associates	1714 Wein Street	Hermann	MO	65041
	Owensville	Mercy Family Clinic	440 MO Hometown Plaza Drive	Owensville	MO	65066
	Owensville	Medical Clinic of Owensville (Capital Region Medical Center)	3536 Kuhne Road	Owensville	MO	65066
	Gasconade County	Gasconade Co. Health Dept. – Main Office	300 Schiller St.	Hermann	MO	65041
	Gasconade County	Gasconade Co. Health Dept. – Satellite Office	305 N. First St.	Owensville	MO	65041

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
HazusID	Jurisdiction	Building Name	Address	City	State	Zip
School Facilities						
MO000491	Hermann	Hermann Elem.	328 W Seventh St.	Hermann	MO	65041
MO002562	Hermann	Hermann Middle	164 Blue Pride Dr.	Hermann	MO	65041
MO000492	Hermann	Hermann High	176 Bearcat Crossing	Hermann	MO	65041
MO001007	Owensville	Owensville K-5 Elementary	2000 Dutchmen Dr.	Owensville	MO	65066
HazusID	Jurisdiction	Building Name	Address	City	State	Zip
MO001010	Owensville	Owensville Middle	3340 Highway 19	Owensville	MO	65066
MO001009	Owensville	Owensville High	3336 Highway 19	Owensville	MO	65066
MO001676	Hermann	St. George School	133 W 4 th St.	Hermann	MO	65041
MO001677	Rosebud	Immanuel Lutheran School	300 1 st St. N	Rosebud	MO	63091
MO002776	Bland	Maries Co. R2 Middle School	300 S Main	Bland	MO	65014
Childcare Facilities						
	Hermann	Bruckerhoff, Shiela	156 State Hwy. 19	Hermann	MO	65041
	Hermann	Little Tykes Childcare and Preschool	1100 Wein St.	Hermann	MO	65041
	Hermann	Steinbeck, Cheryl	1311 Hwy. E	Hermann	MO	65041
	Hermann	Vanausdoll, Deborah Sue	1513 Washington St.	Hermann	MO	65041
	Hermann	Little Bearcats Daycare Center, LLC	334 W. 9 th St.	Hermann	MO	65041
	Owensville	Creative Kiddoz LLC	212 N. Walnut St.	Owensville	MO	65066
	Owensville	McClurg, Violet	206 E. Jefferson Ave.	Owensville	MO	65066
	Owensville	Rademacher, Christina A	419 E. Madison Ave.	Owensville	MO	65066
	Owensville	Kiddie Korner, Inc	207 E. Marvin Ave.	Owensville	MO	65066
	Owensville	Missouri Ozarks Community Action, Inc (Head Start)	1011 Commercial Dr.	Owensville	MO	65066
	Owensville	Tiny Tots of Owensville LLC	3384 Old Hwy. 19	Owensville	MO	65066
Nursing Homes						
	Hermann	Stonebridge Hermann	1800 Wein St.	Hermann	MO	65041
	Hermann	Victorian Place of Hermann, Residential Care by Americare	2120 Village Lane	Hermann	MO	65041
	Owensville	Frene Valley of Owensville – A Stonebridge Community	1016 W. Highway 28	Owensville	MO	65066
	Owensville	Gasconade Manor Nursing Home	1910 Nursing Home Rd.	Owensville	MO	65066
	Owensville	Gasconade Terrace Retirement Center	1930 Nursing Home Rd.	Owensville	MO	65066
	Owensville	Victorian Place of Owensville, Residential	301 N. 7 th St.	Owensville	MO	65066

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
		Care Americare				

Source: Hazard Mitigation Plan Data Collection Questionnaire (2020-2021); Missouri Department of Health and Senior Services website-health.mo.gov

Table 3.8 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 3.8. Inventory of Critical/Essential Facilities and Infrastructure by Jurisdiction

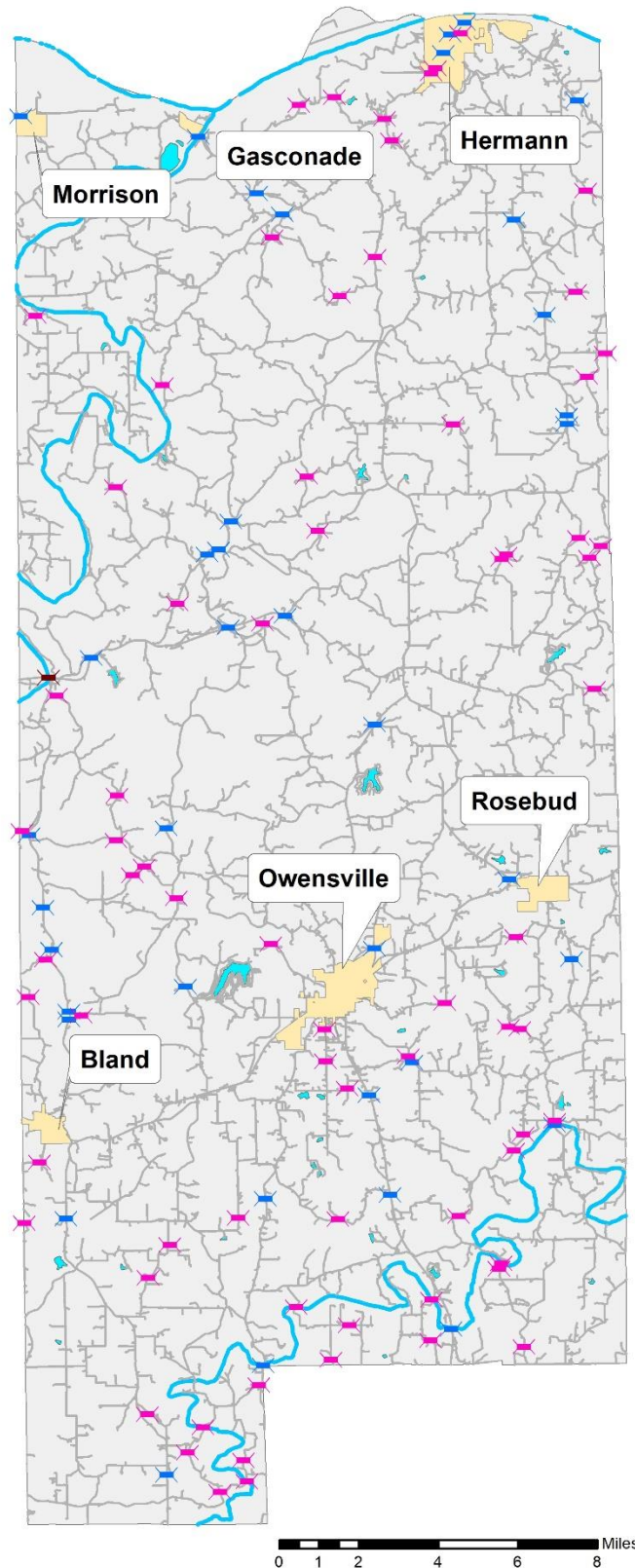
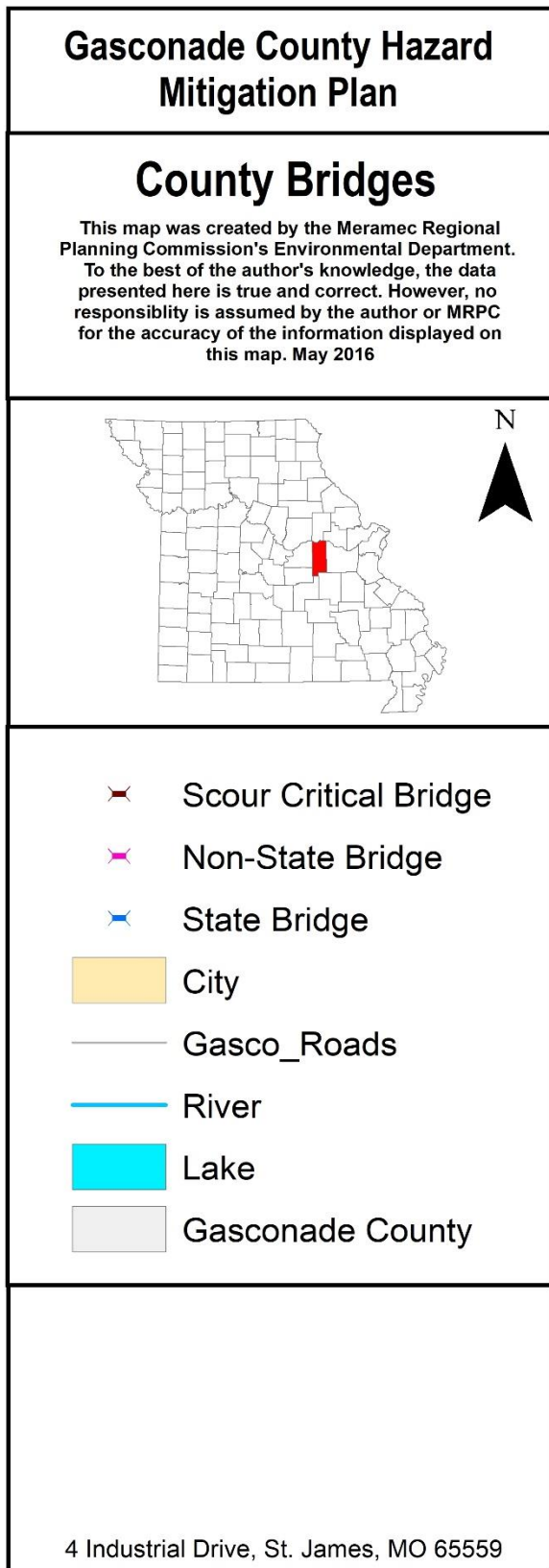
	Airport Facility	Bus Facility	Childcare Facility	Communications Tower	Electric Power Facility	Emergency Operations	Fire Service	Government	Housing	Shelters	State & Non-State Structures (Bridge)	Hospital/Health Care	Military	Natural Gas Facility	Pipeline/Pump Station	Nursing Homes	Police Station	Potable Water Facility	Rail	Sanitary Pump Stations	School Facilities	Stormwater Pump Stations	Tier II Chemical Facility	Wastewater Facility	Total
Unincorporated Gasconade	-	-	-	8	-	1	-	1	4,935	-	127	-	-	-	-	-	1	-	1	-	1	-	5	-	5,080
City of Bland	-	-	-	1	1	-	1	1	292	-	-	-	-	-	-	-	1	1	1	2	1	-	-	1	303
City of Gasconade	-	-	-	-	-	-	-	1	138	-	1	-	-	-	-	-	1	-	1	-	-	-	-	-	142
City of Hermann	1	-	5	1	3	-	1	1	1,291	-	3	4	-	2	-	2	1	-	1	5	3	-	8	1	1,333
City of Morrison	-	-	-	-	-	-	1	1	72	-	1	-	-	-	-	-	-	-	1	-	-	-	1	-	77
City of Owensville	-	-	5	1	-	-	1	1	1,280	-	1	2	-	-	-	4	1	-	1	-	3	-	19	-	1,319
City of Rosebud	-	-	-	-	-	-	1	1	197	-	1	-	-	-	-	-	1	-	1	-	-	-	1	-	203
Totals	1	-	10	11	4	1	5	7	8,205	-	134	3	-	2	-	6	6	1	7	7	8	-	34	2	8,457

Source: 2020 Data Collection Questionnaires, National Bridge Inventory, Missouri Department of Health and Senior Services, Meramec Local Emergency Planning District, MPC, 2010 US Census (Housing units)

According to the National Bridge Inventory there are a total of 139 bridges in Gasconade County². **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 is one scour critical bridge within Gasconade County. The US 50 East bridge spanning the Gasconade River has a scour index of 3. The most recent housing data available was from the 2010 census. However, the Missouri Hazard Mitigation plan estimates that housing units have decreased between 2010 and 2015 in Gasconade County by -3.4 to 0 percent.

² <http://www.fhwa.dot.gov/bridge/nbi/no10/county.cfm>

Figure 3.2. Gasconade 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 3.9** depicts Federally Threatened, Endangered, Proposed and Candidate Species in the county.

Table 3.9. Threatened and Endangered Species in Gasconade County

Common Name	Scientific Name	Status
Amphibians		
Eastern Hellbender	<i>Cryptobranchus alleganiensis alleganiensis</i>	Endangered (S)
Clams		
Pink Mucket	<i>Lampsilis abrupta</i>	Endangered (F) (S)
Scaleshell Mussel	<i>Leptodea leptodon</i>	Endangered (F) (S)
Snuffbox Mussel	<i>Epioblasma triquetra</i>	Endangered (F) (S)
Spectaclecase	<i>Cumberlandia monodonta</i>	Endangered (F) (S)
Elephantear	<i>Elliptio crassidens</i>	Endangered (S)
Ebonyshell	<i>Reginaia ebenus</i>	Endangered (S)
Sheepnose (Bullhead) Mussel	<i>Plethobasus cyphyus</i>	Endangered (F) (S)
Fishes		
Pallid Sturgeon	<i>Scaphirhynchus alba</i>	Endangered (F) (S)
Crystal Darter	<i>Crystallaria asperella</i>	Endangered (S)
Flathead Chub	<i>Platygobio gracilis</i>	Endangered (S)
Lake Sturgeon	<i>Acipenser fulvescens</i>	Endangered (S)
Topeka Shiner	<i>Notropis topeka</i>	Endangered (S)
Birds		
Northern Harrier	<i>Circus cyaneus</i>	Endangered (S)
Peregrine Falcon	<i>Falco peregrinus</i>	Endangered (S)
Flowering Plants		
Western Prairie Fringed Orchid	<i>Platanthera praeclara</i>	Endangered (S)
Mammal		
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)

Note: S = State, F = Federal

Source: U.S. Fish and Wildlife Service, <http://www.fws.gov/midwest/Endangered/lists/missouri-cty.html>;
MDC Endangered Field Guide, <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 3.10** provides the names and locations of parks and conservation areas in Gasconade County.

Table 3.10. Conservation Areas in Gasconade County

Area Name	Address	City
Canaan CA	From Bland, take Route A north about 1.20 miles, then east on the area's southernmost access road (the road north of Rehmert Road). North access is on Highway A north an additional 1.70 miles, then east on Boettcher Road 1.50 miles.	Bland
Fredericksburg Ferry Access	From Linn, take Highway 50 east 3 miles, then Highway 89 north 3.50 miles, then Route J east 6 miles, then on Routes J and N north 4 miles, then Route J east 2 miles, and Old Ferry Road 1 mile to the Gasconade River.	Linn
Gasconade Park Access	In Gasconade, take Main Street north, then Oak Street east (right) to the end of the street.	Gasconade
Helds Island Access	From Mt. Sterling, take Highway 50 east, then Route K north 4 miles until it turns into a gravel road, continue 2 miles to the Access entrance, which is marked by a cantilever sign.	Mt. Sterling
Hermann Riverfront Park	Hermann Riverfront Park is in downtown Hermann along the Missouri River.	Hermann
Mint Spring Access	From Owensville, take Route EE south 9.50.	Owensville
Ming Spring CA	From Owensville, take Route EE south 9.50 miles.	Owensville
Tea Access	From Owensville take Highway 19 south 2 miles, then Route V east 5 miles, and Route T south 4 miles to Tea Road.	Owensville

Source: <https://nature.mdc.mo.gov/discover-nature/places>

Table 3.11 provides information pertaining to community owned/operated parks within Gasconade County.

Table 3.11. Community Owned Parks in Gasconade County

Park Name	Address	City
Memorial Park	712 Park Dr.	Owensville
Buschmann Park	402 S 4 th St	Owensville
Winter Park	409 Radoak Road	Owensville
Luster Park	111 S 2 nd St	Owensville
Hermann City Park	118 West 13 th St	Hermann
Gasconade Park	-	Gasconade

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 3.12** provides information in regard to properties on the National Register of Historic Places in Gasconade County.

Table 3.12. Gasconade County Properties on the National Register of Historic Places

Property	Address	City	Date Listed
Hermann Historic District	-	Hermann	2/172
Hermann Historic District	214 and 304 Franklin, 301-501 Gellert, 2202 MO 100	Hermann	11/29/06
Hermann Historic District	Wharf, First, Mozart, 5 th , Schiller, 4 th , Gutenberg, and Reserve Sts.	Hermann	10/30/09
Kotthoff-Weeks Farm Complex	-	Hermann	3/28/83
Old Stone Hill Historic District	West 12 th , Goethe, Jefferson Sts. And Iron Rd.	Hermann	5/21/69
Peenie Archaeological Petroglyph Site		Restricted	7/29/69
Poeschel, William, House	W 10 th St.	Hermann	6/21/90
Rotunda, The	Washington St.	Hermann	11/2/95
Ruskaup House	Hwy. 50	Drake	3/29/83
Shobe-Morrison House	W of Morrison off MO 100	Morrison	2/10/83
Vallet-Danuser House	E of Hermann on Hwy. 100	Hermann	9/23/82

Source: Missouri Department of Natural Resources – Missouri National Register Listings by County

<http://dnr.mo.gov/shpo/mnrlist.htm>

Economic Resources: **Table 3.13** provides major non-government employers in the planning area. There are approximately 398 employer establishments within the county, employing on average 13 individuals each³.

³ <https://www.census.gov/quickfacts/fact/table/gasconadecountymissouri,US/PST045219>

Table 3.13. Major Non-Government Employers in Gasconade County

Employer Name	Product or Service	Employees
Jahabow LLC	Display Fixtures & Materials-Mfrs	100-249
Frene Valley Health Care	Nursing Facility	100-249
Hermann Area District Hospital	Hospital	100-249
Frene Valley Health Care South	Nursing Facility	100-249
RR Donnelley	Printing	250-499
Wal-Mart	Retail	250-499

Source: <https://meric.mo.gov/industry/business-locator>, 2020 Data Collection Questionnaires

Agriculture plays an important role in Gasconade County. However, the Agribusiness Employment Location Quotient for the county is 2.8, meaning that there is a relatively low share of agribusiness employment to its share of total national employment⁴. In addition, there were 60 individuals working in the agriculture industry, comprising 0.87% of the total workforce in 2018⁵. Furthermore, the market value of products sold in 2017 was \$32,322,000; 54% from livestock sales and 46% from crop sales.

3.3 Land Use and Development

3.3.1 Development Since Previous Plan

Table 3.14 provides population growth statistics for Gasconade County.

Table 3.14. Gasconade County Population Growth, 2010-2019

Jurisdiction	2010 Population	2019 Population	2010-2019 # Change	2010-2019 % Change
Unincorporated Gasconade County	8805	8255	-550	-6.25
Bland	539	481	-58	-10.76
Gasconade	223	334	111	49.78
Hermann	2335	2438	103	4.41
Morrison	139	85	-54	-38.85
Owensville	2522	2599	77	3.05
Rosebud	409	519	110	26.89

Source: U.S. Bureau of the Census, 2015-2019 5 Year American Community Survey; Census 2010 Summary File 1
 Note: The smaller the town the larger the margin of error in ACS data. Large changes in Gasconade, Morrison, and Rosebud are most likely due to error.

⁴ <https://meric.mo.gov/media/pdf/rural-missouri-asset-mapping>

⁵ https://data.census.gov/cedsci/table?q=United%20States&tid=ACSST5Y2018.S2401&q=0400000US29_0500000US29169,29161&t=Occupation&vintage=2018
https://www.nass.usda.gov/Quick_Stats/CDQT/chapter/2/table/1/state/MO/county/073/year/2017

Typically, population growth or decline is generally accompanied by an increase or decrease in the number of housing units. **Table 3.15** provides the change in numbers of housing units in the planning area from 2010-2019.

Table 3.15. Change in Housing Units, 2010-2019

Jurisdiction	Housing Units 2010	Housing Units 2019	2010-2019 # Change	2010-2019 % change
Unincorporated Gasconade County	4,935	5,013	78	1.58
Bland	292	320	28	9.59
Gasconade	138	153	15	10.87
Hermann	1,291	1,177	-114	-8.83
Morrison	72	44	-28	-38.89
Owensville	1,280	1,266	-14	-1.09
Rosebud	197	205	8	4.06

Source: U.S. Census Bureau, 2015-2019 5 Year American Community Survey; U.S. Bureau of the Census, Census 2010 Summary File 1

Since the last update of the Gasconade County Hazard Mitigation Plan (2016), only the Gasconade County R-II school district reported any building development since the previous plan update in 2016. The Owensville Elementary School installed new fencing around the playground and completed a building addition to the south wing. The Gerald Elementary School also installed new fencing around the playground and completed a building addition on the southeast side of the building.

3.3.2 Future Land Use and Development

Jurisdictions reported anticipated future developments within the next five years (2021-2026). Gasconade County and most of the cities did not anticipate any major future developments within the next five years. The city of Bland is planning on installing a new water tower and running new water lines to the community. The city of Rosebud is in the discussion stage regarding an RV Park and convention center project.

Gasconade County R-I School District will be adding secondary entrances to all main campuses in the next five years. Gasconade County R-II School District anticipates a new bus road at Gerald Elementary. Maries County R-II School District indicated that they did not have any major development or construction planned for the next five years. All three school districts are interested in adding a FEMA certified tornado saferoom in the near future if adequate resources can be garnered.

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

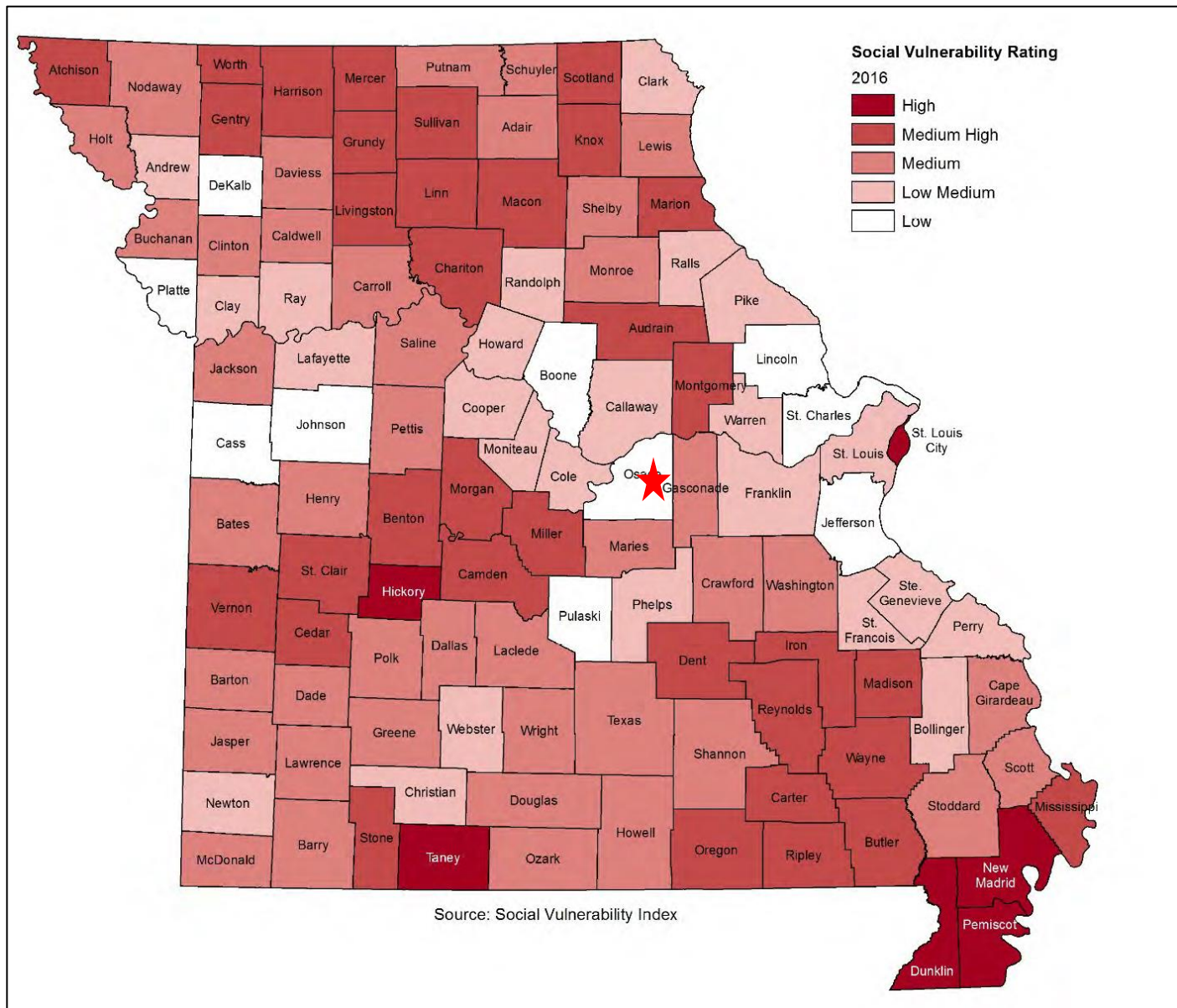
and its correlation to natural hazard vulnerabilities.

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, Gasconade 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 created⁶.

⁶ <https://ded.mo.gov/programs/business/missouri-works>

Figure 3.3. Social Vulnerability Rating for Gasconade County



3.4 Hazard Profiles, Vulnerability, and Problem Statements

Each hazard that has been determined to be a potential risk to Gasconade 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.

Strength/Magnitude/Extent: This includes information about the strength, 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. Strength, magnitude, and extent can also include the speed of onset and the duration of hazard events. Describing the strength/magnitude/extent of a hazard is not the same as describing its potential impacts on a community. Strength/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.

Changing Future Conditions Considerations: 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, <https://crt-climate-explorer.nemac.org/>

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 Gasconade County plan will also be based on:

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

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

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

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

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.

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

Problem Statements

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

3.4.1 Dam Failure

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
- Missouri Department of Natural Resources, Dam and Reservoir Safety,
<http://dnr.mo.gov/env/wrc/dam-safety/statemap.htm>
- Stanford University's National Performance of Dams Program; <http://npdp.stanford.edu/index.html>
- National Inventory of Dams, <http://geo.usace.army.mil/>
- MO DNR Dam & Reservoir Safety Program;
- National Resources Conservation Service <http://www.nrcs.usda.gov>
- 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 3.16** and **Table 3.17**, respectively.

Table 3.16. 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, http://dnr.mo.gov/env/wrc/docs/rules_reg_94.pdf

Table 3.17. 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 Missouri Department of Natural Resources Dam Safety Program, there are 83 recorded dams in Gasconade County, including Class 1 (7), Class 2 (14), Class 3 (62) dams (**Table 3.18**). In addition, the state regulates 14 of the 83 dams. The NID hazard class dams are high (19), significant (4), and low (60). 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 3.19** provides the names, locations, and other pertinent information for all NID High Hazard Dams in the planning area.

Table 3.18. Gasconade County Dams Hazard Risk

Name of Dam	DNR Hazard Class	NID Hazard Class
A C Schneider Lake (Too Small)	3	Low
Ahmad Lake Dam	3	Low
Angry Beaver Lake Dam (J.C.'s Lunger Lagoon)	2	Low
Bains Lake Dam	3	Low
Bay Lake Dam	3	Low
Becker Lake Dam	3	Low
Benson Lake Dam	1	High
Boston Lake Dam	3	Low
Brandt Lake Dam	3	Low
Brown Shanty Lake Dam	1	High
Busch Lake Dam	3	Low
Dougherty Dam	3	Low
Dr Henson Lake Dam	1	High
Epple Lake Dam	3	Low
Frericks Sect-34 Lake Dam	3	Low
Fricke Lake Dam	3	Low
Gade.Lee Dam	3	Low
Garofalo Lake Dam	3	Low
Gehrke Lake Dam	2	Low
Godefroid Lake Dam	3	Low
Gouldner Lake Dam	2	High
Grebe Lake Dam	3	Low
Harring Lake Dam	3	Low
Helmut Weber Dam	3	Significant
Hensley Lake Dam	3	Low
Hickory Lake Dam	3	Low
Hoffmann Lake Dam	3	Low
Jackson Lake Dam	3	Low
Jasper Lake Dam	3	Low
Jasper Lake Dam	3	Low
Jasper Lake Dam	2	High
John C. Hill Lake Dam	2	High
Kehr Lake Dam	2	High
Keiser Lake Dam	3	Low
Kohrman Lake Dam	3	Low
Laboube Lake Dam	3	Low
Lake Carawood Dam	2	High
Lake Northwoods Dam	2	High
Lake Northwoods Dam West	3	Low
Lake Timber Ridge Dam	1	High
Landwehr Lake Dam	2	High

Name of Dam	DNR Hazard Class	NID Hazard Class
Langenberg Lake Dam	2	High
Laury Lake Dam	3	Low
Laylow Dam	3	Low
Lerwick Lake Dam	3	Low
Limberg Lake Dam	3	Low
Lost Valley Lake Dam	2	High
Lost Valley Lake Dam #2	1	High
McGowen Lake Dam	3	Low
Memory Lake Dam	3	Low
Mistler Lake Dam	3	Low
Mononame 538 (Clay Pit)	3	Low
Mueller Lake Dam	3	Low
Mueller Lake Dam	3	Low
Novak Lake Dam	3	Low
Peaceful Valley Lake Dam	1	High
Pershing Farms Dam	3	Low
Ponticello Lake Dam	3	Low
Pueschel Lake Dam	3	Low
Raack Lake Dam	3	Low
Raeker Lake Dam	3	Low
Sammons Lake Dam	3	Low
Schneider Lake Dam Lower	2	High
Schneider Lake Dam Upper	2	High
Seetal Lake Dam	1	High
Shockley Lake Dam	3	Low
South Sediment Pond Dam	3	Significant
Sunswept Lake Dam	3	Low
Swiss Lake Estates Dam	2	High
Tayloe Lake Dam East	3	Low
Tayloe Lake Dam West	3	Low
Tea Lake Dam Number 2	3	Low
Tea Lakes Dam #1	3	Low
Terry Jordan Lake Dam	3	Significant
Trampe Lake Dam	3	Low
W Grimm	3	Low
W J Slais Dam	3	Low
Wagner Lake Dam	3	Low
Walkenbach Lake Dam-North	3	Low
Walkenbach Lake Dam-South	3	Low
Weiss Lake Dam	3	Low
Windy Hill Lake Dam	3	Significant
Worthington Lake Dam	3	Low

Source: MDNR Dam and Safety Program

Table 3.19. NID High Hazard Class Dams in the Gasconade County Planning Area

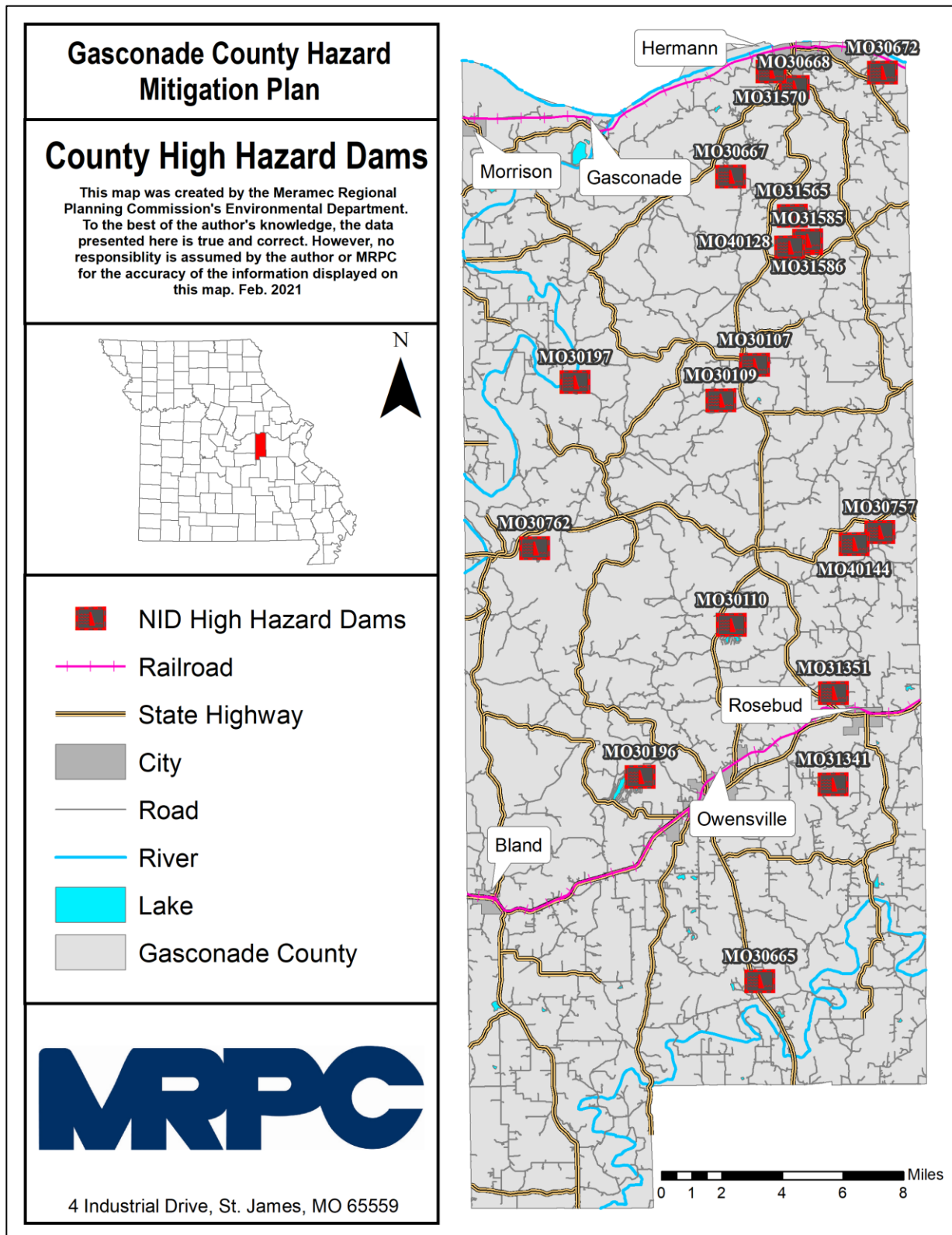
Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (Mi.) *
BENSON LAKE DAM	MO30667	High	25	54	FRENE CREEK	HERMANN	5
BROWN SHANTY LAKE DAM	MO30197	High	34	164	TR-GASCONADE RIVER	GASCONADE	1
DR HENSON LAKE DAM	MO31570	High	29	47	FRENE CREEK	HERMANN	-
GOULDNER LAKE DAM	MO30672	High	34	109	TR-LITTLE BERGER CREEK	NEW HAVEN	15
JASPER LAKE DAM	MO31565	High	30	64	TR-LITTLE BERGER CREEK	NEW HAVEN	18
JOHN C. HILL LAKE DAM	MO40128	High	52	523	LITTLE BERGER CREEK	HERMANN	4.5
KEHR LAKE DAM	MO31341	High	30	353	TR-RED OAK CREEK	ROSEBUD	-
LAKE CARAWOOD DAM	MO30107	High	36	167	TR-BIG BERGER CREEK	NEW HAVEN	18
LAKE NORTHWOOD S DAM	MO30110	High	50	2097	TR.TO SECOND CR.	BAY	8
LAKE TIMBER RIDGE DAM	MO30762	High	43	810	TR.TO PINOAK CR.	GASCONADE	23
LANDWEHR LAKE DAM	MO30665	High	30	96	TR-DRY FK-BOURBEUSE RIVER	NOSER MILL	14
LANGENBERG LAKE DAM	MO31351	High	34	473	TR-BOEUF CREEK	BEEMONT	5
LOST VALLEY LAKE DAM	MO30757	High	30	626	TR-BIG BRCH-BOEUF CREEK	WASHINGTON	30
LOST VALLEY LAKE DAM #2	MO40144	High	42	913	BIG BRANCH	-	-
PEACEFUL VALLEY LAKE DAM	MO30196	High	64	4784	TR-CEDAR BRANCH CREEK	COOPER HILL	-
SCHNEIDER LAKE DAM LOWER	MO31586	High	25	27	TR-LITTLE BERGER CREEK	NEW HAVEN	20
SCHNEIDER LAKE DAM UPPER	MO31585	High	25	27	TR-LITTLE BERGER CREEK	NEW HAVEN	20
SEETAL LAKE DAM	MO30668	High	51	232	TR-FRENE CREEK	HERMANN	1

Dam Name	NIDID	Hazard Potential *	NID Height (Ft.)	NID Storage	River	Nearest City *	Distance To City (MI.) *
SWISS LAKE ESTATES DAM	MO30109	High	42	667	TR-PUNCHEON CREEK	FREDRICKSBURG	25

Figure 3.4 depicts locations of NID high hazard dams located in the planning area. If a dam failure were to occur in Gasconade 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 are areas of assembly in dam inundation zones, specifically retail stores in Hermann, MO.

Seven dam inundation maps were available from the Missouri Department of Natural Resources. These Regulated Dams include John C. Hill Lake Dam, Lake Northwoods Dam, Lake Timber Ridge Dam, Lost Valley Lake Dam #2, Peaceful Valley Lake Dam, Seetal Lake Dam, and Swiss Lake Estates Dam (**Figure 3.5 – Figure 3.11**). No other dam inundation maps were available for the remaining NID High Hazard Dams in the county.

Figure 3.4. NID High Hazard Dam Locations in Gasconade County



Source: MSDIS, MRPC
 * Dams MO31586 and MO31585 overlap

Figure 3.5. John C. Hill Lake Dam Inundation Zone

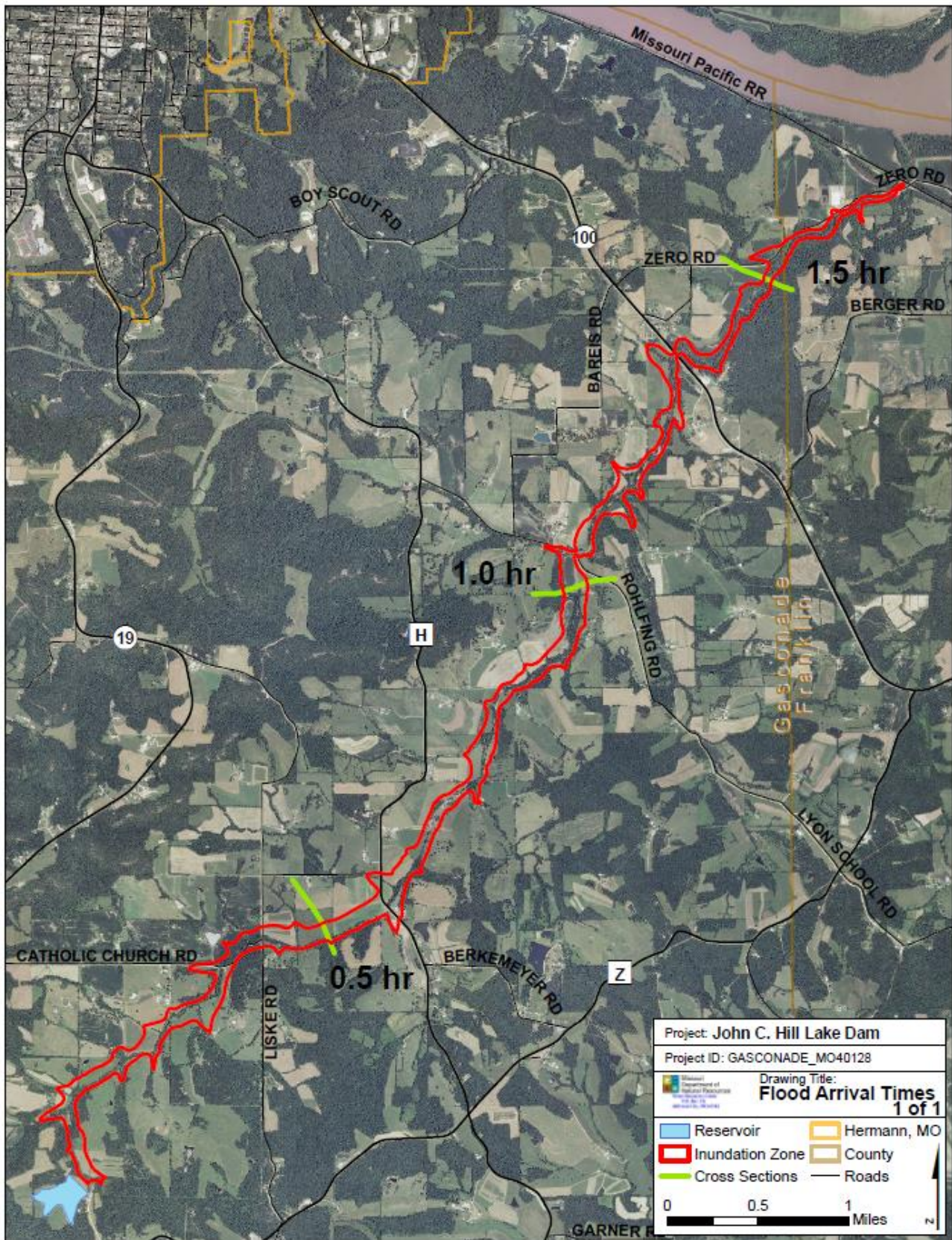


Figure 3.6. Lake Northwoods Dam Inundation Zone

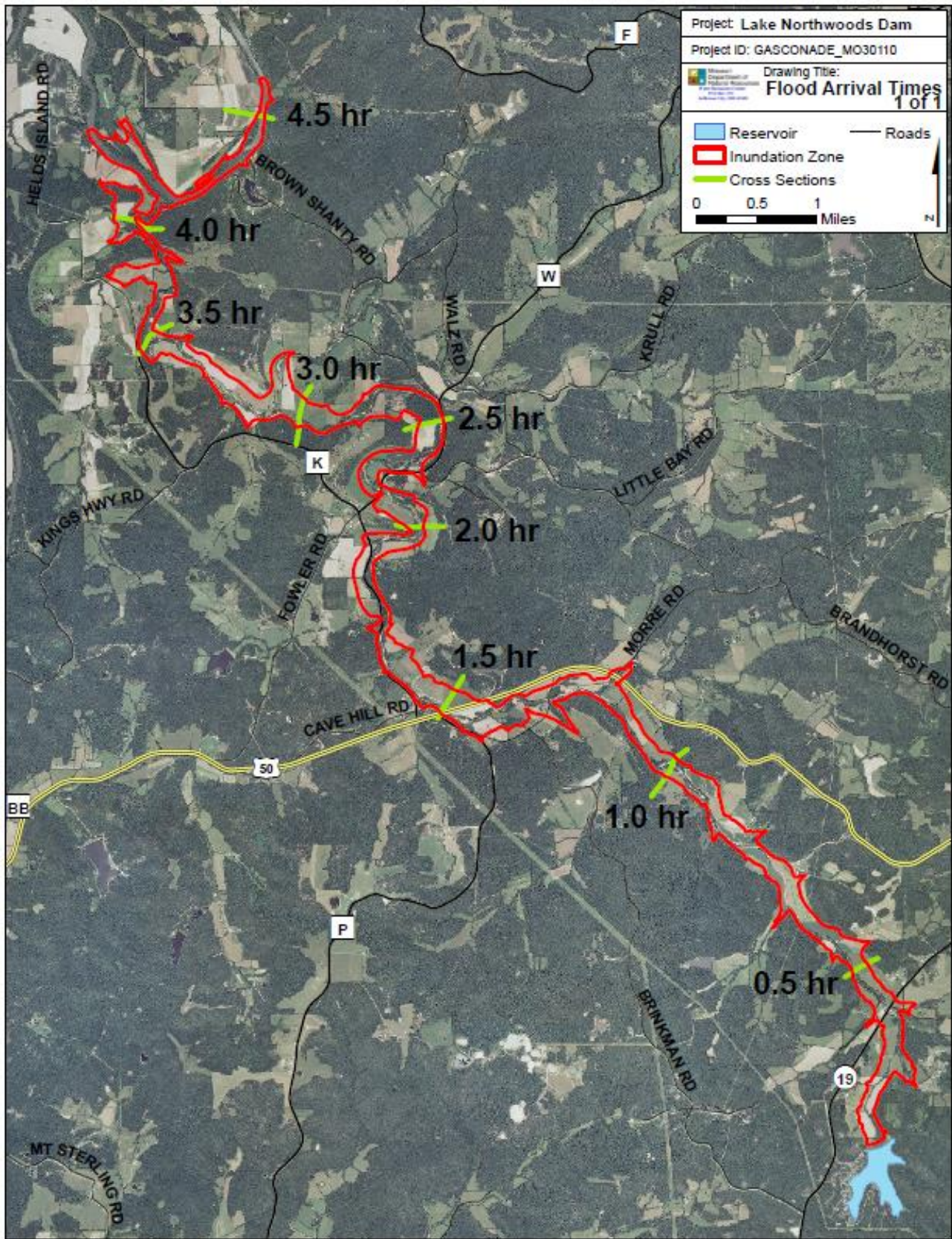


Figure 3.7. Lake Timber Ridge Dam Inundation Zone

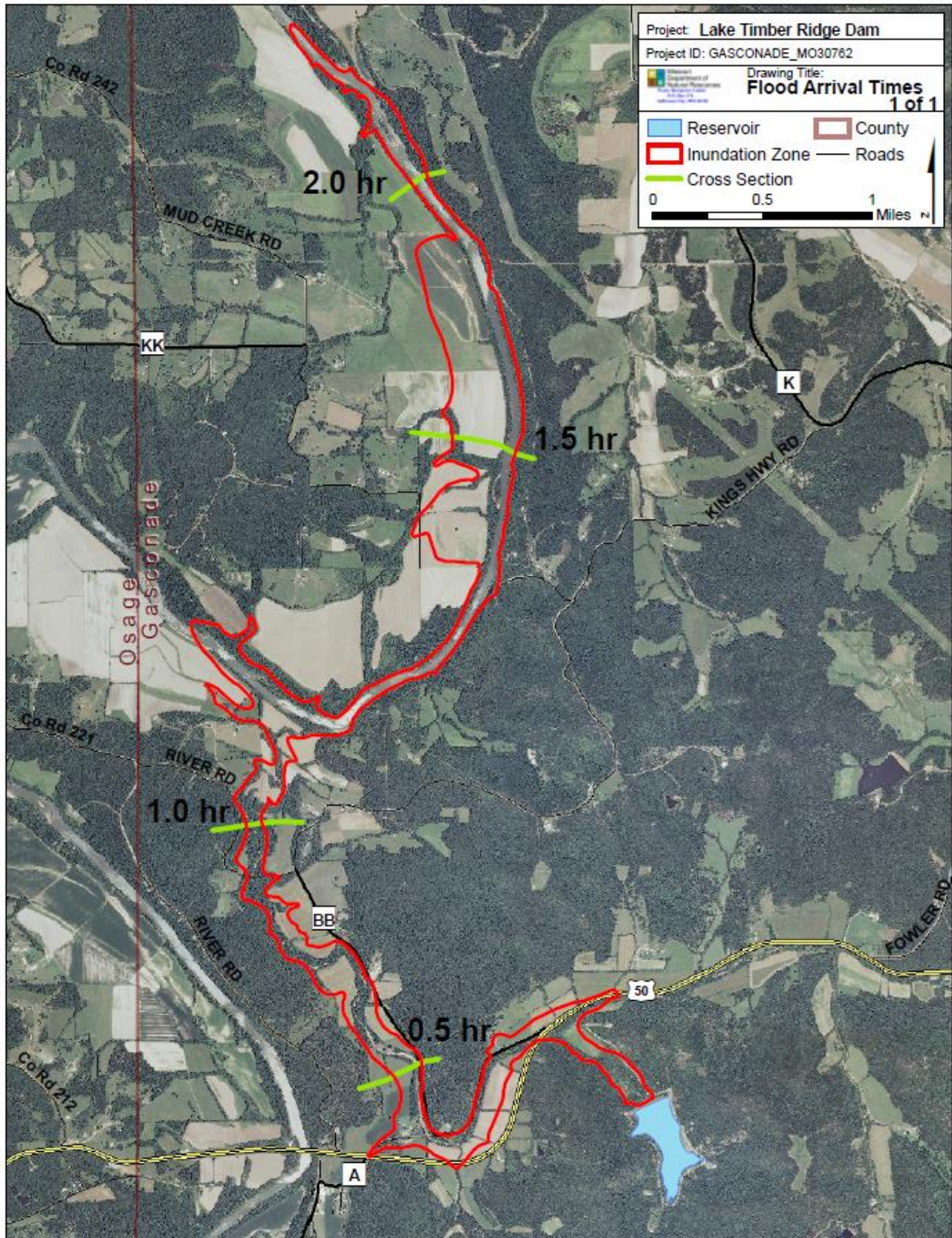


Figure 3.8. Lost Valley Lake #2 Dam Inundation Zone

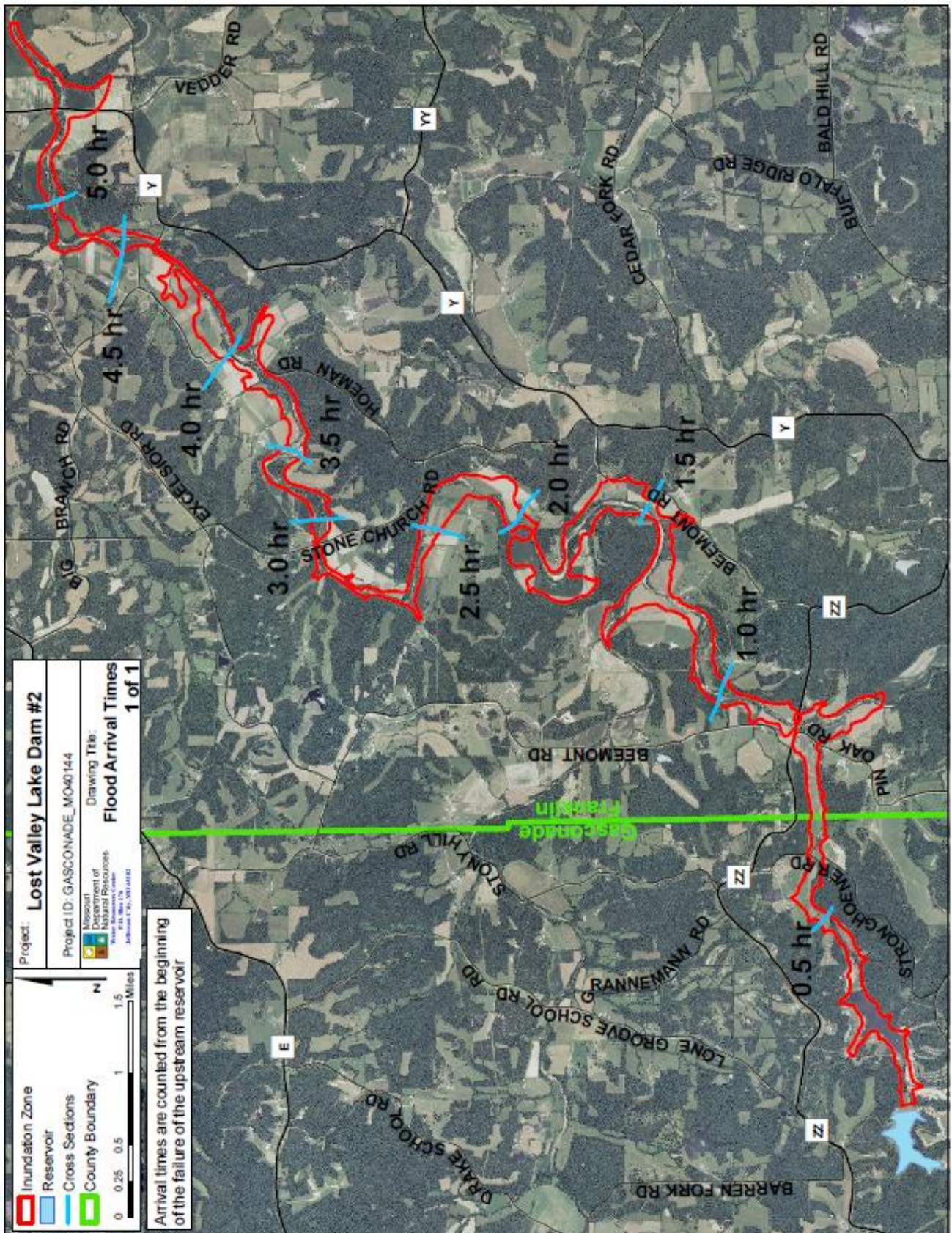


Figure 3.9. Peaceful Valley Lake Dam Inundation Zone

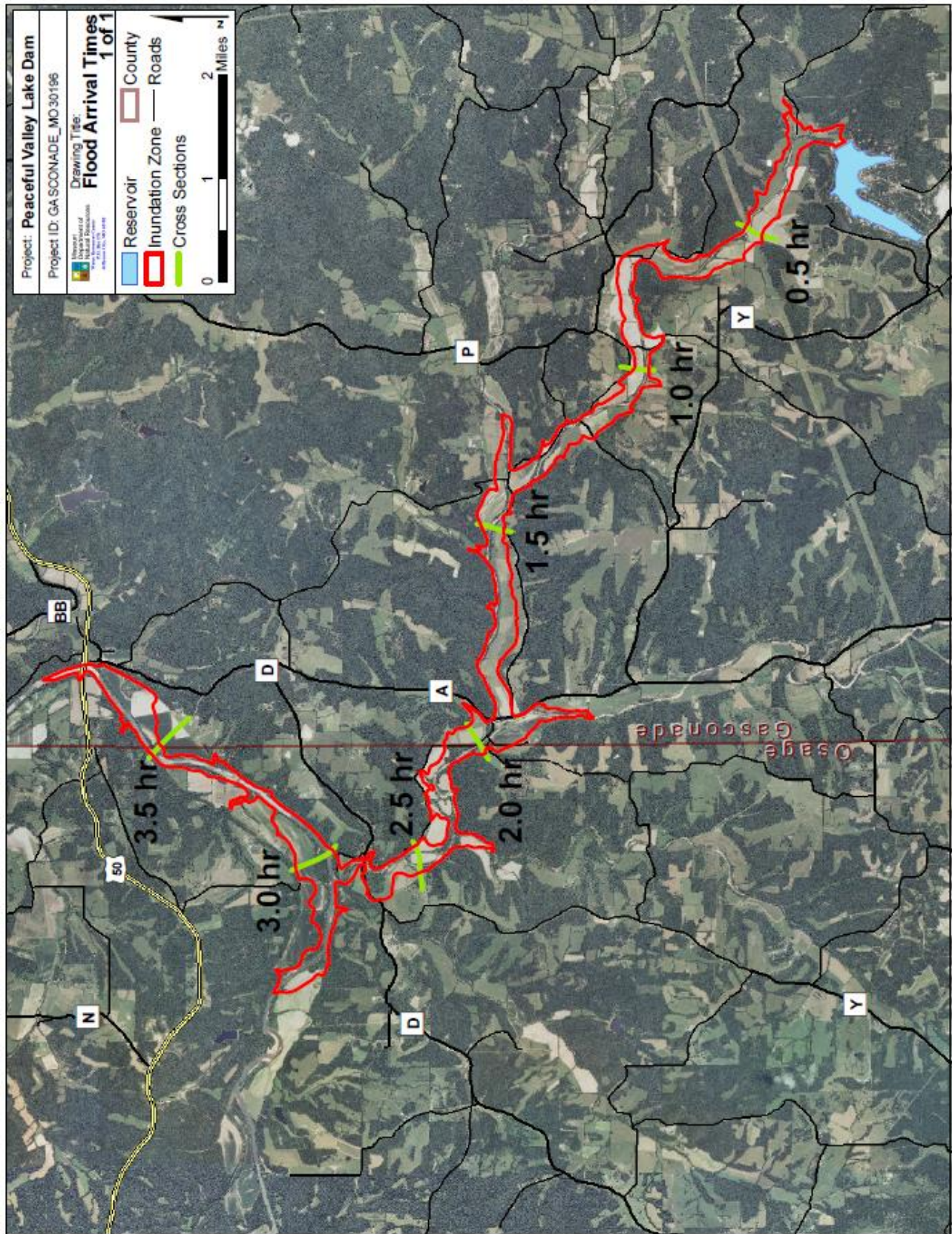


Figure 3.10. Seetal Lake Dam Inundation Zone

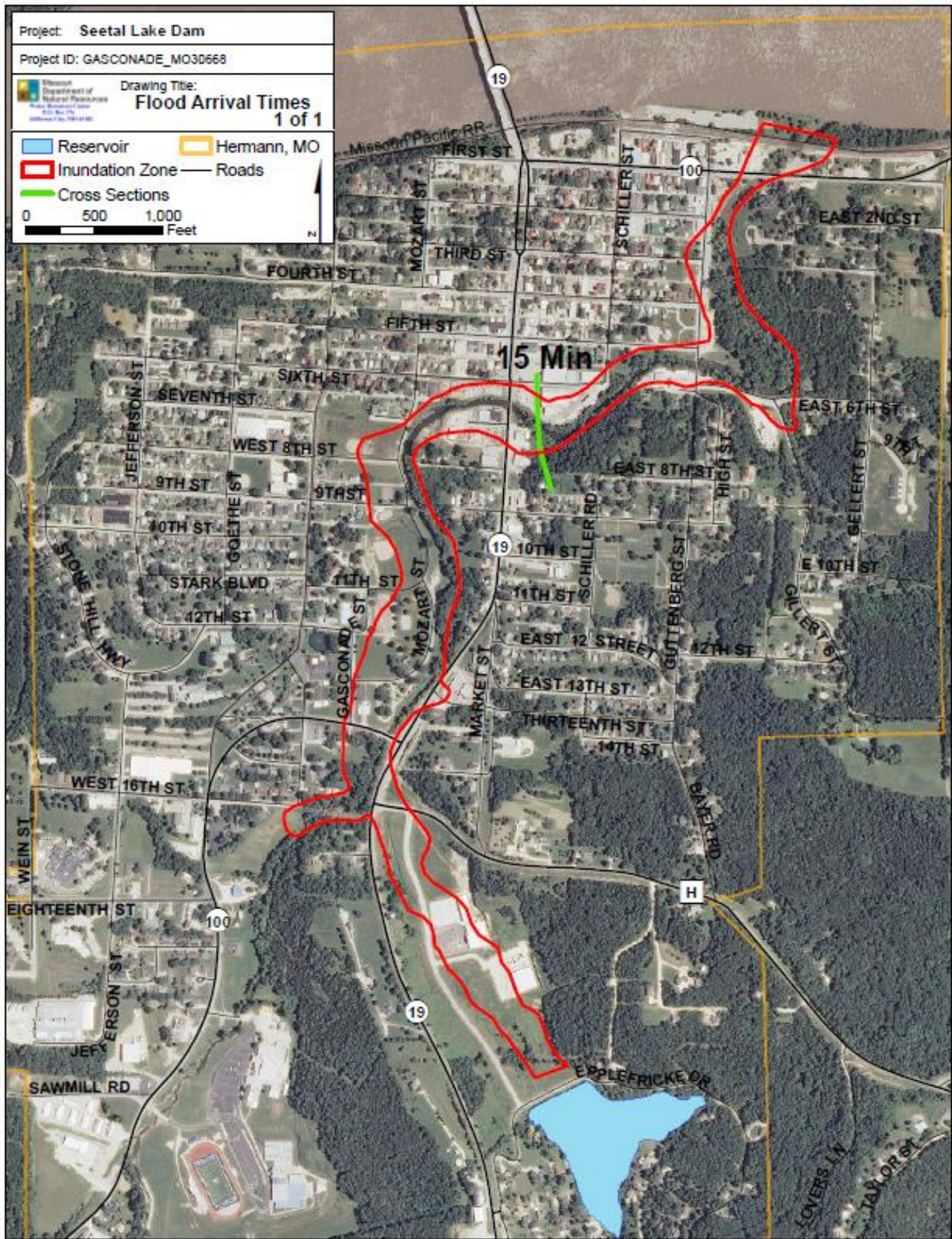
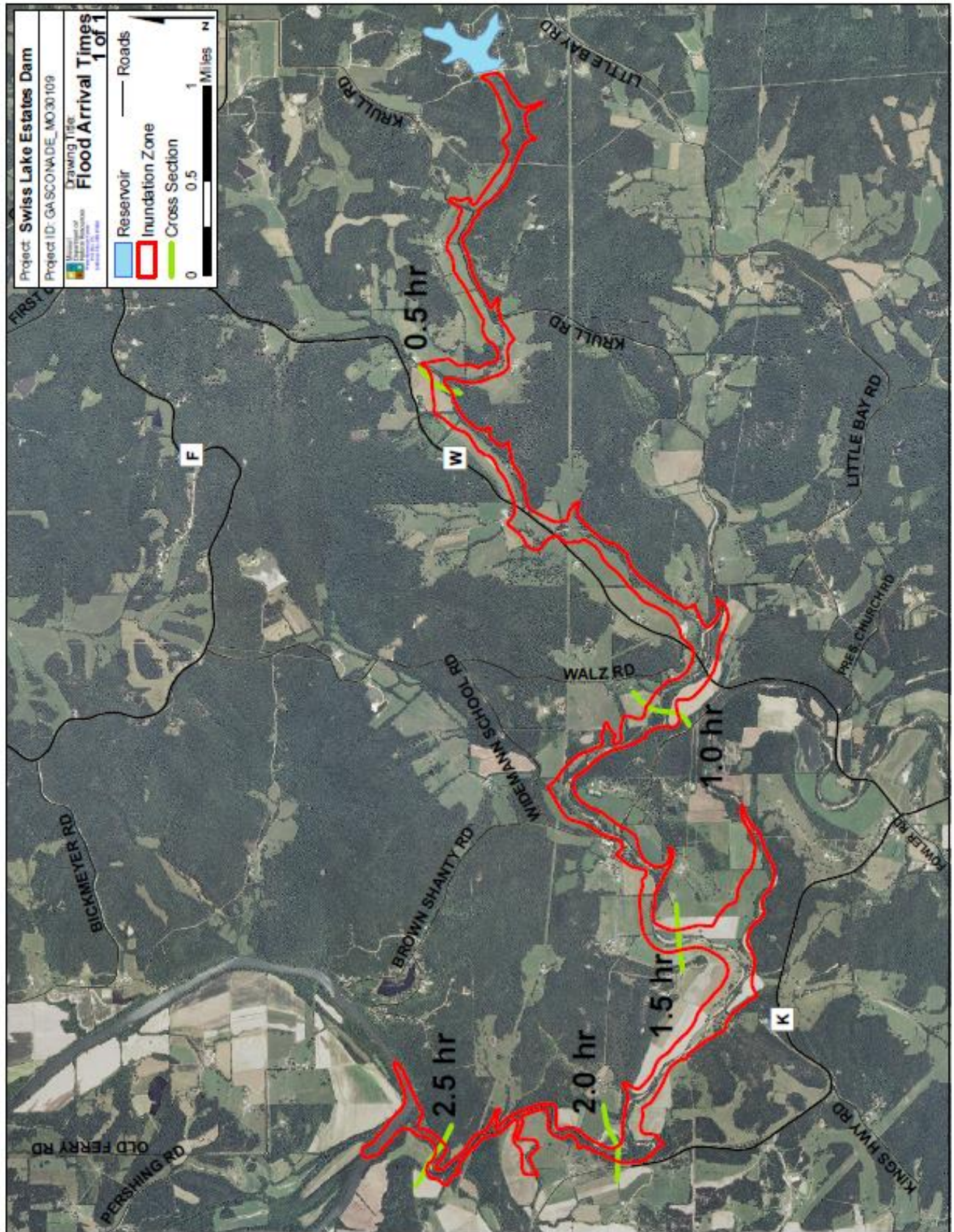


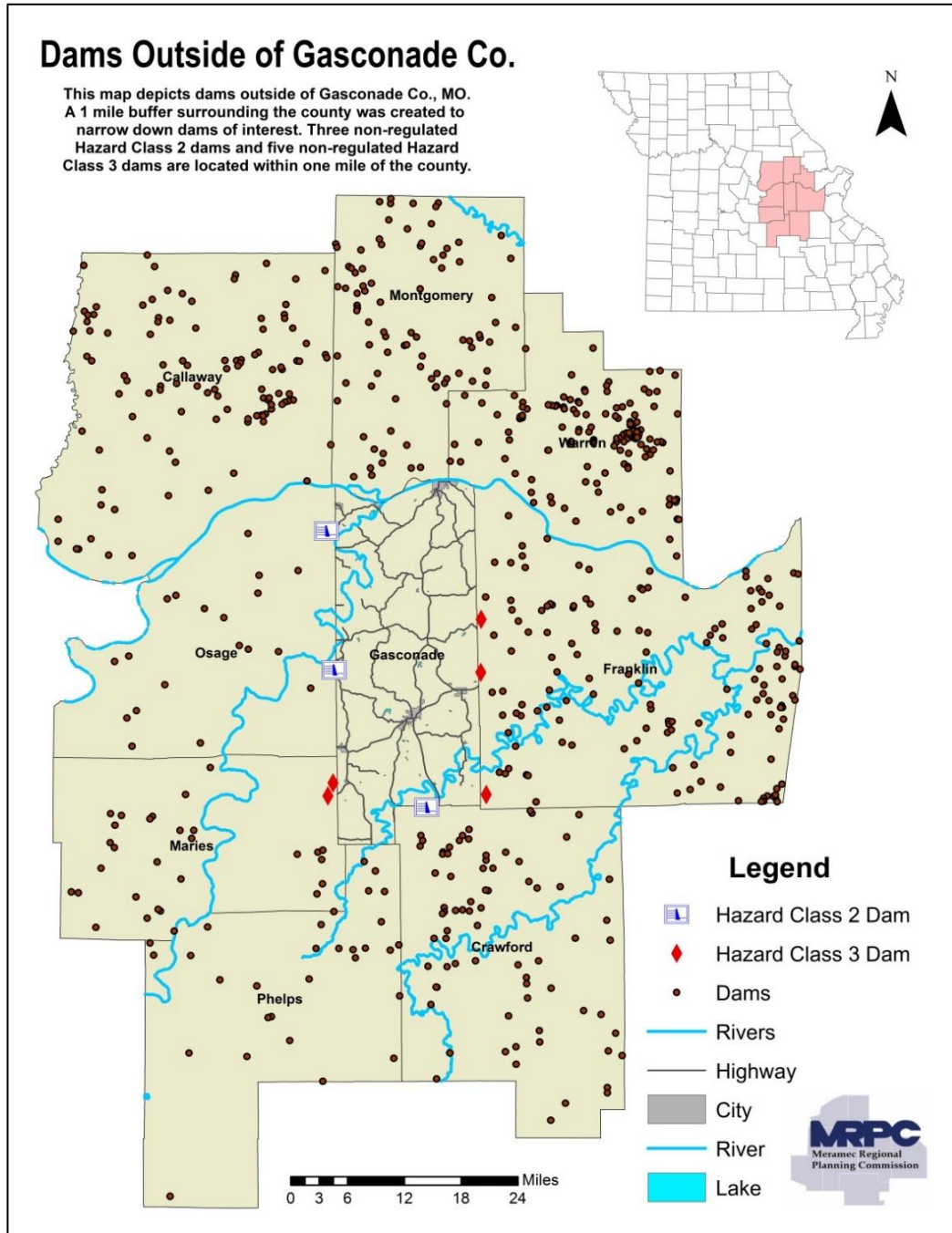
Figure 3.11. Swiss Lake Estates Dam Inundation Zone



Upstream Dams Outside the Planning Area

According to the Missouri Department of Natural Resources' Dam and Reservoir Safety Program, there are no regulated high hazard dams that would flow into Gasconade County from surrounding counties during a failure event. However, it was noted that Indian Hills Lake Dam in Crawford County (Regulated, Class 3) would have to travel approximately 15 miles of streambed before it would reach Gasconade County. **Figure 3.12** depicts dams outside of Gasconade County. Three Hazard Class 2 dams (non-regulated) are located within a 1-mile buffer. Five other dams located within the 1-mile buffer are Hazard Class 3 (non-regulated).

Figure 3.12. Upstream Dams Outside Gasconade County



Strength/Magnitude/Extent

The strength/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. Worst case scenario would be a catastrophic failure at Seetal Lake Dam in Hermann. With retail stores located approximately 260 yards downstream, residents would have a miniscule amount of time to evacuate; loss of life would be likely.

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 2016. 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 park⁷. 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 high⁸. 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 hard⁹.

⁷ United States Geological Survey. Damage Evaluation of the Taum Sauk Reservoir Failure using LiDAR. http://mccgsc.usgs.gov/publications/t_sauk_failure.pdf

⁸ The Alert. Spring 2006. After the Deluge...What's Ahead for Taum Sauk? By Dan Sherburne.

⁹ The Alert. Spring 2006. After the Deluge...What's Ahead for Taum Sauk? By Dan Sherburne.

Event Description

According to Stanford University's National Performance of Dams Program, no dam incidents have been recorded for Gasconade County¹⁰.

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 possible¹¹. In addition, dam failure within the county has not occurred according to available data.

Changing Future Conditions Considerations

According to the Missouri State Hazard Mitigation Plan, studies have been conducted to investigate the impact of climate change scenarios on dam safety. Dam failure is already tied to flooding and the increased pressure flooding places on dams. The impacts of changing future conditions on dam failure will most likely be those related to changes in precipitation and the likelihood of flooding. Projections of changes in future conditions suggest that precipitation may increase and occur in more extreme events, which may increase risk the flooding, putting stress on dams and increasing the likelihood of dam failure.¹²

The safety of dams in the future can be based on an evaluation of changes in design floods and the freeboard available to accommodate an increase in flood levels. The results from the studies indicate that the design floods with the corresponding outflow floods and flood water levels will increase in the future. This increase will affect the safety of the dams in the future. Studies concluded that the total hydrological failure probability of a dam will increase in the future climate and that the extent and depth of flood waters will increase by the future dam break scenario.¹³

Vulnerability

Vulnerability Overview

Data was obtained from the 2013 Missouri State Hazard Mitigation Plan for the vulnerability analysis of dam failure for Gasconade 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 3.20** provides vulnerability analysis data for the failure of State-regulated dams in Missouri.

¹⁰ http://npdp.stanford.edu/dam_incidents

¹¹ 2018 Missouri State Hazard Mitigation Plan

¹² Ibid.

¹³ Ibid.

Table 3.20. 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 (\$)
Gasconade	4	3	7	14	38	281,627	10,701,837	7	82,799,897

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.
- 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.

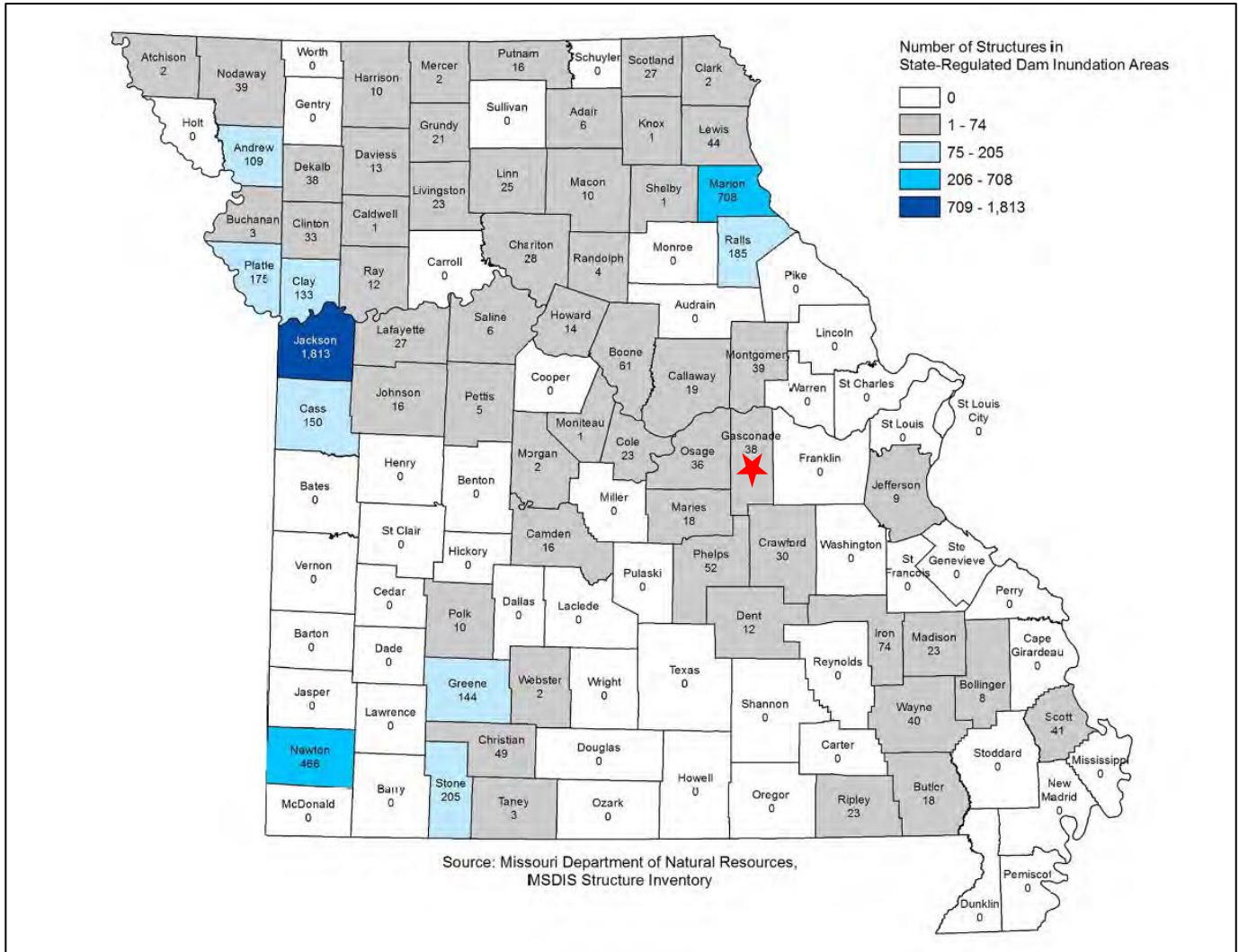
According to the 2018 Missouri State Hazard Mitigation Plan, there are 38 buildings vulnerable to failure of State-regulated dams (**Figure 3.13**) in Gasconade County. Furthermore, the state quantified potential loss estimates in terms of property damages. To execute the analysis, the following assumptions 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.¹⁴

¹⁴ 2018 Missouri State Hazard Mitigation Plan

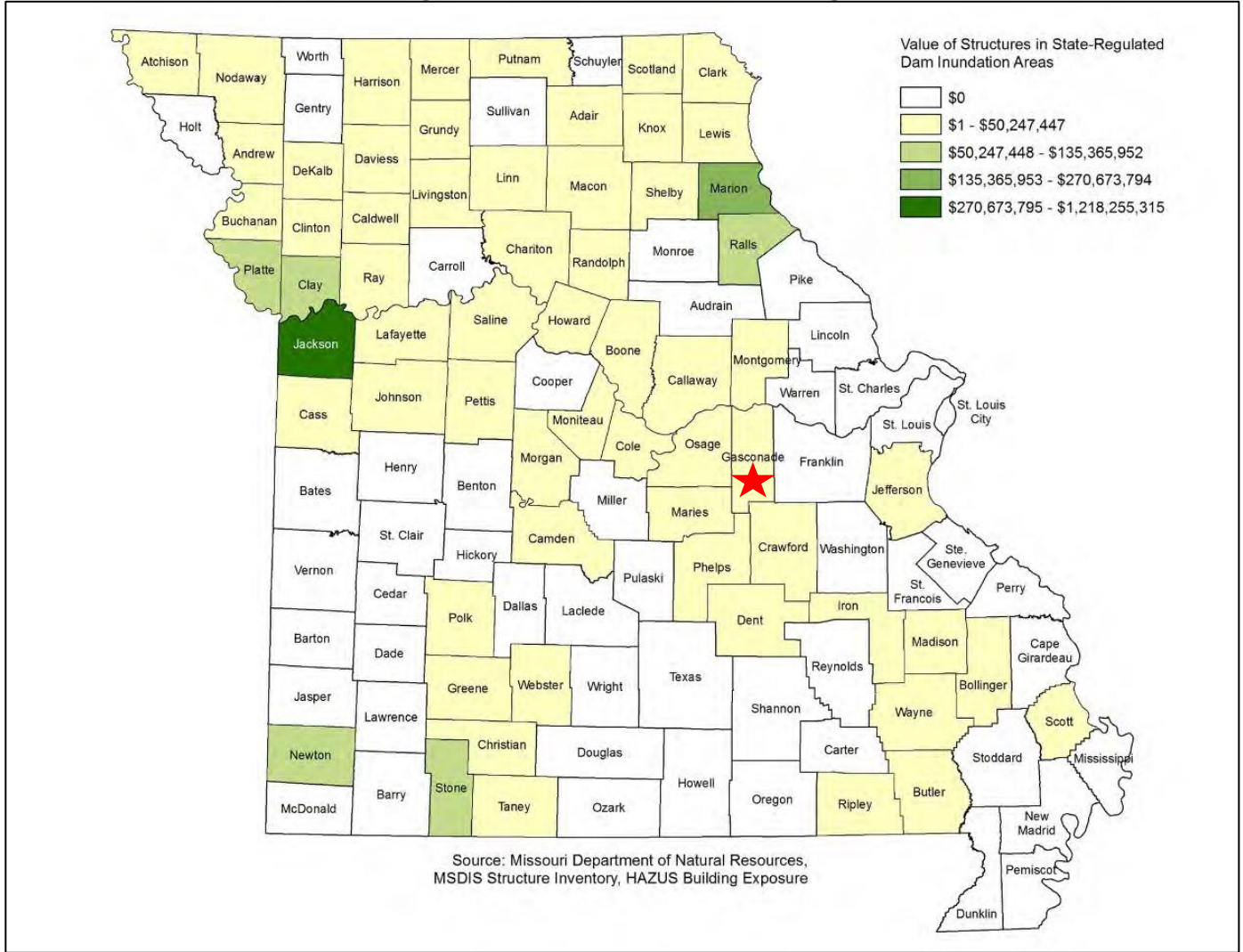
Figure 3.14 and **Figure 3.15** depict the total estimated building losses and population exposure by county, respectively. The estimated building losses from failure of State-regulated dams are \$1 – \$50,247,447. The estimated population exposure to failure of State-regulated dams ranges between 1 and 104.

Figure 3.13. Estimated Number of Buildings Vulnerable to Failure of State-regulated Dams



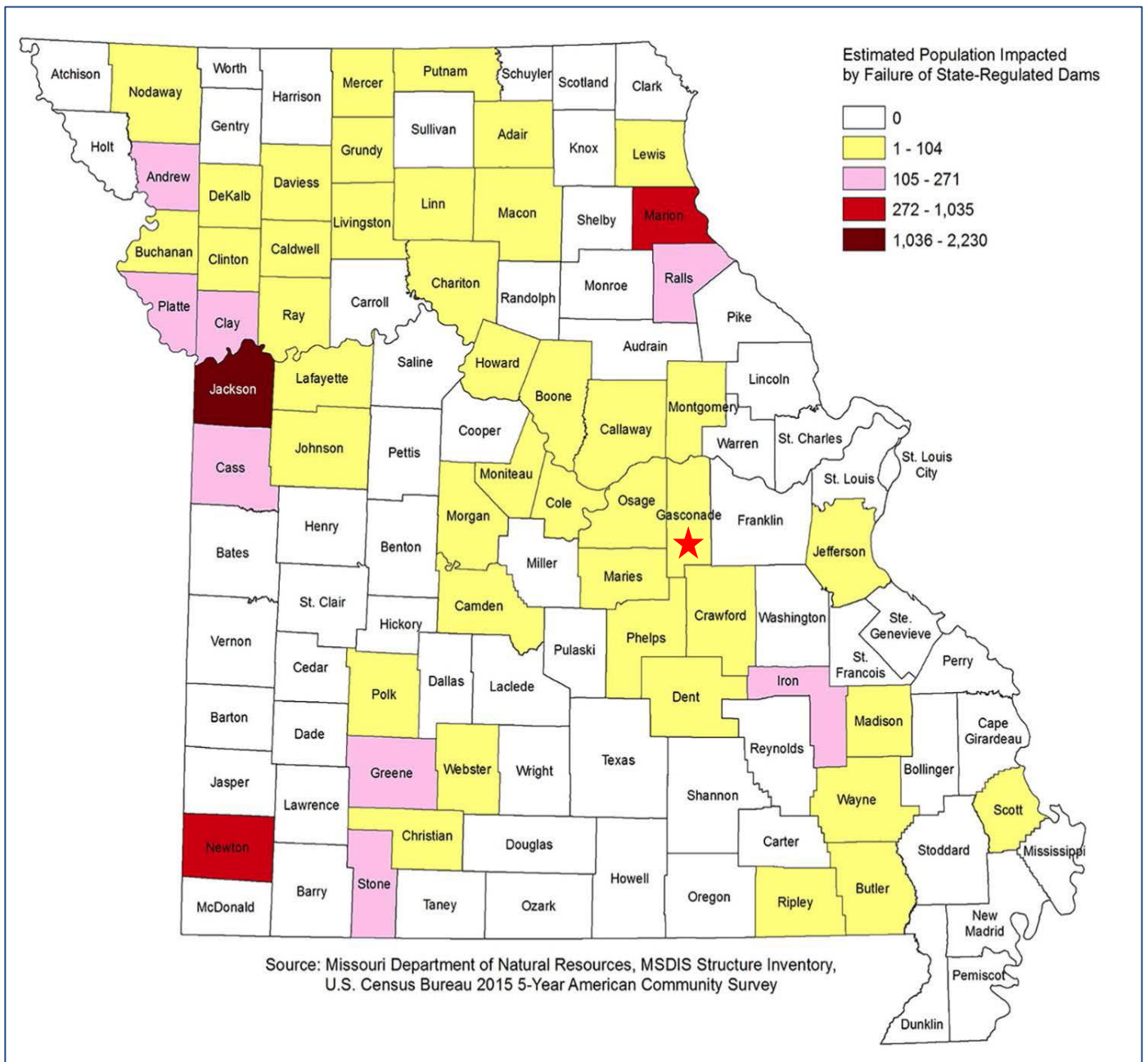
Source: 2018 Missouri State Hazard Mitigation Plan
 *Red star indicates Gasconade County

Figure 3.14. Estimated Building Losses from Failure of State-regulated Dams



Source: 2018 Missouri State Hazard Mitigation Plan
 *Red star indicates Gasconade County

Figure 3.15. Estimated Population Exposure to Failure of State-regulated Dams



Source: 2018 Missouri State Hazard Mitigation Plan
 *Red star indicates Gasconade 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 Seetal Lake Dam (**Figure 3.10**) in Hermann. During a failure event, serious loss to road infrastructure, commercial and residential structures, and human life is likely. Other high hazard dams within the county would most likely experience loss to road infrastructure and residential structures. However, the majority of dams in Gasconade County are rural in nature.

Impact of Previous and 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. Nonetheless, Gasconade County school districts and special districts do not have assets located in dam breach inundation areas. Seetal Lake Dam in Hermann seems to be most vulnerable to losses during the event of failure due to the number of assets within the inundation zone.

Problem Statement

In summary, the hazard risk for dam failure in Gasconade 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. Due to the dam's proximity to vulnerable properties and the number of vulnerable assets within its inundation zone, failure at the Seetal Lake Dam has the highest risk of affecting a densely populated area. An emergency action plan has been developed for this dam. Possible solutions for mitigating this risk would be development of an evacuation plan and review of local ordinance to determine potential for development restrictions within the inundation zone. Additionally, the owner should develop a regular inspection and maintenance schedule to be aware of any issues as early as possible. In general, 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.

3.4.2 Drought

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, <http://dnr.mo.gov/pubs/WR69.pdf>
- Populations served by groundwater by county, USGS-NWIS, <http://maps.waterdata.usgs.gov/mapper/index.html>
- Census of Agriculture, http://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1_Chapter_2_County_Level/Missouri/and http://www.agcensus.usda.gov/Publications/2012/Online_Resources/County_Profiles/Missouri/
- USDA Risk Management Agency, Insurance Claims, <http://www.rma.usda.gov/data/cause.htm>
- 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/1bPkc0jgF9ofwQLnTL9N0u-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 people¹⁵ - which impacts supply and demand of some economic commodity.

Geographic Location

All areas and jurisdictions in Gasconade 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 Gasconade County rely on groundwater resources for drinking water. Approximately 61% of the land in the county is utilized for agricultural purposes. Furthermore, livestock sales comprise 54% of the market of agricultural products sold in Gasconade County. A drought would directly impact livestock production and the agriculture economy in Gasconade County¹⁶.

Strength/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 mortality¹⁷.

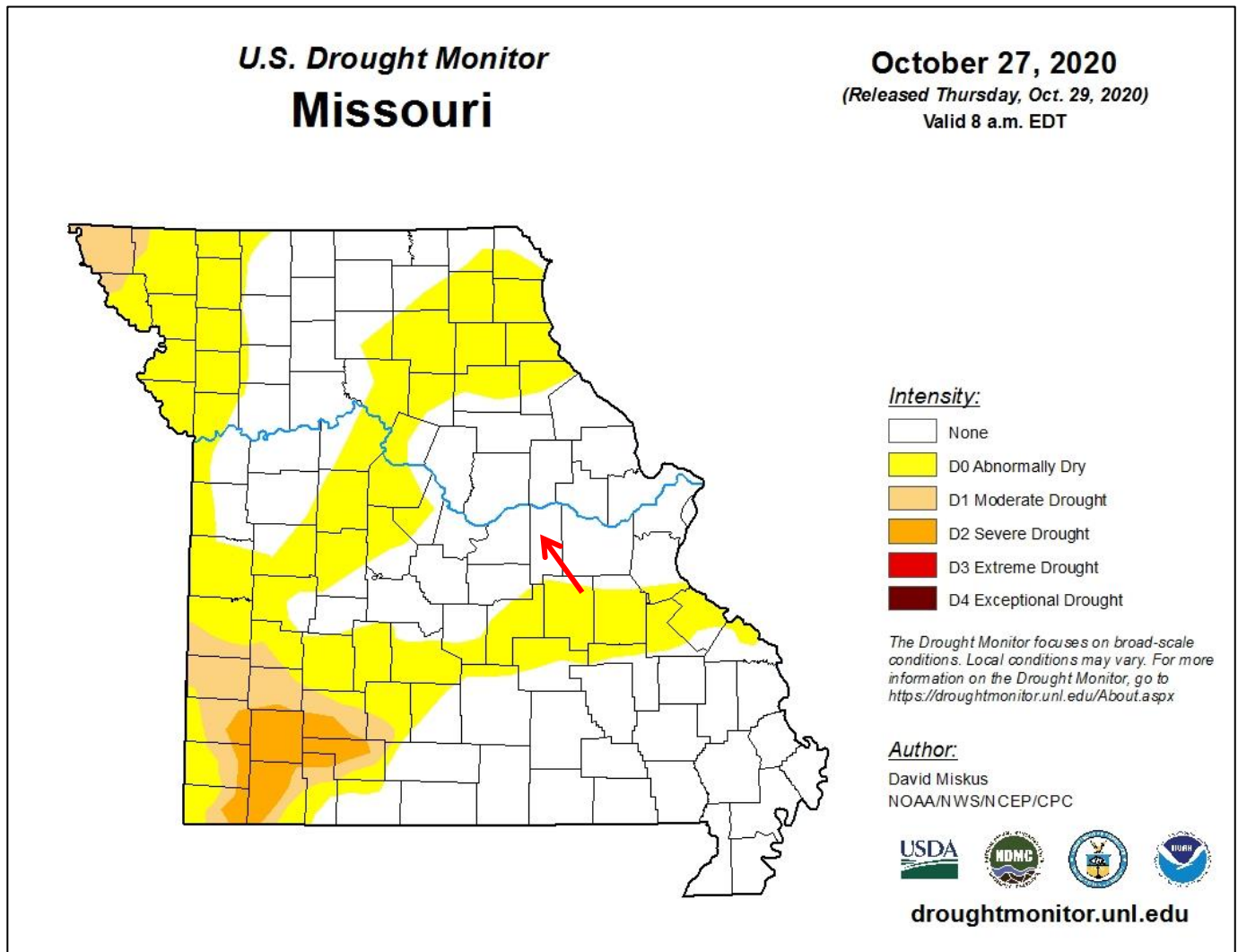
Figure 3.16 depicts a U.S. Drought Monitor map of Missouri on October 27, 2020. This map illustrates the planning area, which could be in drought at any given moment in time. A red arrow indicates the location of the planning area (Gasconade County).

¹⁵ <http://www.drought.unl.edu/> <http://droughtreporter.unl.edu/>

¹⁶ https://www.nass.usda.gov/Publications/AgCensus/2017/Online_Resources/County_Profiles/index.php

¹⁷ Ibid

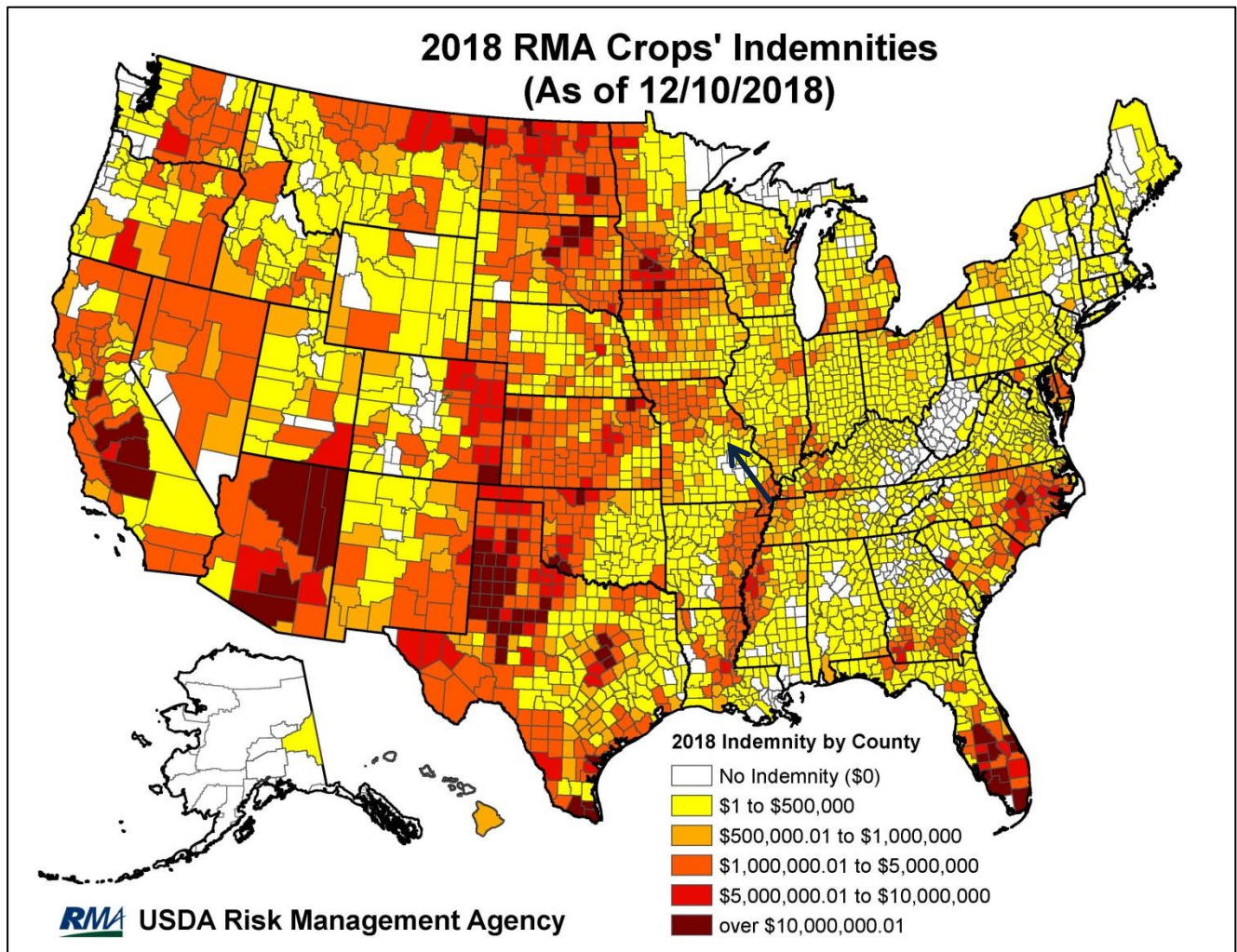
Figure 3.16. U.S. Drought Monitor Map of Missouri on October 27, 2020



Source: U.S. Drought Monitor, <http://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?MO>
*Red arrow indicates Gasconade County

Figure 3.17 illustrates RMA crop indemnities for 2018 across the United States. Gasconade County fell in the range of \$1 to \$500,000 for crop indemnities.

Figure 3.17. 2018 RMA Crop Indemnities for the United States



Source: <http://www.rma.usda.gov/data/indemnity/> *Black arrow indicates Gasconade County

According to the USDA's Risk Management Agency, there have been 169 crop insurance payments due to drought in Gasconade County since 1999, totaling \$2,218,177.37. **Table 3.21** illustrates the year, number of payments, and total amount of crop insurance payments.

Table 3.21. Gasconade County Crop Indemnity Payments (1999-2019)

Year	Number of Payments	Total
1999	19	\$71,529.75
2000	0	0
2001	3	\$4,259.00
2002	15	\$61,390.75
2003	16	\$106583.00
2004	0	0
2005	13	\$93,413.00
2006	5	\$21,072.00

Year	Number of Payments	Total
2007	15	\$136,997.00
2008	0	0
2009	0	0
2010	0	0
2011	12	\$189,022.50
2012	40	\$1,385,653.47
2013	7	\$45,019
2014	0	0
2015	1	\$11,747.20
2016	2	\$1,432.50
2017	5	\$24,011.35
2018	16	\$66,046.85
2019	0	0
TOTAL	169	\$2,218,177.37

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

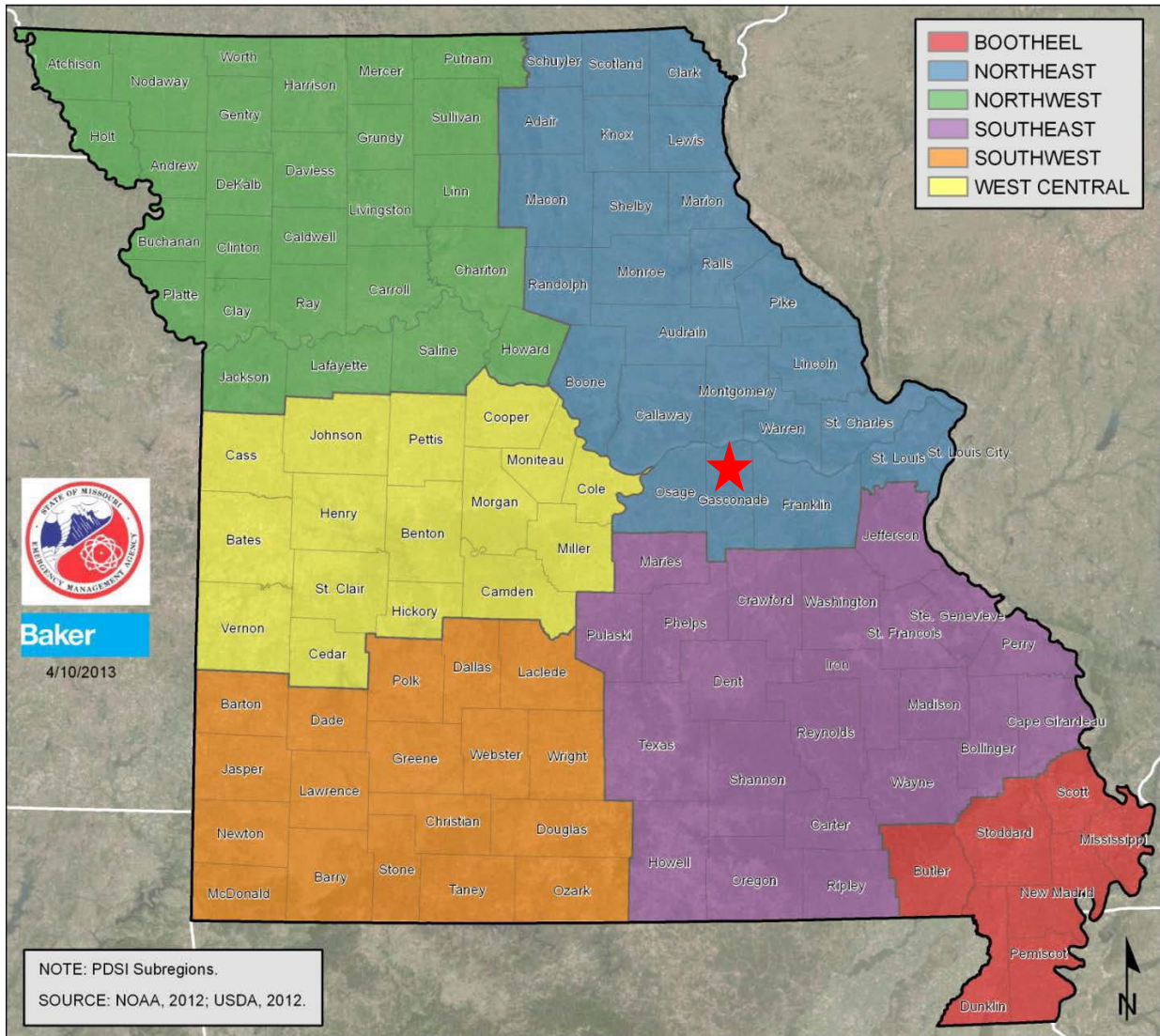
The Palmer Drought Indices measure dryness based on recent precipitation and temperature. The indices are based on a “supply-and-demand model” of soil moisture. Calculation of supply is relatively straightforward, using temperature and the amount of moisture in the soil. However demand is more complicated 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 3.18 illustrates the Palmer Drought Severity Index sub-regions of Missouri. Gasconade County is categorized under the Northeast sub-region.

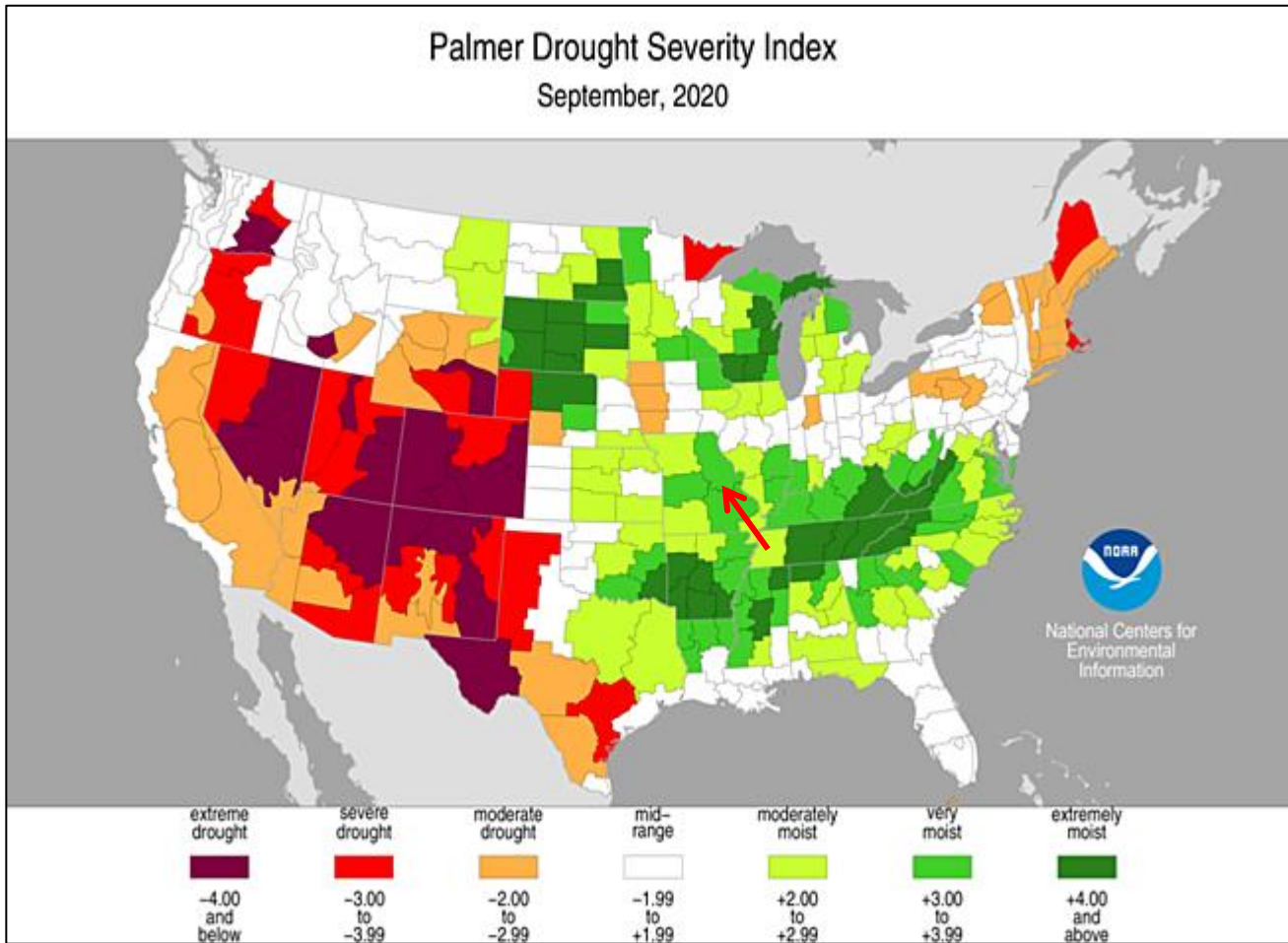
Figure 3.18. Palmer Drought Severity Index: Missouri Sub-regions



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

Figure 3.19 is an example of the Palmer Modified Drought Index for the United States for September 2020.

Figure 3.19. Palmer Modified Drought Index National Map September 2020



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

Data was collected from the Missouri Department of Natural Resources (2020 Census of Missouri Public Water Systems) to determine water source by jurisdiction. Each of the participating communities within Gasconade County utilizes well water as the primary source of water. These communities could experience hardship in the event of a long-term drought. **Table 3.22** provides information in regard to the percent of source that is groundwater for each jurisdiction in the county.

Table 3.22. 2018 Water Source by Jurisdiction

Jurisdiction	% of source that is groundwater
Bland	100
Gasconade	100
Hermann	100
Morrison	100
Owensville	100
Rosebud	100

Source: Missouri Dept. of Natural Resources, 2020 Census of Missouri Public Water Systems

Previous Occurrences

Table 3.23 offers Palmer Drought Severity Index data for Gasconade County between 2010 and 2019. This information exemplifies drought conditions on a monthly basis for Missouri’s Southeast sub-region within the United States.

Table 3.23. Palmer Drought Severity Index for Gasconade County, MO (2010 – 2019)

	Year									
Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Jan.	Extremely moist	Extremely moist	Mid-range	Mid-range	Moderate Drought	Moderately moist	Extremely moist	Mid-range	Moderate drought	Mid-range
Feb.	Extremely moist	Extremely moist	Mid-range	Mid-range	Moderate Drought	Moderately moist	Very moist	Mid-range	Mid-range	Moderately moist
March	Extremely moist	Extremely moist	Mid-range	Mid-range	Moderate Drought	Mid-range	Very moist	Mid-range	Mid-range	Moderately moist
April	Extremely moist	Very moist	Mid-range	Moderately moist	Mid-range	Mid-range	Moderately moist	Mid-range	Mid-range	Moderately moist
May	Extremely moist	Very moist	Mid-range	Very moist	Mid-range	Mid-range	Moderately moist	Mid-range	Mid-range	Very moist
June	Extremely moist	Very moist	Moderate drought	Very moist	Mid-range	Very moist	Mid-range	Mid-range	Mid-range	Very moist
July	Extremely moist	Mid-range	Severe drought	Mid-range	Mid-range	Extremely moist	Mid-range	Mid-range	Moderate drought	Very moist
Aug.	Extremely moist	Mid-range	Extreme drought	Mid-range	Mid-range	Extremely moist	Very moist	Mid-range	Mid-range	Extremely moist
Sept.	Extremely moist	Mid-range	Severe drought	Mid-range	Moderately moist	Very moist	Very moist	Mid-range	Mid-range	Very moist
Oct.	Extremely moist	Moderate drought	Severe drought	Mid-range	Very moist	Moderately moist	Moderately moist	Mid-range	Mid-range	Very moist
Nov.	Extremely moist	Mid-range	Severe drought	Mid-range	Very moist	Very moist	Mid-range	Mid-range	Mid-range	Very moist
Dec.	Extremely moist	Mid-range	Severe drought	Moderate drought	Moderately moist	Extremely moist	Mid-range	Moderate drought	Mid-range	Very moist

Source: <https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/psi/199901-202009>

Probability of Future Occurrence

To calculate the probability of future occurrence of drought in Gasconade County, historical climate data was analyzed. There were 40 months of recorded drought (**Table 3.24**) over a 21 year span (January, 1999 to December, 2019). The number of months in drought (40) was divided by the total number of months (252) and multiplied by 100 for the annual average percentage probability of drought (**Table 3.25**). Although drought is not predictable, long-range outlooks and predicted impacts of climate change could indicate an increase change of drought.

Table 3.24. Palmer Drought Severity Index for Gasconade County, MO (1999 – 2019)

Month	Year											
	January	February	March	April	May	June	July	August	September	October	November	December
1999										x	x	x
2000	x	x	x	x	x							
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												

Source: <https://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/zin/199901-201912>

*x indicates drought

Table 3.25. Annual Average Percentage Probability of Drought in Gasconade County, MO

Location	Annual Avg. % P of Drought
Gasconade County	15.9%

Source: NOAA National Centers for Environmental Information, Historical Palmer Drought Indices
*P = probability; see page 3.44 for definition.

Changing Future Conditions Considerations

According to the 2018 Missouri Hazard Mitigation Plan, severe drought is a natural part of Missouri’s climate and is a risk to agriculture. Future increases in evaporation rates due to higher temperatures may increase the intensity of naturally occurring droughts. Although it is believed that springs will be wetter, summer droughts are likely to be more severe. Higher evaporation and lower summer rainfall are likely to reduce river flows. The number of heavy rainfall events is predicted to increase, with the overall total rainfall amounts to remain the same. This indicates that there will be periods of heavy rainfall followed by longer periods of dry days. Higher temperatures and increased evapotranspiration increase the likelihood of drought and its negative impact on agriculture.¹⁸

Vulnerability

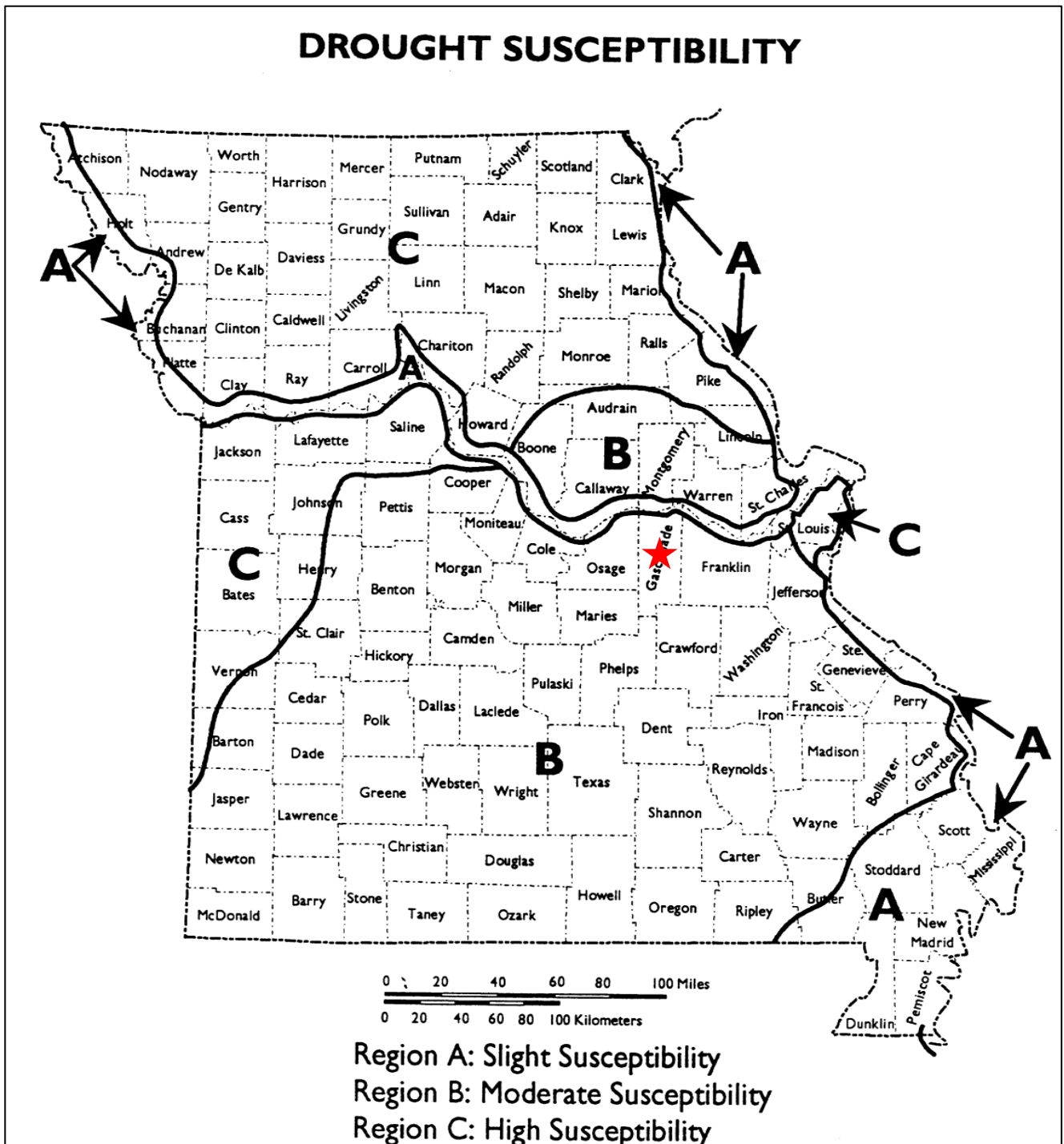
Vulnerability Overview

Data was obtained from the 2018 Missouri State Hazard Mitigation Plan for the drought vulnerability analysis. **Table 3.26** 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. Gasconade County is determined as having low to medium vulnerability to crop loss (**Table 3.27**) as a result of a drought. Additionally, SEMA has divided the State into 3 regions in regards to drought susceptibility (**Figure 3.20**). Gasconade 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 irrigation¹⁹.

¹⁸ 2018 Missouri State Hazard Mitigation Plan

¹⁹ 2018 Missouri State Hazard Mitigation Plan

Figure 3.20. Drought Susceptibility in Missouri



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

Table 3.26. Ranges for Drought Vulnerability Factor Ratings

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

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.27. Vulnerability of Gasconade 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
2	\$1,759,655	\$195,517	1	\$9,253,000	1	10.72	5	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 hazards²⁰.

Impact of Future Development

Impacts of drought on future development within Gasconade County would be negligible. Population projections as provided by the Missouri Office of Administration suggest that Gasconade County will increase by approximately 31 individuals within the next 10 years²¹. Moreover, with an increasing population, water use and demand would be expected to increase as well; potentially straining the water supply systems. Bland anticipates new water infrastructure within the next 5 years. However, 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.

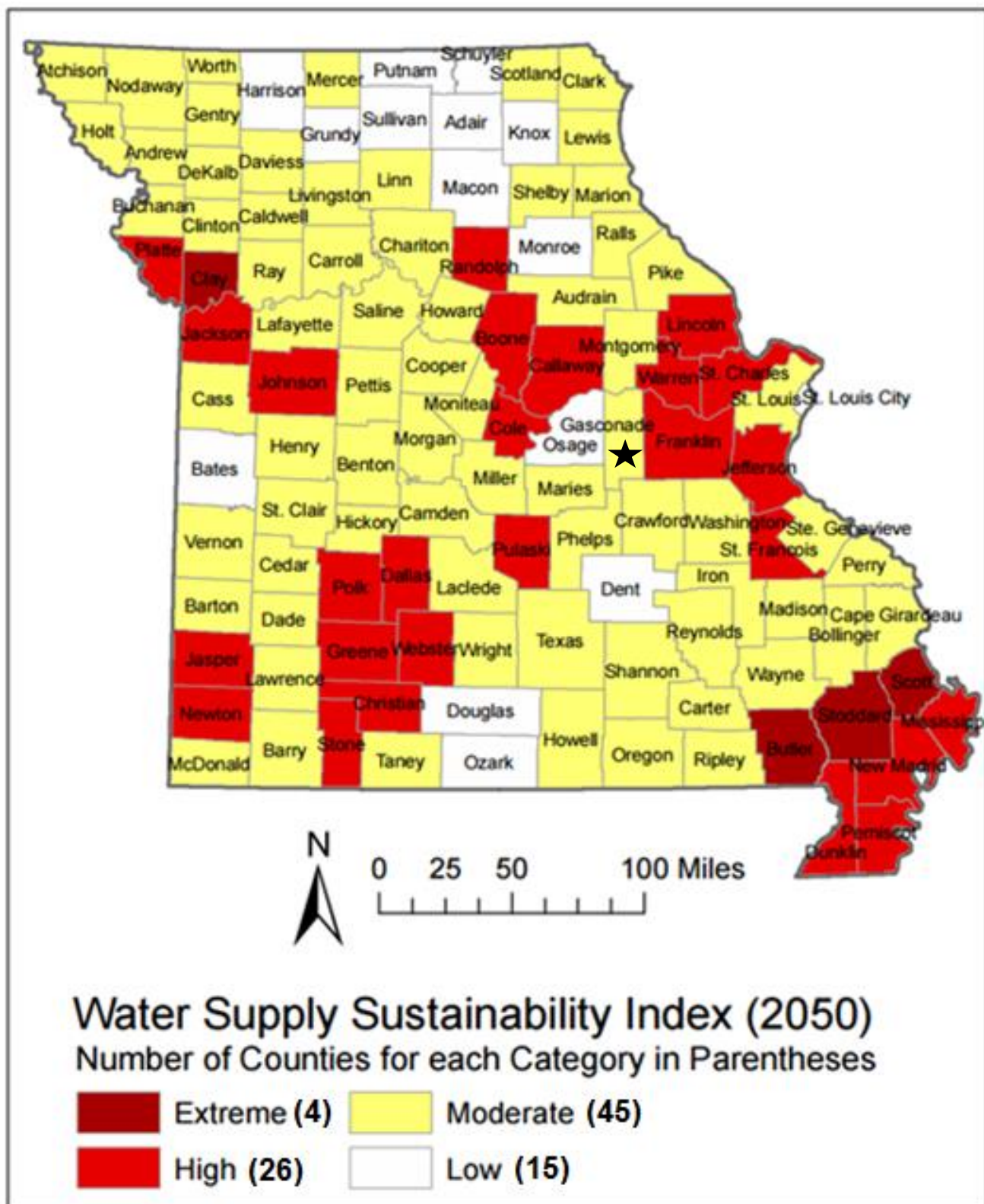
²⁰ 2015 Boone County Hazard Mitigation Plan

²¹ Missouri Office of Administration <http://oa.mo.gov/budget-planning/demographic-information/population-projections/2000-2030-projections>

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. Gasconade County is predicted to experience moderate water shortages as a result of global warming (**Figure 3.21**) by the year 2050.

Figure 3.21. Water Supply Sustainability Index (2050) with Climate Change Impacts



Source: Natural Resources Defense Council (NRDC), Climate Change, Water, and Risk
 *Black star indicates Gasconade County

Hazard Summary by Jurisdiction

The variations between jurisdictions are non-existent to minimal. Gasconade County and the communities of Bland, Gasconade, Hermann, Morrison, Owensville, and Rosebud 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 Gasconade County is considered low-moderate risk. Climate change predictions also suggest low-moderate risks by the year 2050. Gasconade County has a strong 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.

3.4.3 Earthquakes

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, http://earthquake.usgs.gov/hazards/products/conterminous/2014/HazardMap2014_lg.jpg;
- Impact of Earthquakes on the Central USA 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, <http://www.igsb.uiowa.edu/Browse/quakes/quakes.htm>;
- Probability of magnitude 5.0 or greater within 100 Years, United States Geological Survey, <https://geohazards.usgs.gov/eqprob/2009/index.php>

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 Gasconade 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 earthquake²².

Geographic Location

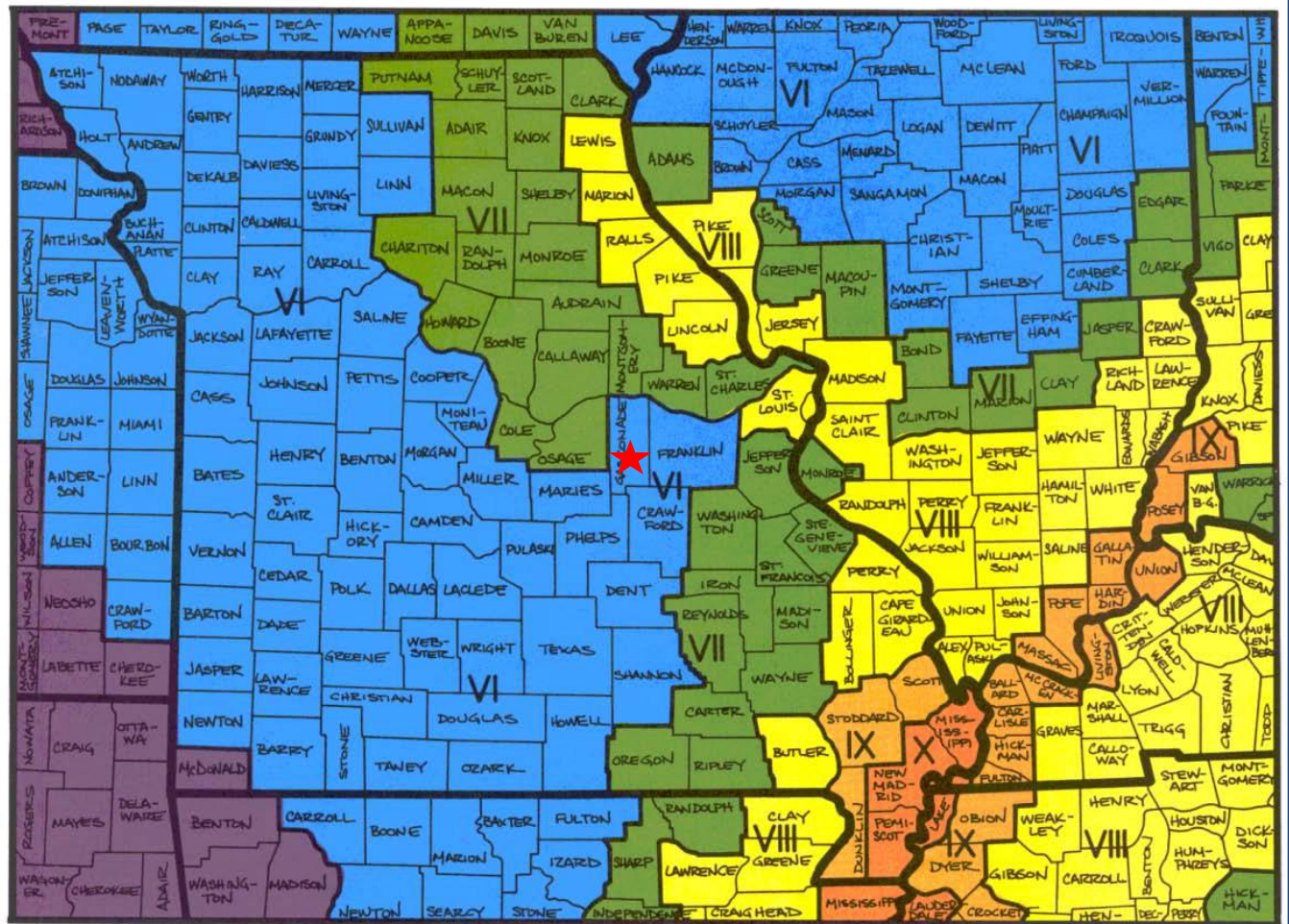
There are eight earthquake source zones in the Central United States, one of which is located within the state of Missouri—the New Madrid Fault. Other seismic zones, because of their close proximity, also affect Missourians. These are the Wabash Valley Fault, Illinois Basin, and the Nemaha Uplift. The 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 3.22 depicts impact zones for a magnitude 7.6 earthquake along the New Madrid Fault along with associated Modified Mercalli Intensities. Gasconade County is indicated by a red star.

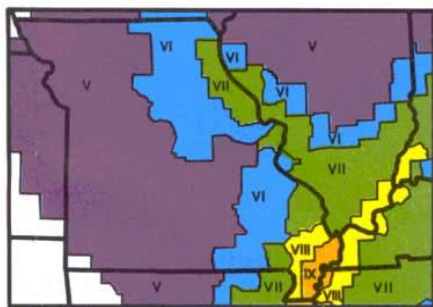
²² Missouri Department of Natural Resources, Facts about the New Madrid Seismic Zone

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, Gasconade County would experience a Modified Mercalli Intensity of V (**Figure 3.23**). This intensity is categorized as being almost felt by everyone. 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. Additionally, in the occurrence of 7.6 and 8.6 magnitude earthquakes; the county would experience Modified Mercalli Intensities of VI and VII respectively. There will 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 3.23** and **Table 3.28** further define Richter Scale intensities.

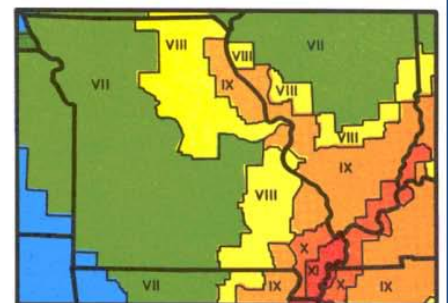
Figure 3.22. Impact Zones for Earthquake Along the New Madrid Fault



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.



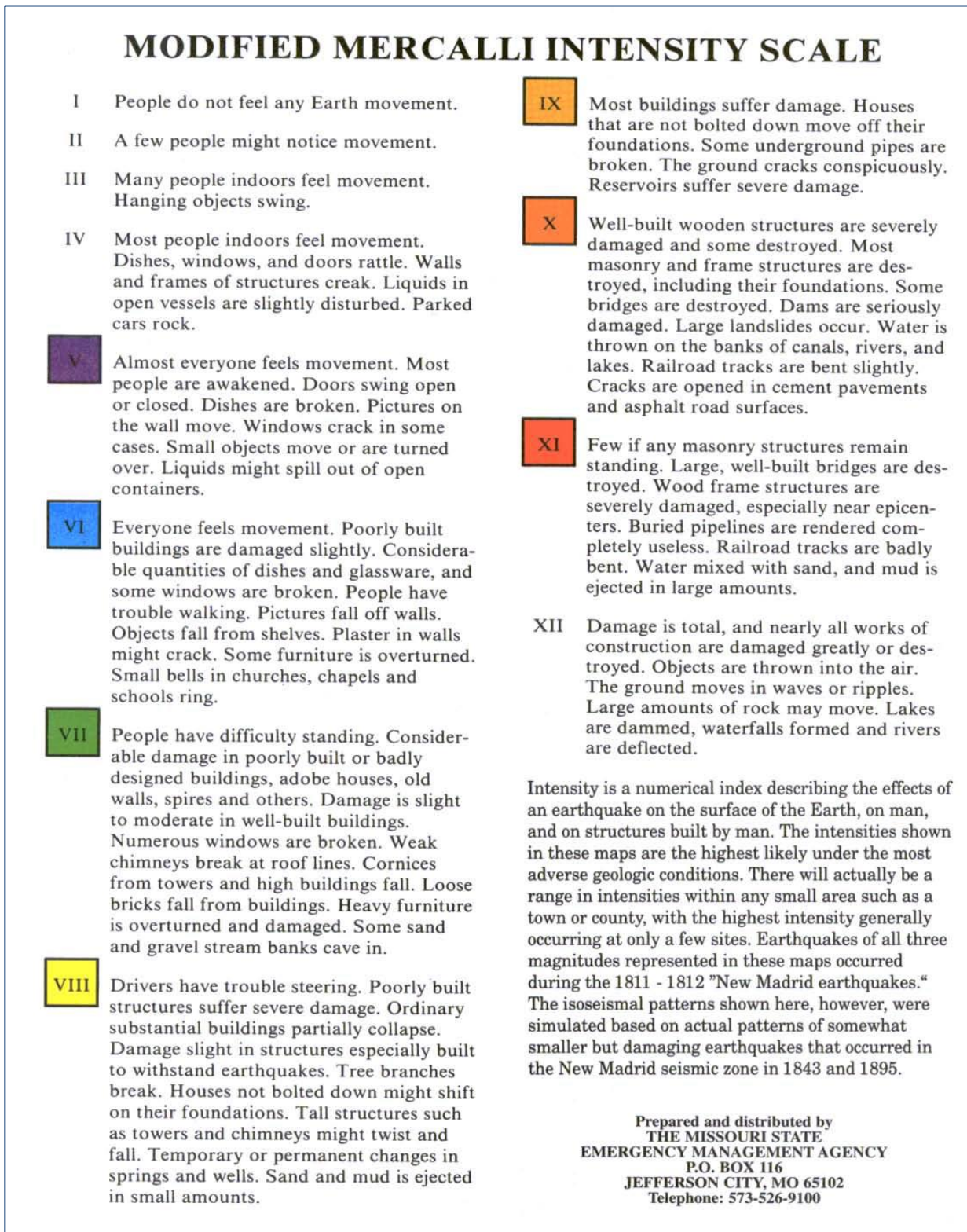
This map shows the highest projected Modified Mercalli intensities by county from a potential magnitude - 6.7 earthquake whose epicenter could be anywhere along the length of the New Madrid seismic zone.



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; *Red star indicates Gasconade County

Figure 3.23. Projected Earthquake Intensities



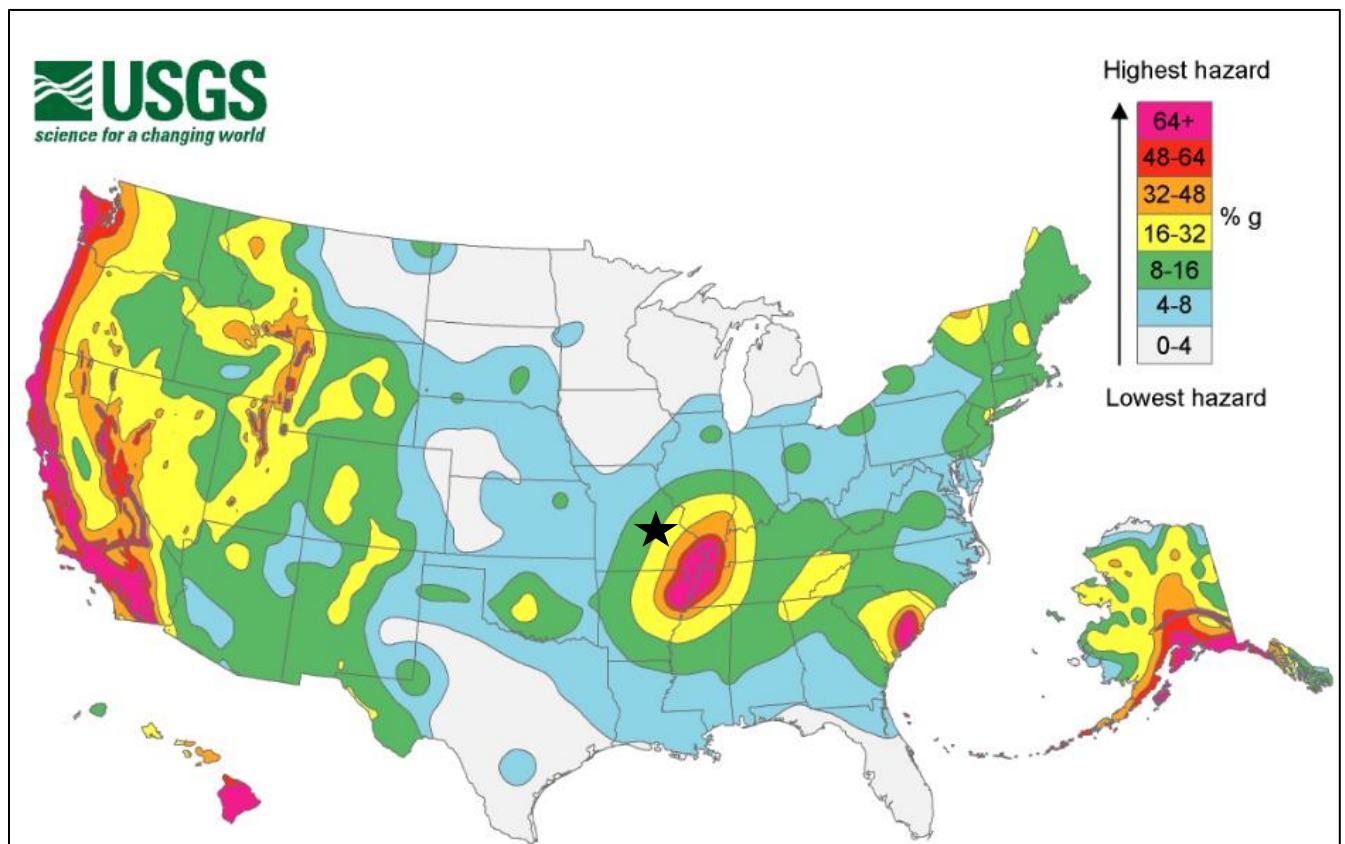
Source: sema.dps.mo.gov

Table 3.28. 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 3.24 illustrates the seismicity in the United States. A black star indicates the location of Gasconade 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 3.24. United States Seismic Hazard Map



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

Strength/Magnitude/Extent

The extent or strength 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)²³.

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

²³ Measuring the Size of an Earthquake, https://www.usgs.gov/fags/how-are-earthquakes-recorded-how-are-earthquakes-measured-how-magnitude-earthquake-determined?qt-news_science_products=0#qt-news_science_products

the river. High river banks caved in, sand bars gave way, and entire islands disappeared. The violence of 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 was 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 statesⁱⁱ.

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 buildings²⁴.

Probability of Future Occurrence

Gasconade County has reported a total of zero earthquakes since 1931. The County, located in east central Missouri, a good distance from the southeast corner of the state that has the potential for moderate damage should a significant earthquake occur.

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.

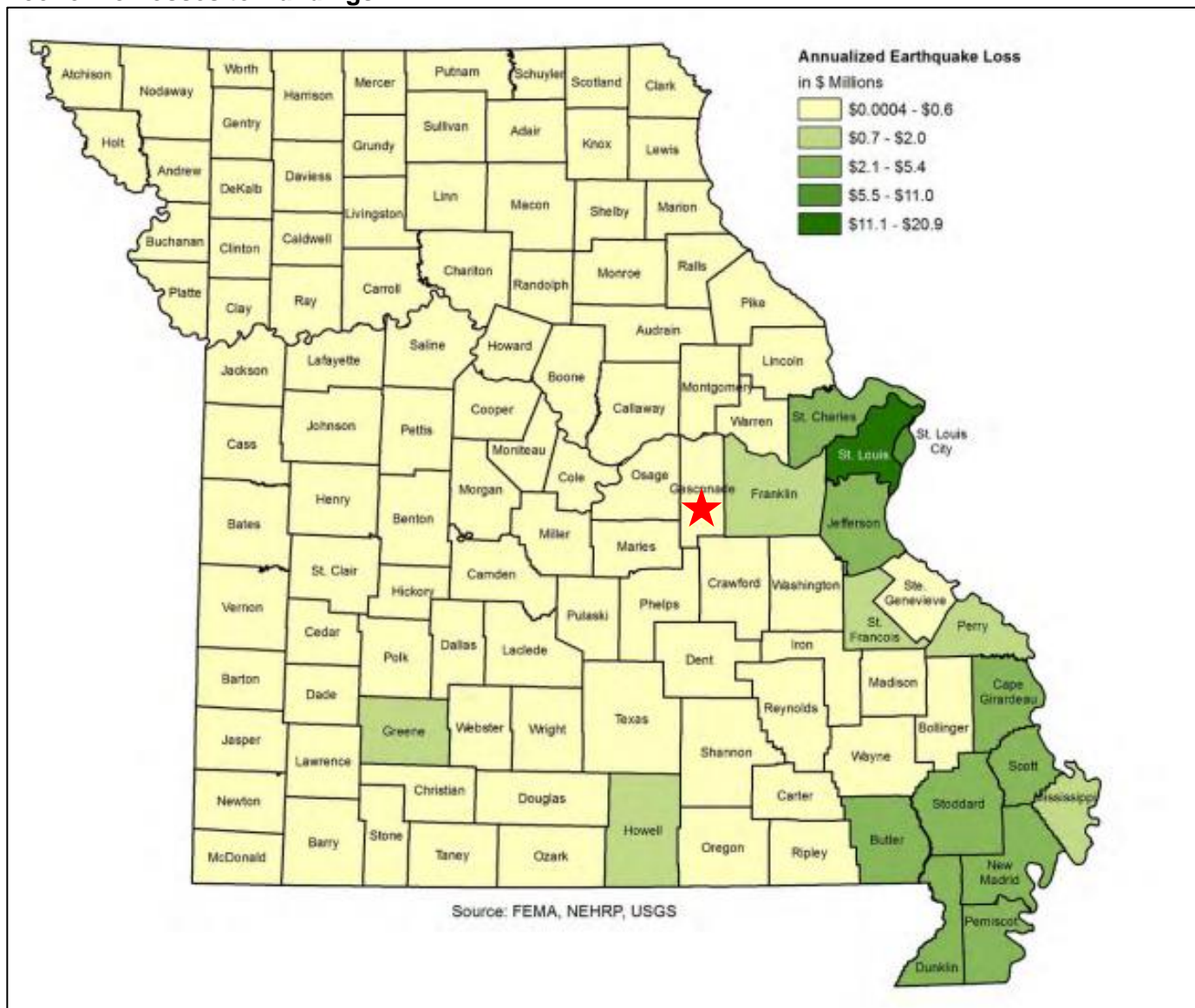
Annualized loss is the maximum potential annual dollar loss resulting from eight return periods (100, 200, 500, 750, 1,000, 1,500, 2,000, and 2,500 years) averaged on a ‘per year’ basis²⁵. This is the scenario that FEMA uses to compare relative risk from earthquakes and other hazards at the county level nationwide. The Hazus earthquake loss estimation is depicted in **Figure 3.25** which shows annualized loss scenario direct economic losses to buildings. In this scenario, the annualized earthquake loss for buildings in Gasconade County in any one year is estimated to be \$4,000 to \$600,000. **Table 3.29** provides information on total estimated losses, estimated losses per capita and loss ratio. This results in the county being ranked 49th 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.²⁶

²⁴ Missouri State Hazard Mitigation Plan 2018

²⁵ 2018 Missouri State Hazard Mitigation Plan

²⁶ Ibid

Figure 3.25. HAZUS-MH Earthquake Loss Estimation: Annualized Loss Scenario –Direct Economic Losses to Buildings.



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

Table 3.29. HAZUS-MH Earthquake Loss Estimation-Gasconade County: Annualized Loss Scenario

Total Losses in \$ Thousands	Loss Per Capita, In \$ Thousands	Loss Ratio in \$ Per Million	Statewide Ranking for Expected Losses
\$114	\$0.0075	\$60	49th

Source: Hazus 2.1

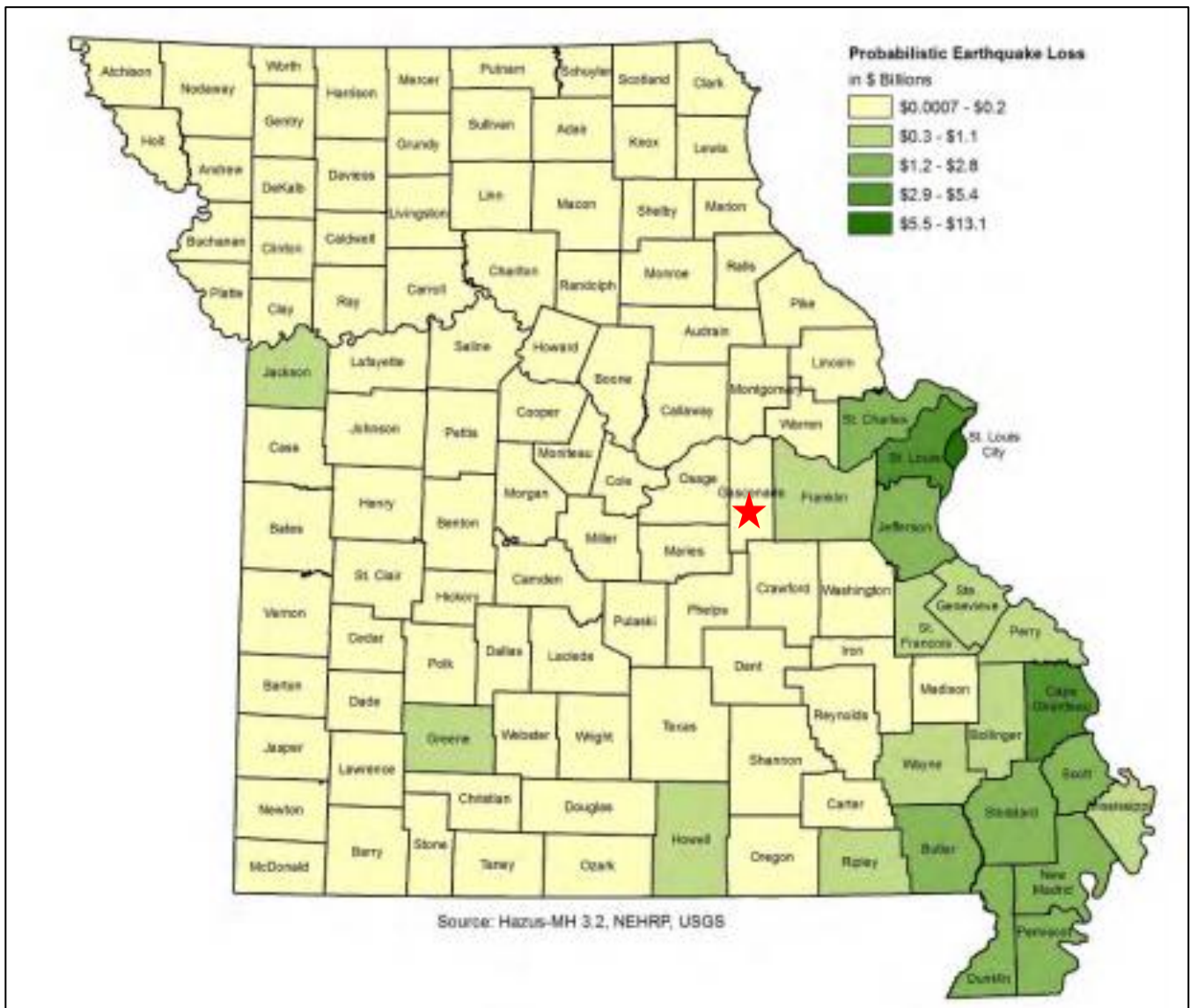
*All \$ values are in thousands

**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

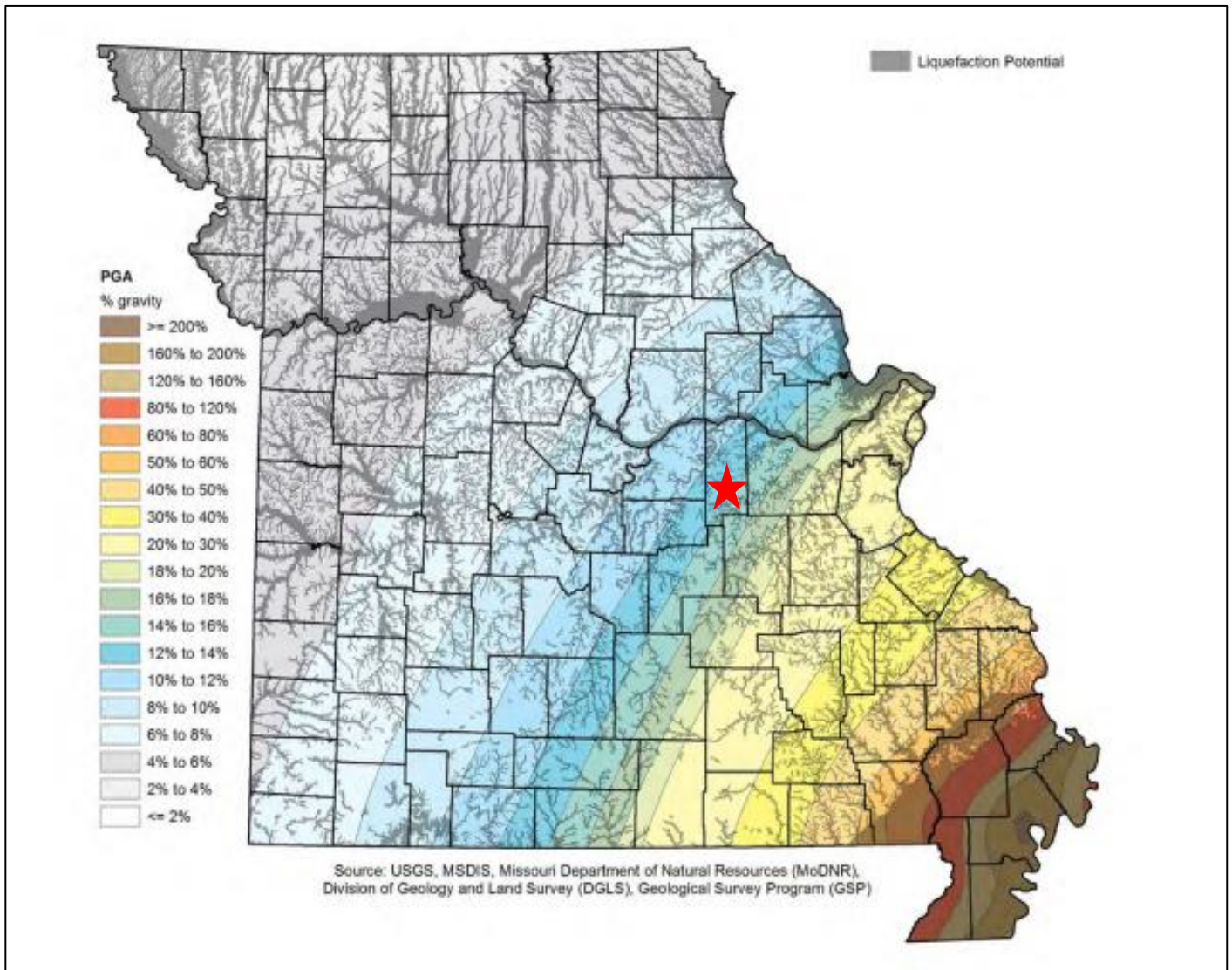
hazard shaking grids developed by the U.S. Geological Survey (USGS) for the National Seismic Hazard Maps that are included with HAZUS-MH. The USGS updated this mapping in 2014. **Figure 3.26** illustrates direct economic loss to buildings. Gasconade County is anticipated to lose between \$700,000 and \$200,000,000 in a 50 year scenario. Moreover, in the same event the county is estimated to experience between 3.1 percent and 7 percent loss (damage) of the total. **Figure 3.27** 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. Gasconade County is estimated to have peak ground acceleration between 10 percent and 18 percent.

Figure 3.26. 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 Gasconade County

Figure 3.27. Hazus Earthquake 2% Probability of Exceedance in 50 Years – Ground Shaking and Liquefaction Potential



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

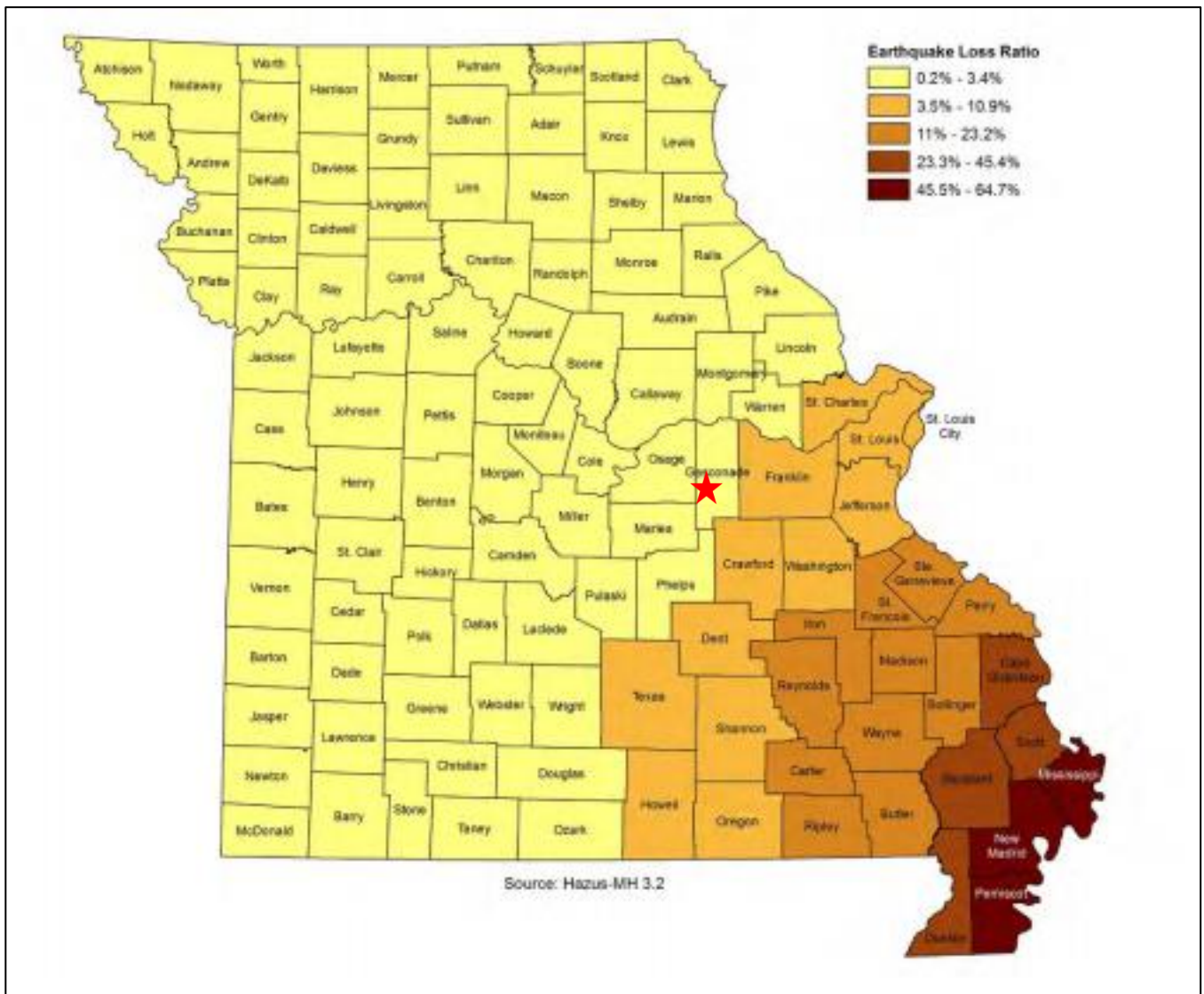
Figure 3.28 depicts a map of the modeled earthquake impacts by county based on building losses, including structural and nonstructural damage, content and inventory loss, and wage and income loss. Gasconade County shows a loss ratio of 0.2 percent to 3.4 percent. **Figure 3.28** depicts loss ratio by 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 3.30** provides information on estimated direct economic losses for Gasconade County, including structural, nonstructural, inventory, contents, relocation costs, capital related loss, wages and rental income loss. According to the 2018 Missouri Hazard Mitigation Plan, Gasconade County's loss ratio is 2.48 percent. Gasconade County ranks 47th in the state for direct economic losses in this scenario.

Table 3.30. HAZUS-MH Earthquake Loss Estimation 2% Probability of Exceedance in 50 Years Scenario Direct Economic Losses Results Summary for Gasconade 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
\$12,743	\$34,070	\$12,792	\$382	2.48	\$8,034	\$2,282	\$3,146	\$2,855	\$76,305

Source: 2018 Missouri Hazard Mitigation Plan
 *All values in thousands

Figure 3.28. 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 Gasconade 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.²⁷

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. Infrastructure in the region such as highways, bridges, pipelines, communication lines and railroads might suffer damage, which would adversely affect Gasconade 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 2017 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 \$149 per year. In high risk counties the increases have been more substantial – from \$57 per year in 2000 to \$405 per year in 2017. The number of residences covered by earthquake insurance has dropped over the last 15 years – likely due to the increased cost of premiums. In 2018 the percentage of residential policies with earthquake coverage in Gasconade County was 29.8 percent with the average cost of coverage at \$105 per year.²⁸

Potential Losses to Existing Development

Gasconade County's buildings are suggested to lose between \$4,000 and \$600,000 in any one year, thus ranking the County as being ranked as 45th in the state for total expected losses. In the HAZUS

²⁷ Missouri State Hazard Mitigation Plan 2018

²⁸ The State of Earthquake Coverage Report <https://insurance.mo.gov/earthquake/>

scenario illustrated in Figure 3.28, Phelps County has a loss ratio of .2 percent to 3.4 percent. The loss ratio indicates impacts on local economies in the event of an earthquake, and the difficulty for jurisdictions to recover from said event. According to the 2018 Missouri State Hazard Mitigation Plan, Phelps would suffer total building losses of \$700,000 - \$200,000,000 in a two percent HAZUS-MH 50-year scenario.

Impact of Previous and Future Development

Future development at risk includes new water infrastructure development in Bland. Future development will not increase the risk of an earthquake, rather contributing to the overall exposure of damaged property. 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 jurisdiction²⁹.

Hazard Summary by Jurisdiction

Since earthquake intensity is not likely to vary greatly throughout the planning area, the risk will be the same throughout. Gasconade County is not near the New Madrid Shock 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 3.31** depicts the percent of residences built prior to 1939 in Gasconade 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. However, all school districts indicated that school facilities in the county were built later than 1939. If a major earthquake should occur, Gasconade County would likely be impacted by the number of refugees traveling through the area seeking safety and assistance.

The city of Hermann has portions of Highways 19, 100, Gutenberg Natural Gas, Kit Bond Bridge, Union Pacific Railroad, and the Industrial Park Well that could be impacted by an earthquake. Critical facilities including the Police Department, fire stations, Hermann Area District Hospital, ambulance building, Southwest Medical Clinic may also be impacted. High potential loss facilities including three substations, Hermann City Hall, Victorian Manor, Frene Valley, and Little Bearcats Daycare may also be impacted. The city of Morrison City Hall Building and volunteer fire department could be impacted by an earthquake.

Table 3.31. Percent of Gasconade County Residences Built Prior to 1939

Jurisdiction	Number of Residences Built Prior to 1939	% of Residences Built Prior to 1939
Unincorporated Gasconade County	1,195	23.8%
Bland	60	18.8%

²⁹ 2015 Boone County Hazard Mitigation Plan

Jurisdiction	Number of Residences Built Prior to 1939	% of Residences Built Prior to 1939
Gasconade	53	34.6%
Hermann	274	23.3%
Morrison	25	56.8%
Owensville	279	22.0%
Rosebud	33	16.1%

Source: U.S. Census Bureau, 2015-2019 5-Year American Community Survey

Problem Statement

In a worst case scenario, the county is expected to encounter \$76,305,000 in total economic losses to buildings. Morrison has a higher risk of damage to buildings due to over 56 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.

3.4.4 Extreme Temperatures

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
- 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, www.weather.gov/os/heat/index.shtml ;
- Wind Chill chart, National Weather Service, http://www.nws.noaa.gov/om/cold/wind_chill.shtml ;
- Daily temperatures averages and extremes, High Plains Regional Climate Summary,
http://www.hprcc.unl.edu/data/historical/index.php?state=ia&action=select_state&submit=Select+State, <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/1bPk0jgF9ofwQLnTL9N0u-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 3.29** 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 3.29** - 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

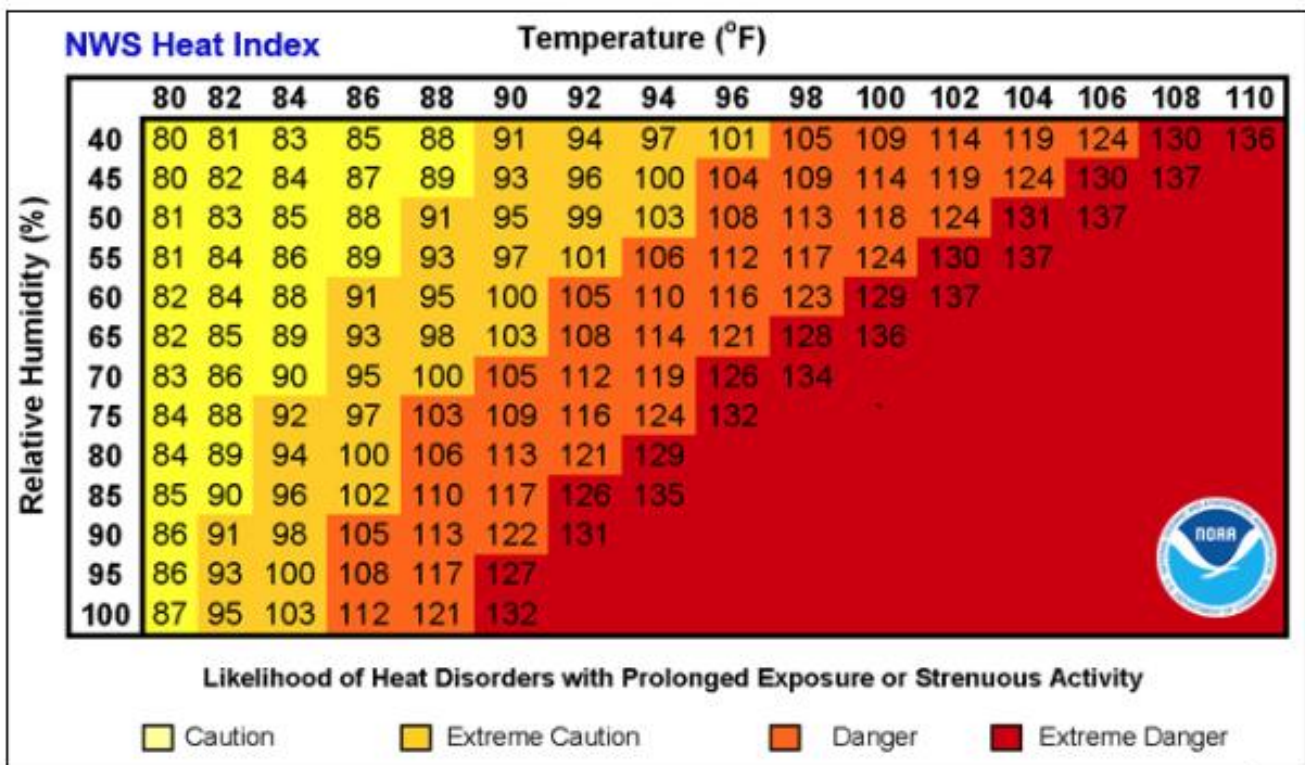
increase HI values by up to 15 degrees Fahrenheit. Also, strong winds, particularly with very hot, dry air, can be extremely dangerous.

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 3.29. Heat Index (HI) Chart



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

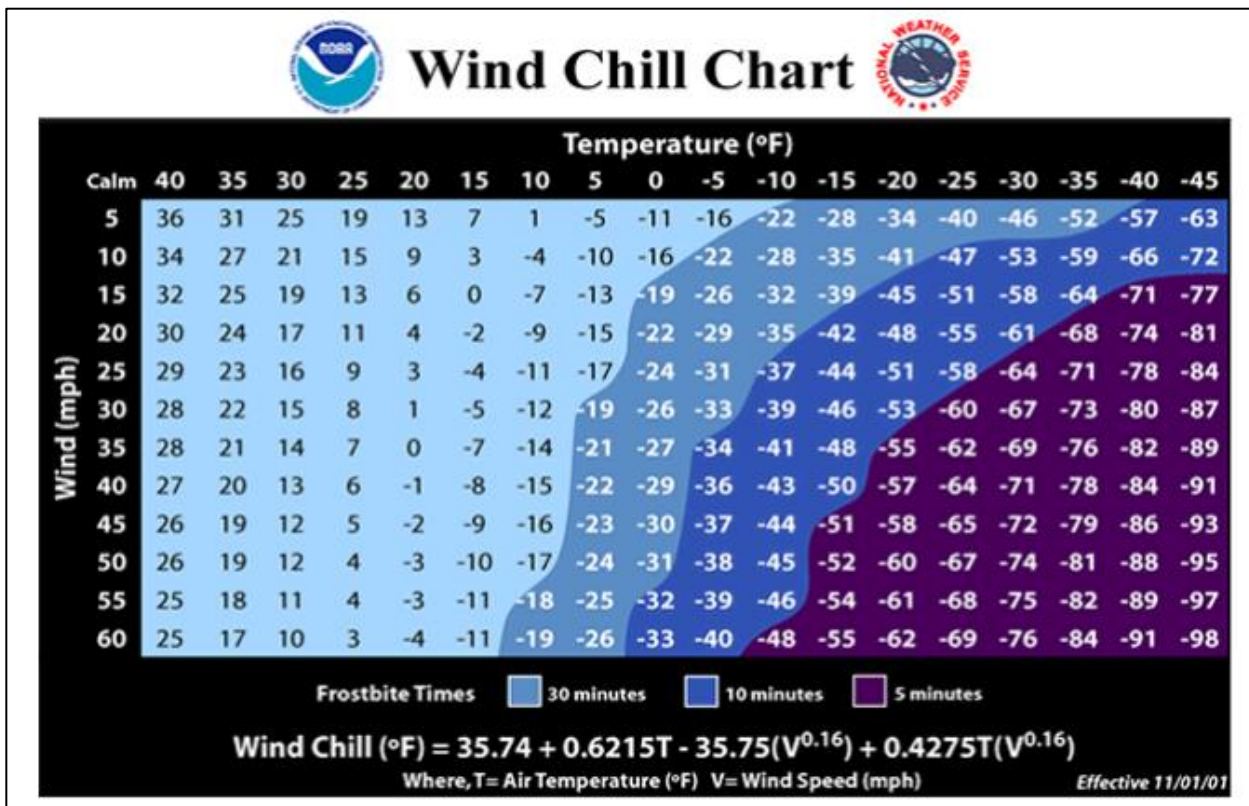
Note: Exposure to direct sun can increase Heat Index values by as much as 15°F. The shaded zone above 105°F corresponds to a HI that may cause increasingly severe heat disorders with continued exposure and/or physical activity.

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 3.30**, 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 3.30. 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 Gasconade 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 night time minimum

Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

The NWS Wind Chill Temperature (WCT) index 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. **Figure 3.30** 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.

Extreme heat can cause stress to crops and animals. However, according to the NOAA Storm Events Data Base, there were no reported agricultural losses for Gasconade County during that 20 year time period. **Table 3.32** displays data specifically on agricultural losses due to extreme heat from the USDA Risk Management website. 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.

Table 3.32. Gasconade County Heat Related Crop Indemnity Payments (1999-2019)

Year	Number of Payments	Total
1999	1	\$149.00
2011	4	\$29,339.50
2012	5	\$6,040.53
2014	2	\$9,480.00
2016	2	\$1,276.00
2018	1	\$709.50
TOTAL	15	\$46,544.53

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

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 Gasconade 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 3.33 lists typical symptoms and health impacts due to exposure to extreme heat.

Table 3.33. Typical Health Impacts of Extreme Heat

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

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index.shtml

The National Weather Service has an alert system in place (advisories or warnings) when the Heat Index is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. A common guideline for issuing excessive heat alerts is when for two or more consecutive days: (1) when the maximum daytime Heat Index is expected to equal or exceed 105 degrees Fahrenheit (°F); and the night time minimum Heat Index is 80°F or above. A heat advisory is issued when temperatures reach 105 degrees and a warning is issued at 115 degrees.

Previous Occurrences

Table 3.34 provides data in relation to record heat events between 1999 and 2019 in Gasconade County. Maximum heat index values and temperatures are shown for each extreme temperature event. Fortunately, there was only one injury and zero fatalities recorded during this time. In addition, **Figure 3.31** illustrates heat related deaths by county in Missouri between 1980 and 2016.

Table 3.34. NCEI Gasconade County Heat Events Summary (1999 – 2019)

Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)
7/18/1999	14	0	0	90-100	105-115
7/7/2001	3	0	0	90+	105-110
7/17/2001	1	0	0	90+	110-115
7/21/2001	4	0	0	90+	105-115
7/29/2001	3	0	0	90+	105-110
8/1/2001	1	0	0	90+	105
8/7/2001	3	0	0	90+	102-110

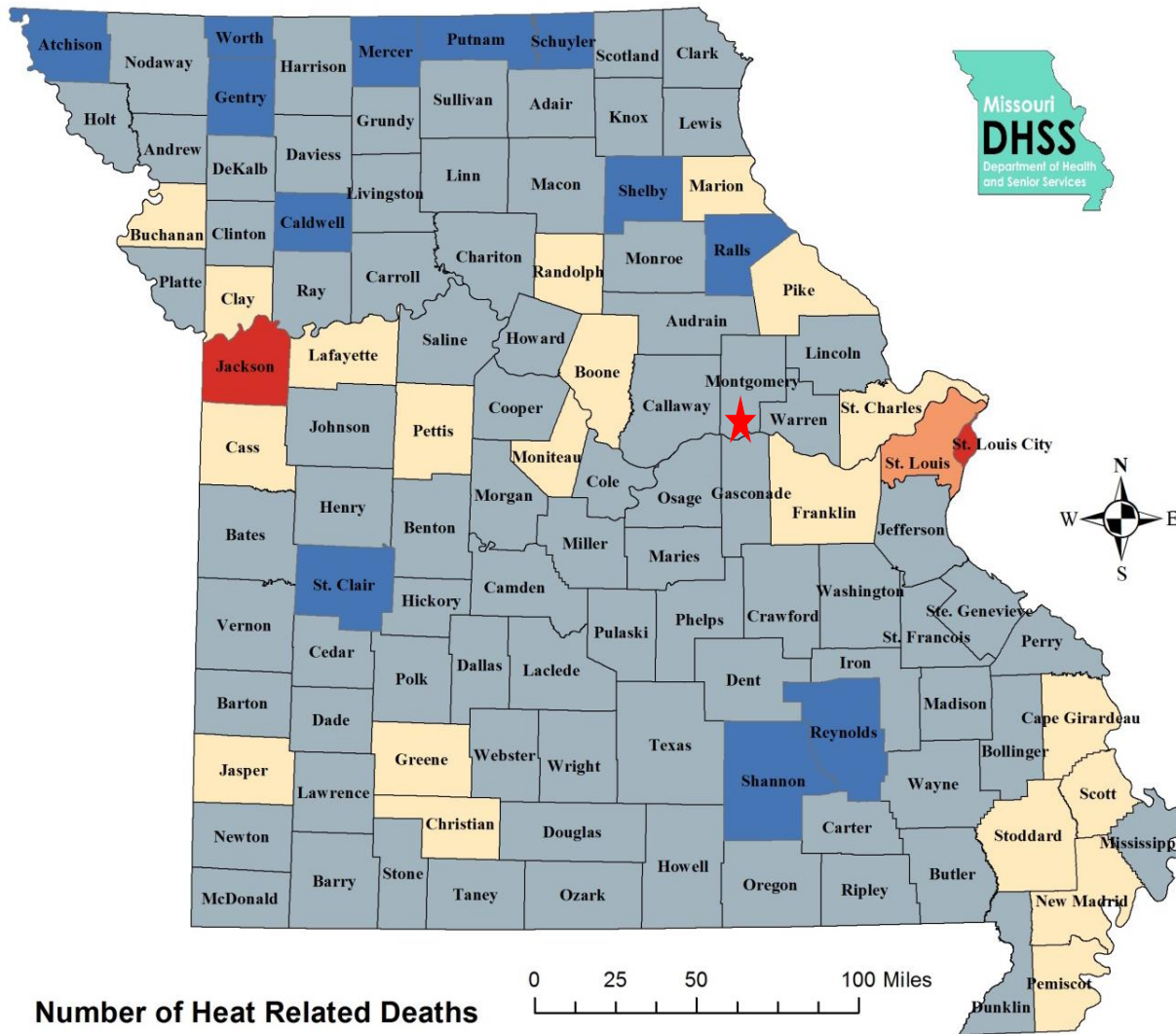
Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)
Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)
8/21/2001	2	0	0	90-100	105-110
7/8/2002	2	0	0	90+	105-110
7/20/2002	3	0	0	90+	105-115
7/26/2002	6	0	0	90+	105-115
8/1/2002	7	0	1	101	-
8/15/2003	7	0	0	90-100	-
8/24/2003	5	0	0	90-100	105-110
7/20/2004	3	0	0	90+	105-110
7/20/2005	1	0	0	100+	105-120
7/17/2006	4	0	0	90-100	105-110
7/29/2006	3	0	0	100	105-110
8/1/2006	2	0	0	100	-
7/1/2011	3	0	0	90+	105-110
7/10/2011	3	0	0	90-100	-
8/6/2011	2	0	0	90+	105-110
8/31/2011	1	0	0	100+	105-110
9/1/2011	3	0	0	104	105
8/31/2013	1	0	0	100	105-110

Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)
9/1/2013	1	0	0	100	105-110
8/20/14	7	0	0	90-100	105-110
7/12/2015	1	0	0	90-100	110
7/17/2015	1	0	0	90-100	105-110
7/25/2015	1	0	0	90-100	105
Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)	Heat Index Values (F°)
7/29/2015	1	0	0	90-100	105-110
6/15/2016	1	0	0	90-100	105
6/22/2016	1	0	0	90-100	105
7/18/2016	7	0	0	90-100	110
7/18/2017	6	0	0	90-110	105-110
Total	114	0	1	-	-

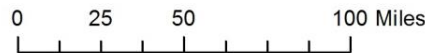
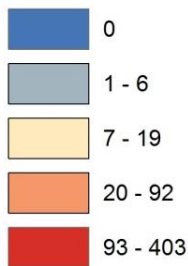
Source: <http://www.ncdc.noaa.gov/stormevents/>

Figure 3.31. Heat Related Deaths in Missouri 2000 - 2016

Number of Heat Related Deaths in Missouri by County** for 1980 - 2016^



Number of Heat Related Deaths



** County of death may differ from county of residence

^ Data for 2016 is preliminary and subject to change

Total number of deaths from 1980 to 2016 was 1,272

Includes 18 non-Missouri residents who died in Missouri

Source: Bureau of Environmental Epidemiology

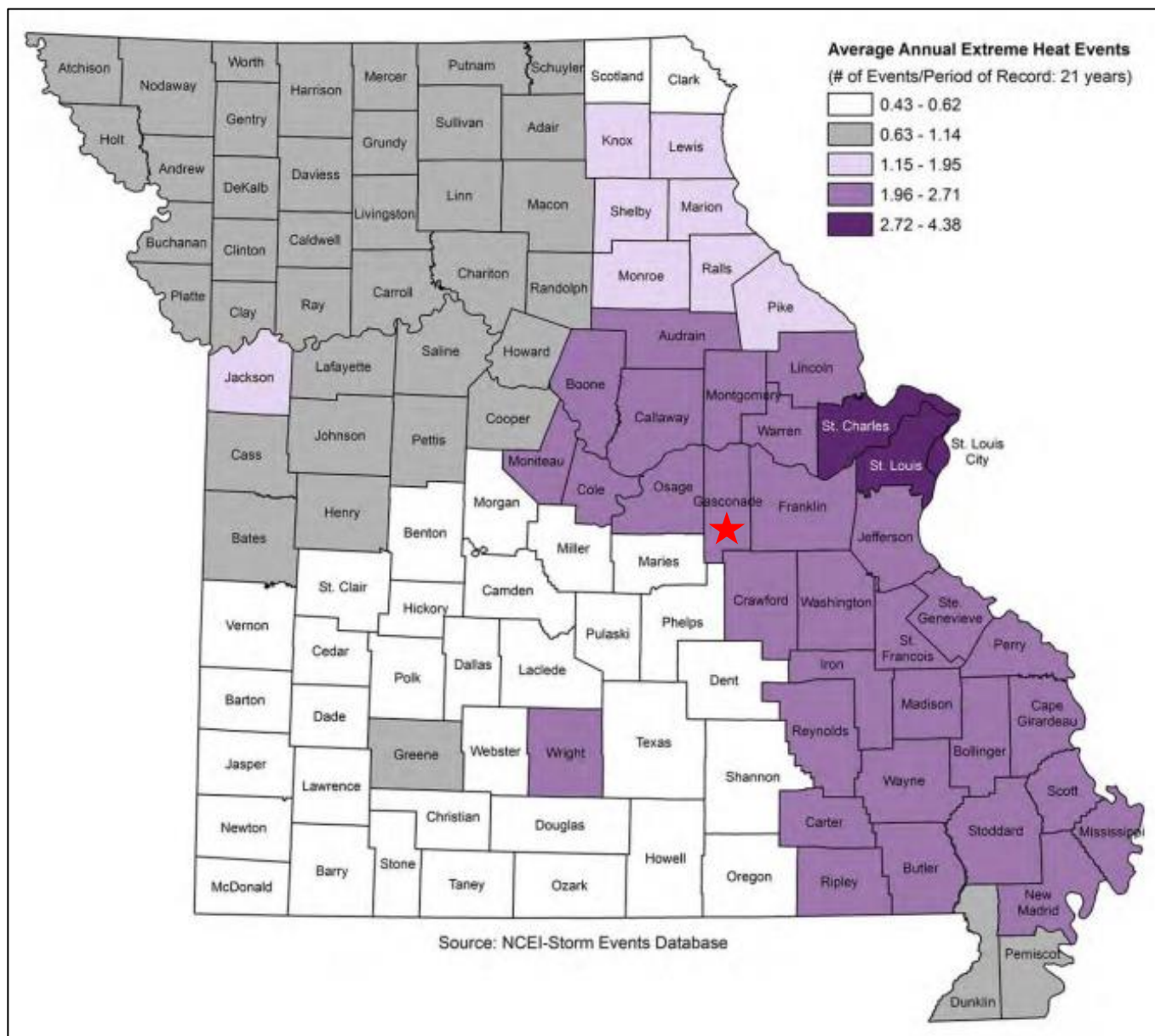
Date: 6/19/2017

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

Probability of Future Occurrence

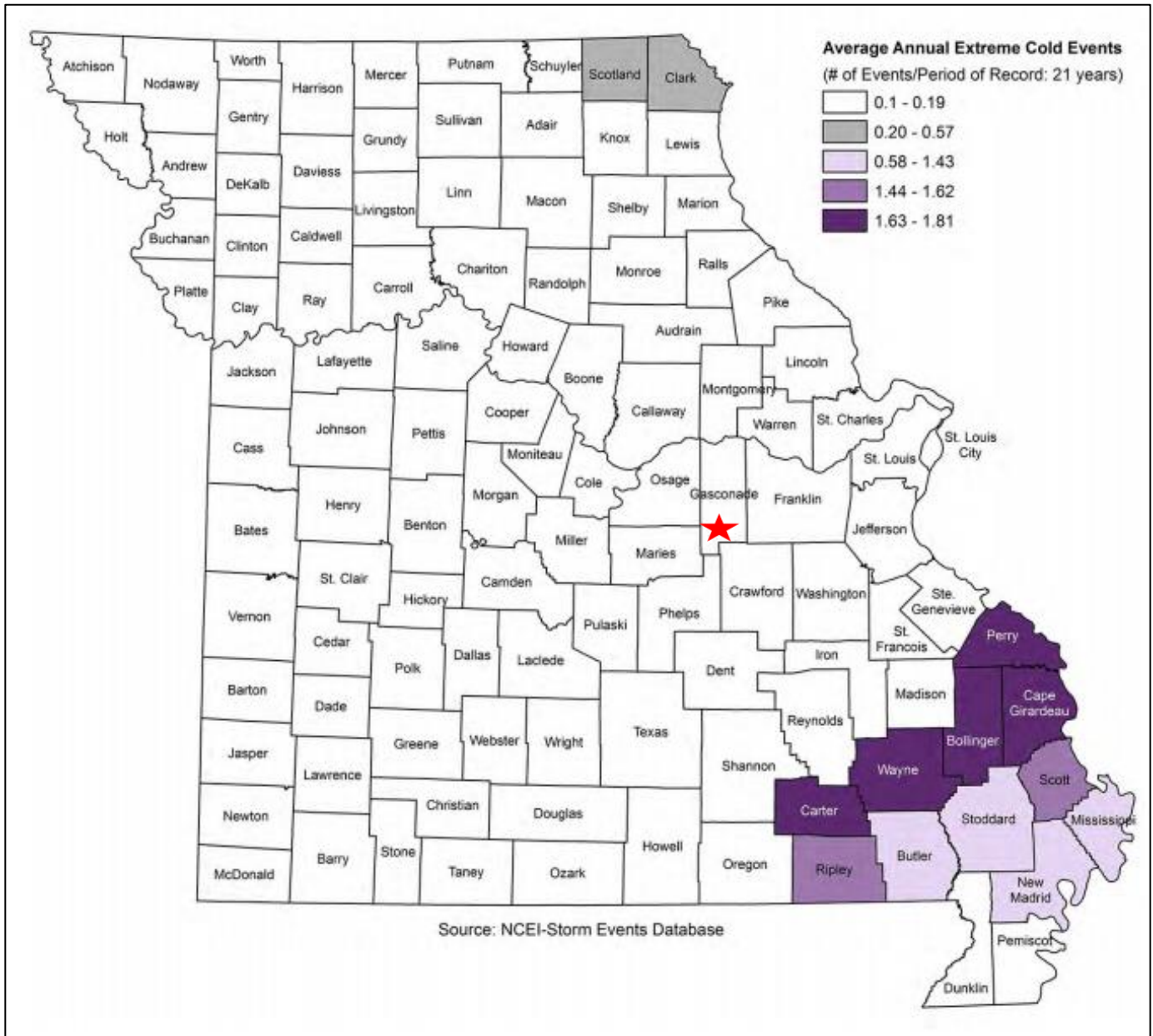
Figure 3.32 illustrates the average annual occurrence for extreme heat statewide. Based on information provided in the 2018 Missouri State Hazard Mitigation Plan, Gasconade County has an average of 1.96 to 2.71 events per year based on data from 21 years. **Figure 3.33** illustrates the average annual occurrence for extreme cold statewide. Gasconade 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 3.32. Average Annual Occurrence for Extreme Heat



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

Figure 3.33. Average Annual Occurrence for Extreme Cold



Source: 2018 Missouri Hazard Mitigation Plan, *Red star indicates Gasconade 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 21st 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

Gasconade County, along with the rest of the state of Missouri is vulnerable to extreme heat and cold events. **Table 3.35** 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 3.40**). People who are overweight, ill or on certain medication can also be more vulnerable to high temperatures. The city of Bland has an estimated 31.0 percent of individuals are 65 or older. The city of Gasconade had the lowest number of older residents with 9.9 percent aged 65 and over. 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 3.35. Typical Health Impacts of Extreme Heat

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

Source: National Weather Service Heat Index Program, www.weather.gov/os/heat/index/shtml

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 3.36 shows the population, percent of population over 65 and social vulnerability index data for

Gasconade County overall.

Table 3.36. Population, Percent of Population Over 65 and SOVI Data for Gasconade County

County	Total Population Rating	Percentage of Population Over 65	Percent of Population Over 65 Rating	SOVI Ranking	SOVI Rating
Gasconade	3	21	4	Medium Low	2

Source: 2018 Missouri Hazard Mitigation Plan

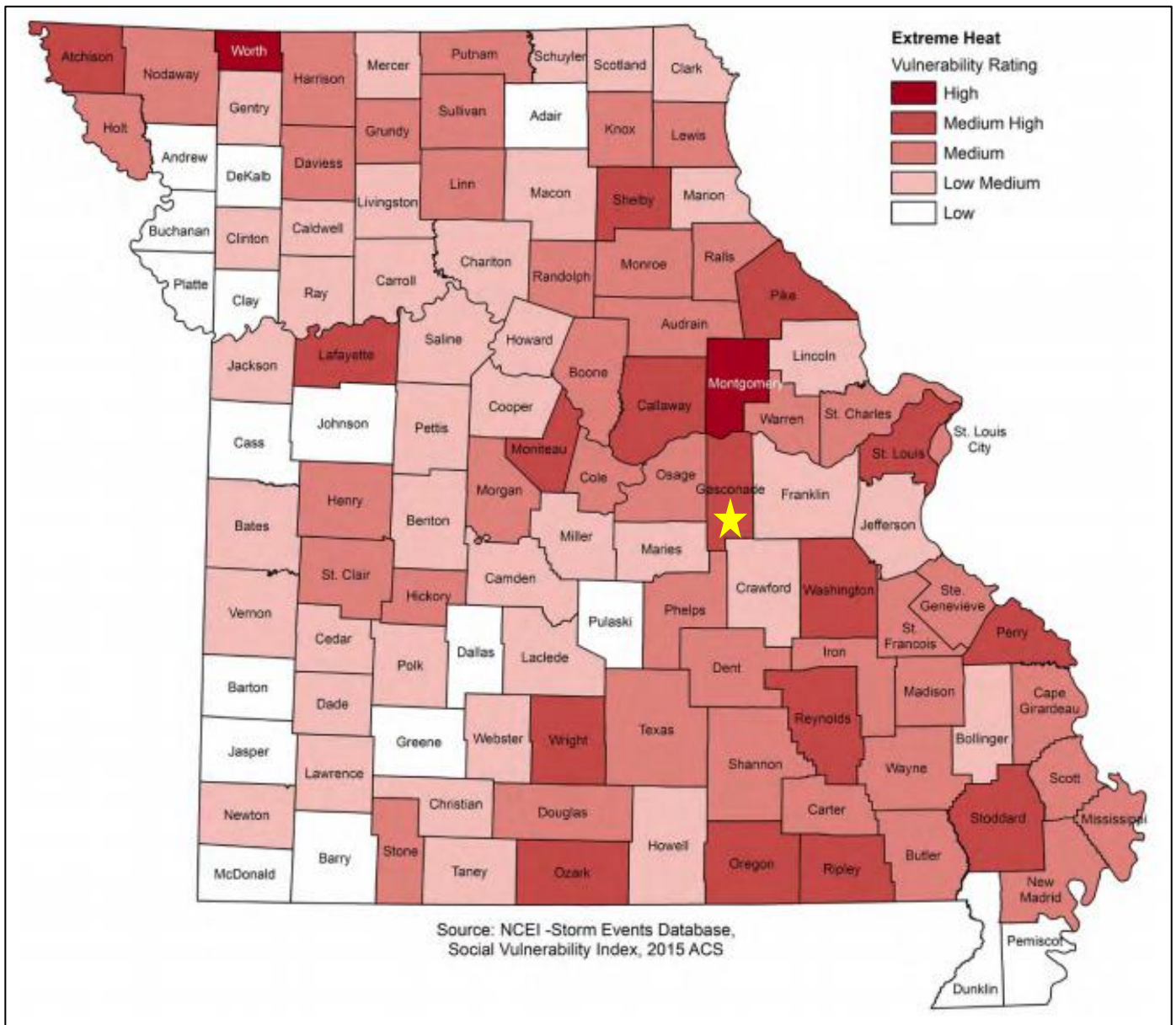
Table 3.37 illustrates the likelihood of occurrence and overall vulnerability rating for extreme temperatures for Gasconade County. **Figure 3.34** and **Figure 3.35** provide a vulnerability summary for extreme heat and extreme cold, respectively. Gasconade County has Medium-High vulnerability for extreme heat and Medium vulnerability for extreme cold.

Table 3.37. Gasconade 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
52	2.48	4	13	Medium High	2	0.10	1	10	Medium

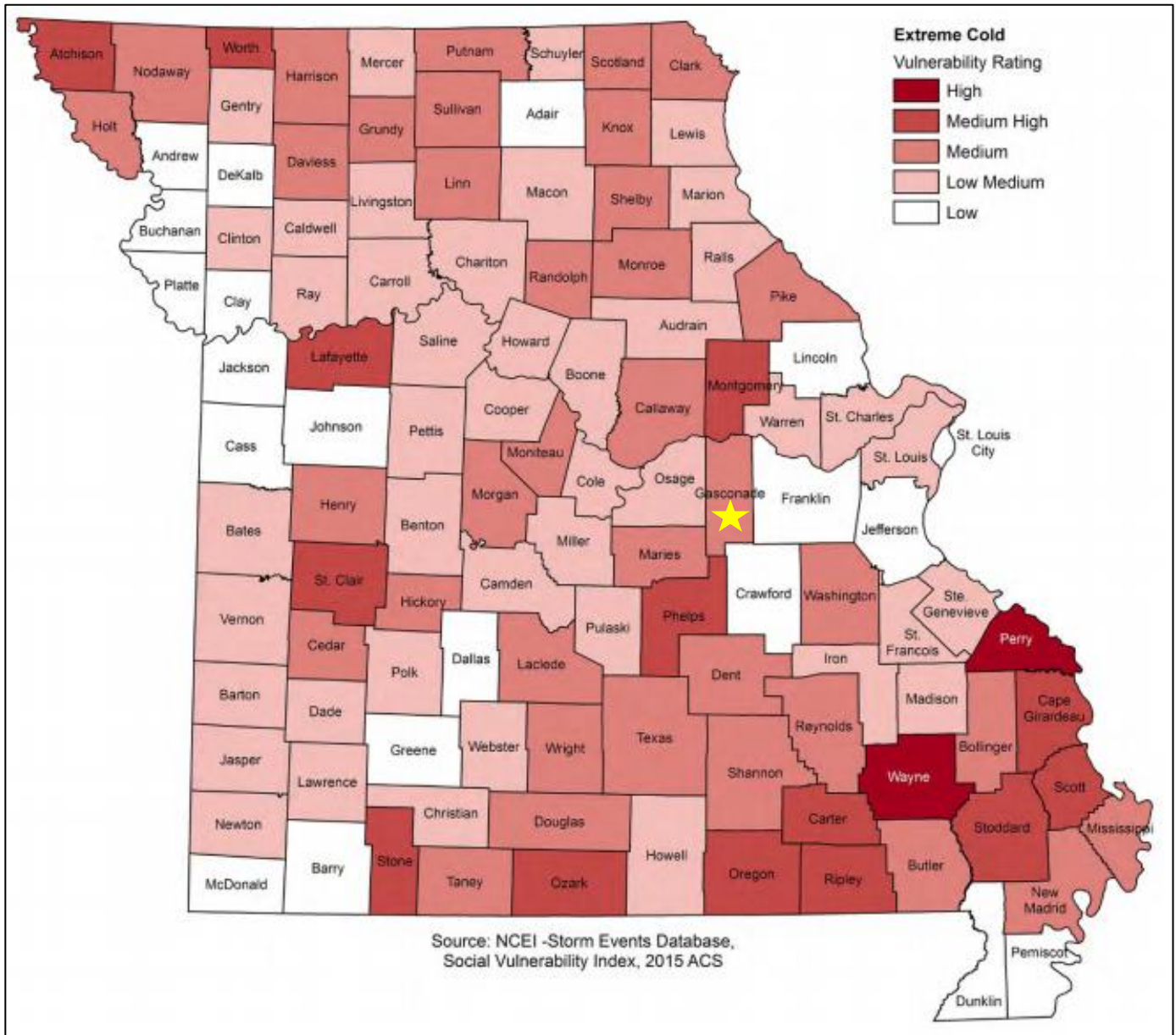
Source: 2018 Missouri Hazard Mitigation Plan

Figure 3.34. Vulnerability Summary for Extreme Heat



Source: 2018 Missouri Hazard Mitigation Plan, *Yellow star indicates Gasconade County

Figure 3.35. Vulnerability Summary for Extreme Cold



Source: 2018 Missouri Hazard Mitigation Plan, *Yellow star indicates Gasconade County

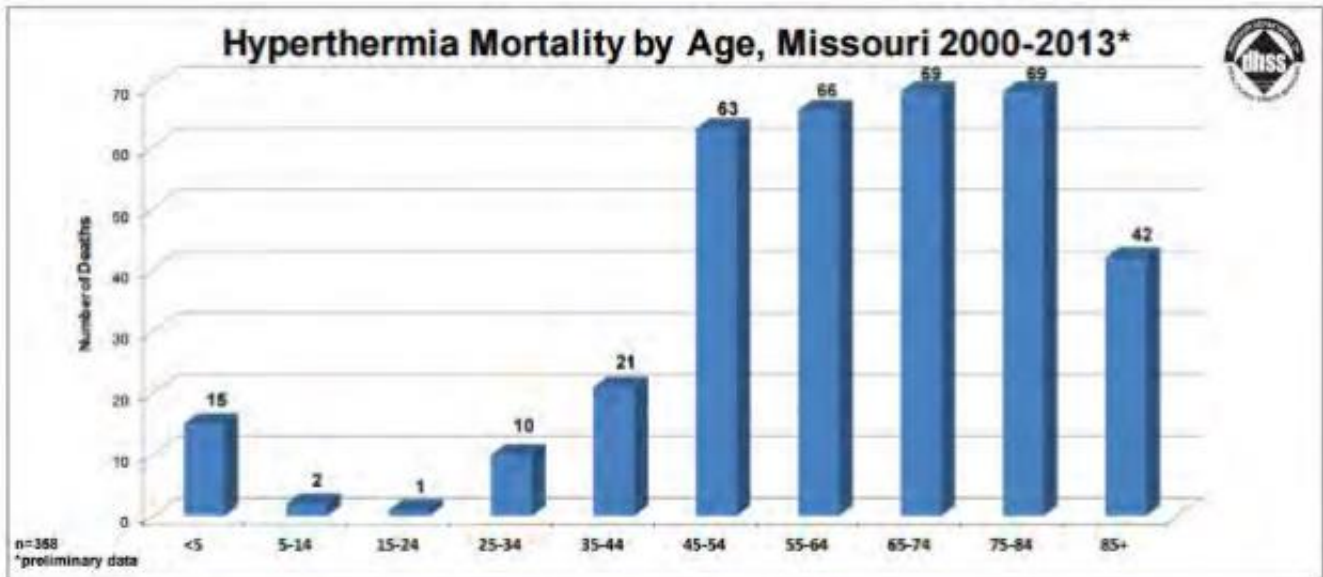
Potential Losses to Existing Development

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 3.36** shows the hyperthermia mortality rate by age for the 2000-2013 timeframe.

Figure 3.36. Hyperthermia Mortality of Age, Missouri 2000-2013



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

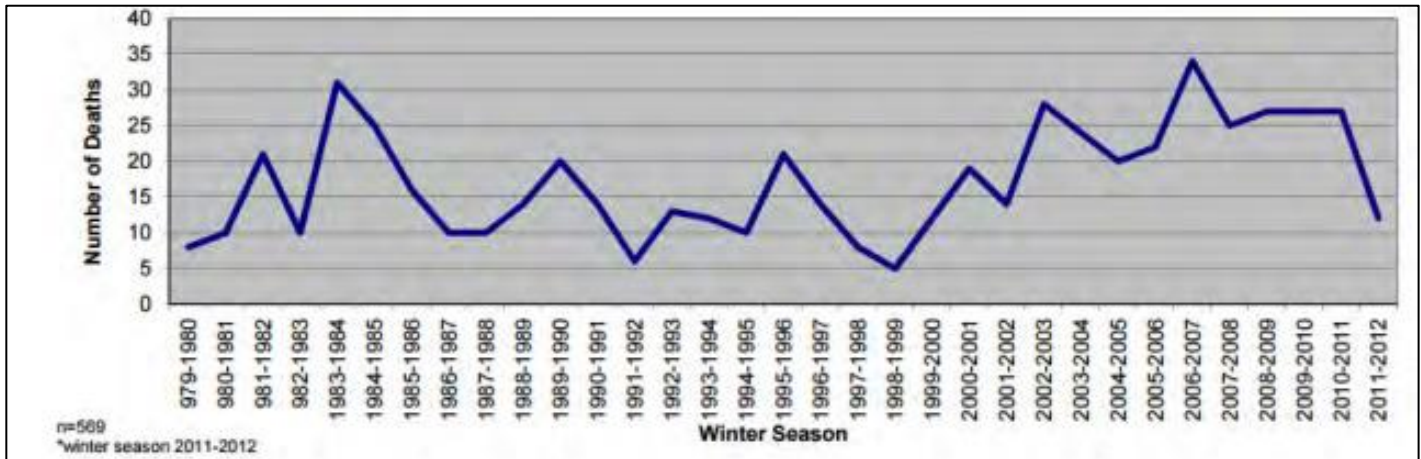
During extreme heat events structural, road, and electrical infrastructure are vulnerable to damages. Depending upon temperatures and duration of extreme heat, losses will vary.

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 3.37**. 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 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 3.37. Hypothermia Deaths, Missouri: Winter Seasons 1979-2012



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

Extreme cold can also cause stress to crops and animals. However, according to the NOAA Storm Events Data Base, there were no reported agricultural losses for Gasconade County during that 20 year time period. **Table 3.37** displays data specifically on agricultural losses due to extreme cold from the USDA Risk Management website.

Table 3.38. Gasconade County Cold/Freeze Related Crop Indemnity Payments (1999-2019)

Year	Number of Payments	Total
2010	2	\$5,332.00
2013	2	\$10,436.55
2015	1	\$16,023.00
TOTAL	5	\$31,791.55

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

Table 3.39 provides data in relation to record cold, wind chill, and freeze events between 1999 and 2019 in Gasconade County. Minimum temperatures are shown for each extreme temperature event where available. Fortunately, there were no recorded injuries and fatalities during this time.

Table 3.39. NCEI Gasconade County Cold/Wind Chill/Freeze Events Summary (1999-2019)

Month, Year	# of Event Days	Fatalities	Injuries	Temperature (F°)
12/16/2000	2	0	0	-30-40
4/4/2007	7	0	0	NA
1/1/2010	12	0	0	-16
1/6/2014	1	0	0	-26
Total	22	0	0	-

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

Impact of Previous and Future Development

Population trends from 2010 to 2019 for Gasconade County indicate that the population in unincorporated areas has fallen by an estimated 6.3 percent. The city of Morrison's population has decreased by a significant 38 percent. The city of Gasconade's population has grown by an estimated 49.8 percent. Overall, the county population has decreased by 1.7 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 2015-2019 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 3.40** 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 3.40. County Population Under Age 5 and Over Age 65 (2015-2019)

Jurisdiction	Population Under 5 Years	Population 65 Years and over
Unincorporated Gasconade County	4.7%	22.9%
Bland	5.4%	31.0%
Gasconade	5.7%	9.9%
Hermann	4.6%	23.7%
Morrison	3.5%	16.5%
Owensville	6.4%	21.9%
Rosebud	5.0%	10.8%

Source: U.S. Census Bureau, 2015-2019 American Community Survey 5-Year Estimates

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 Bland has a high percentage of individuals 65 and over with 31.0 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 Gasconade 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 Bland has the highest risk because of a large population of people aged 65 and over (**Table 3.40**).

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.

3.4.5 Flooding (Riverine and Flash)

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
- Watershed map, Environmental Protection Agency, <https://mywaterway.epa.gov/>
- FEMA Map Service Center, Digital Flood Insurance Rate Maps (DFIRM) for all jurisdictions, if available, msc.fema.gov/portal
- 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, <http://www.rma.usda.gov/data/cause.htm>
- 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.

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.

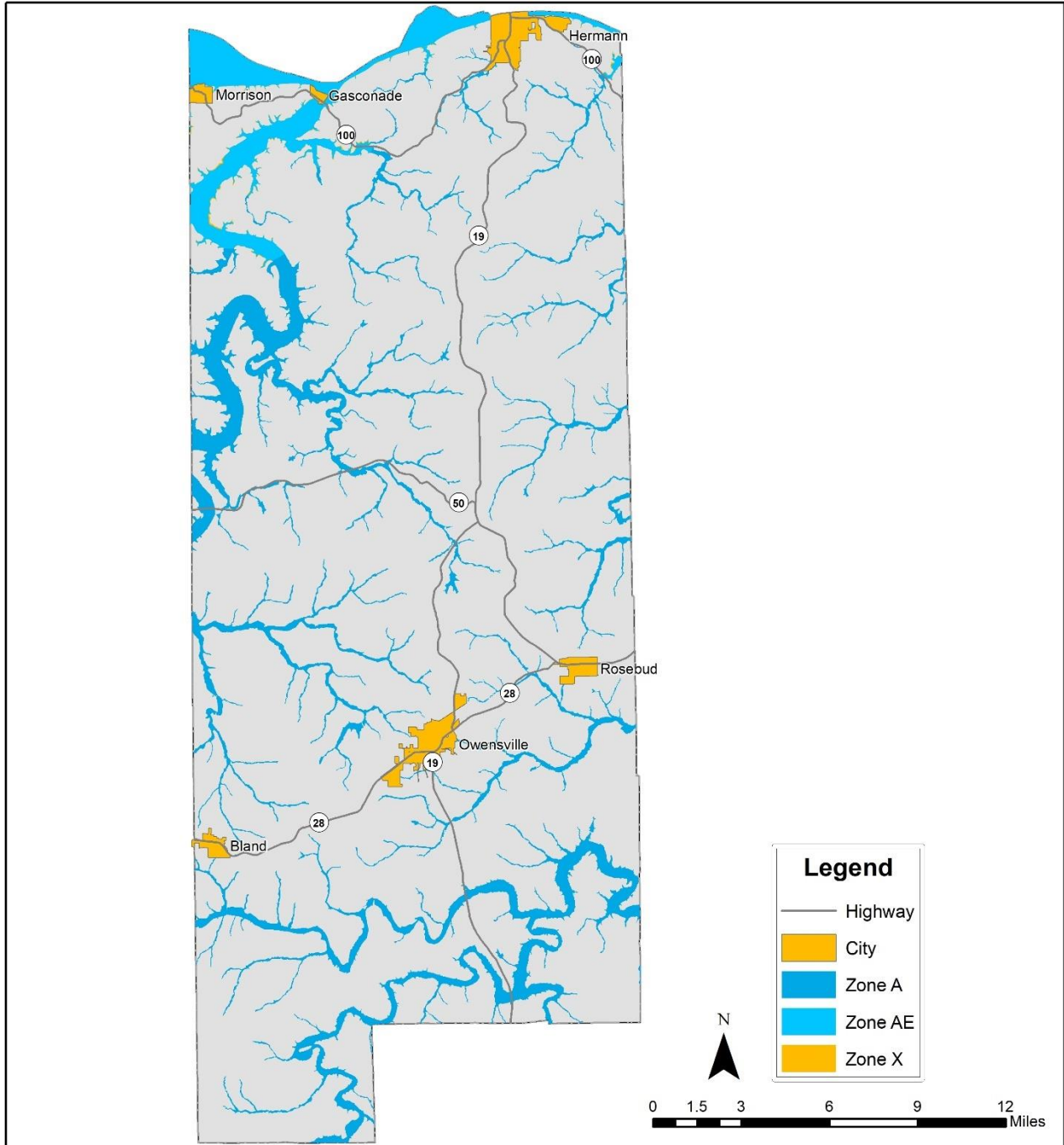
In certain areas, aging storm sewer systems are not designed to carry the capacity currently needed to handle the increased storm runoff. Typically, the result is water backing into basements, which damages mechanical systems and can create serious public health and safety concerns. This combined with 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). **Figure 3.38** is a map of Gasconade County showing the floodplain boundaries. Following the county-wide map are FIRMs for Bland, Gasconade, Morrison, Hermann, Owensville and Rosebud (**Figure 3.39 through 3.43**). Digital data for SFHAs is not available. **Figure 3.44** shows a map of the school districts in Gasconade County with an overlay of the SFHA. **Table 3.41** shows Gasconade County NCEI flood events by location between 1999 and 2019.

Figure 3.38 Map of Gasconade County with Special Flood Hazard Areas




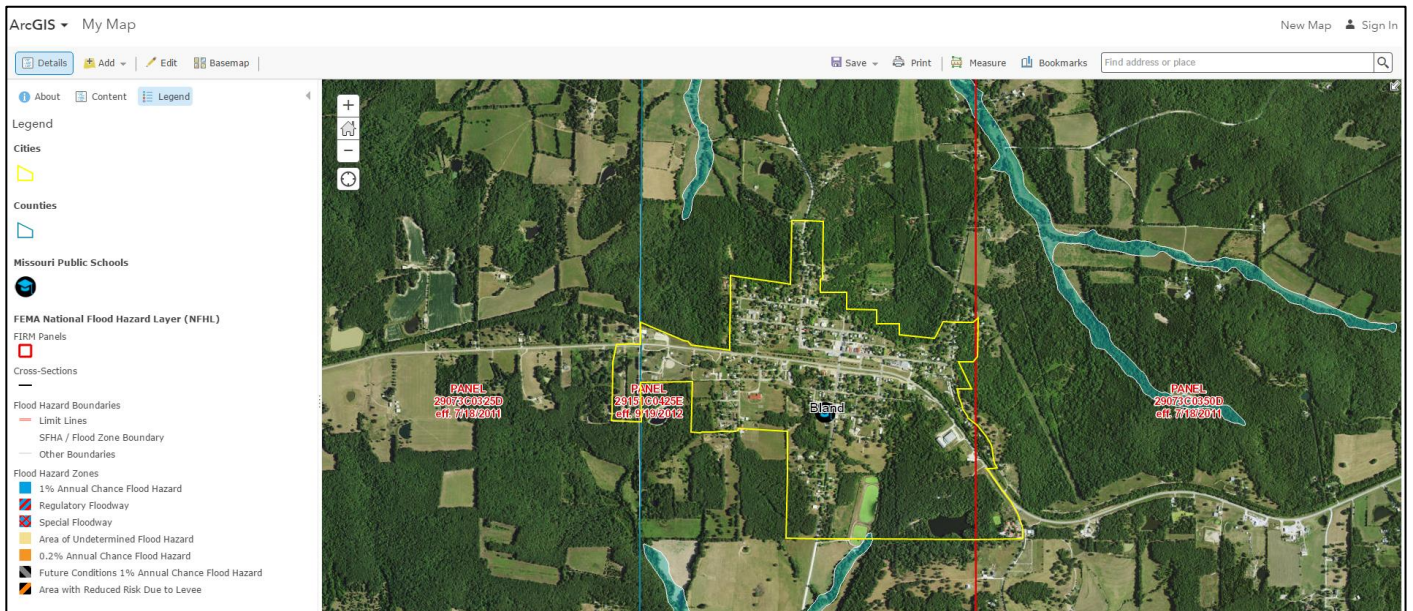
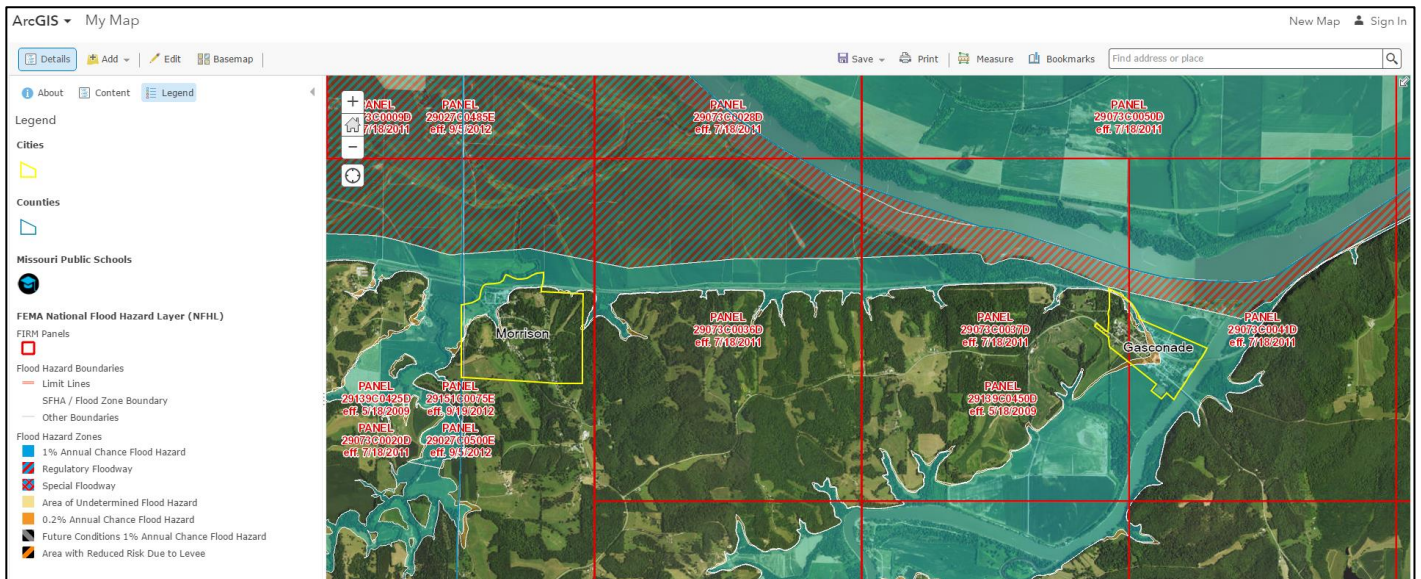
<p>4 Industrial Dr, St. James, MO 65559</p>	<p>Gasconade County Special Flood Hazard Area</p> <p>This map was created by the Meramec Regional Planning Commission's GIS Department. To the best of the author's knowledge, the data presented here is accurate. However, the author or MRPC assumes no responsibility for the accuracy of the data presented on this map.</p> <p><small>Document: X:\GIS\GIS\Project Folders\Gasconade\TMP\Gasconade_School Districts and Flood Area\Flood Area.mxd</small></p>	
<p>Date Created 8/19/2021</p>		

Figure 3.39. City of Bland, Missouri Special Flood Hazard Areas (SFHAs)



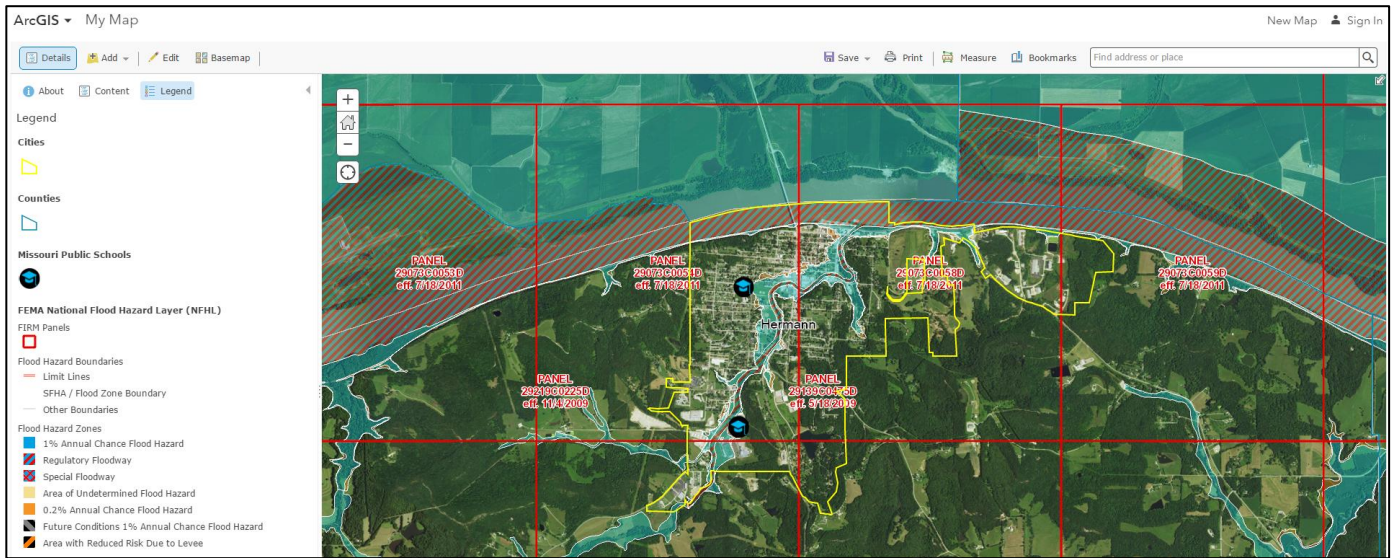
Source: ESRI's ArcGIS, Streets

Figure 3.40. Cities of Gasconade and Morrison, Missouri Special Flood Hazard Areas (SFHAs)



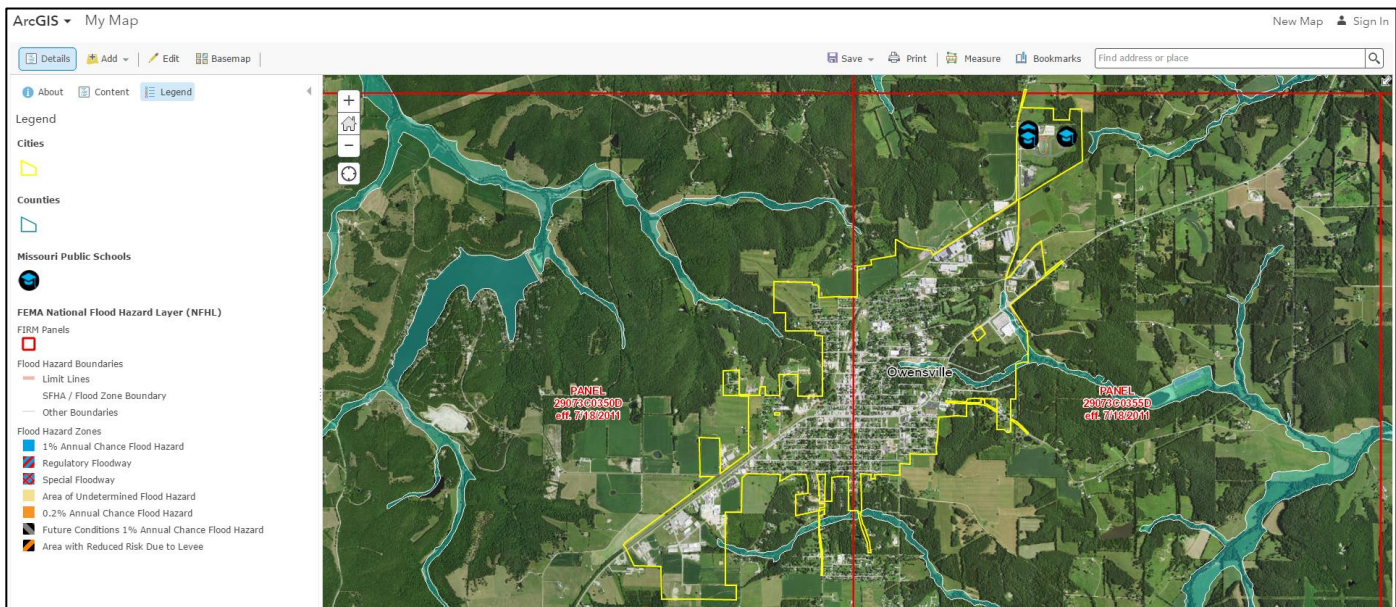
Source: ESRI's ArcGIS, Streets

Figure 3.41. City of Hermann, Missouri Special Flood Hazard Areas (SFHAs)



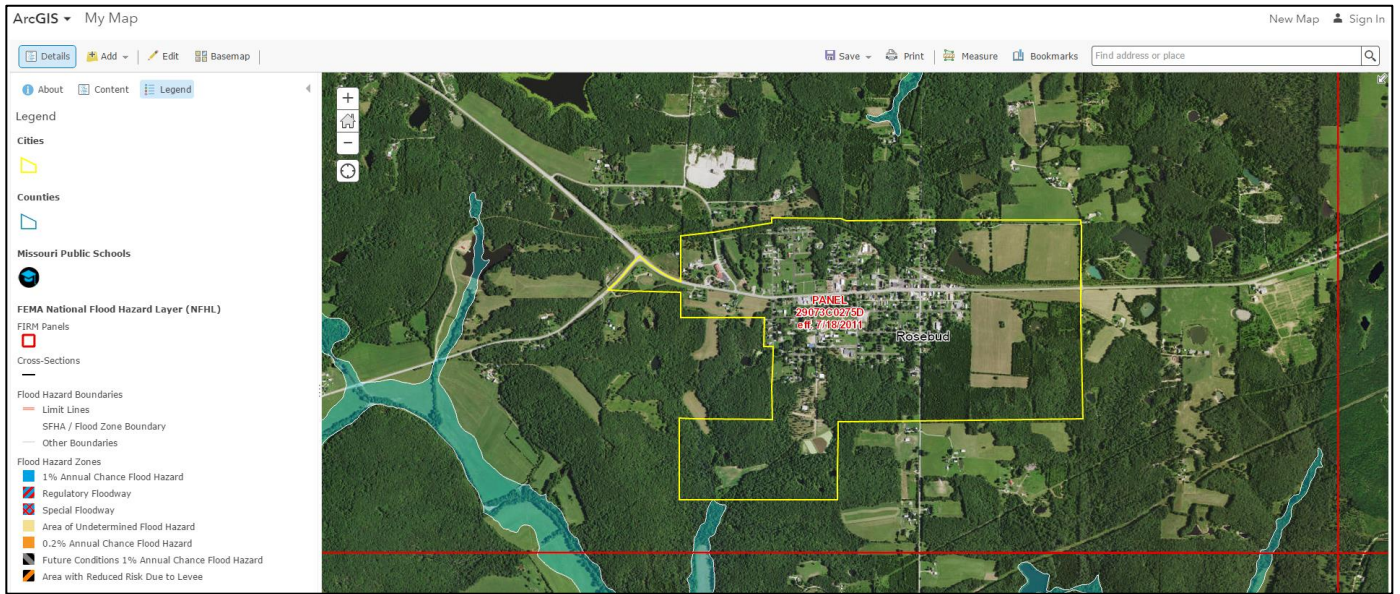
Source: ESRI's ArcGIS, Streets

Figure 3.42. City of Owensville, Missouri Special Flood Hazard Areas (SFHAs)



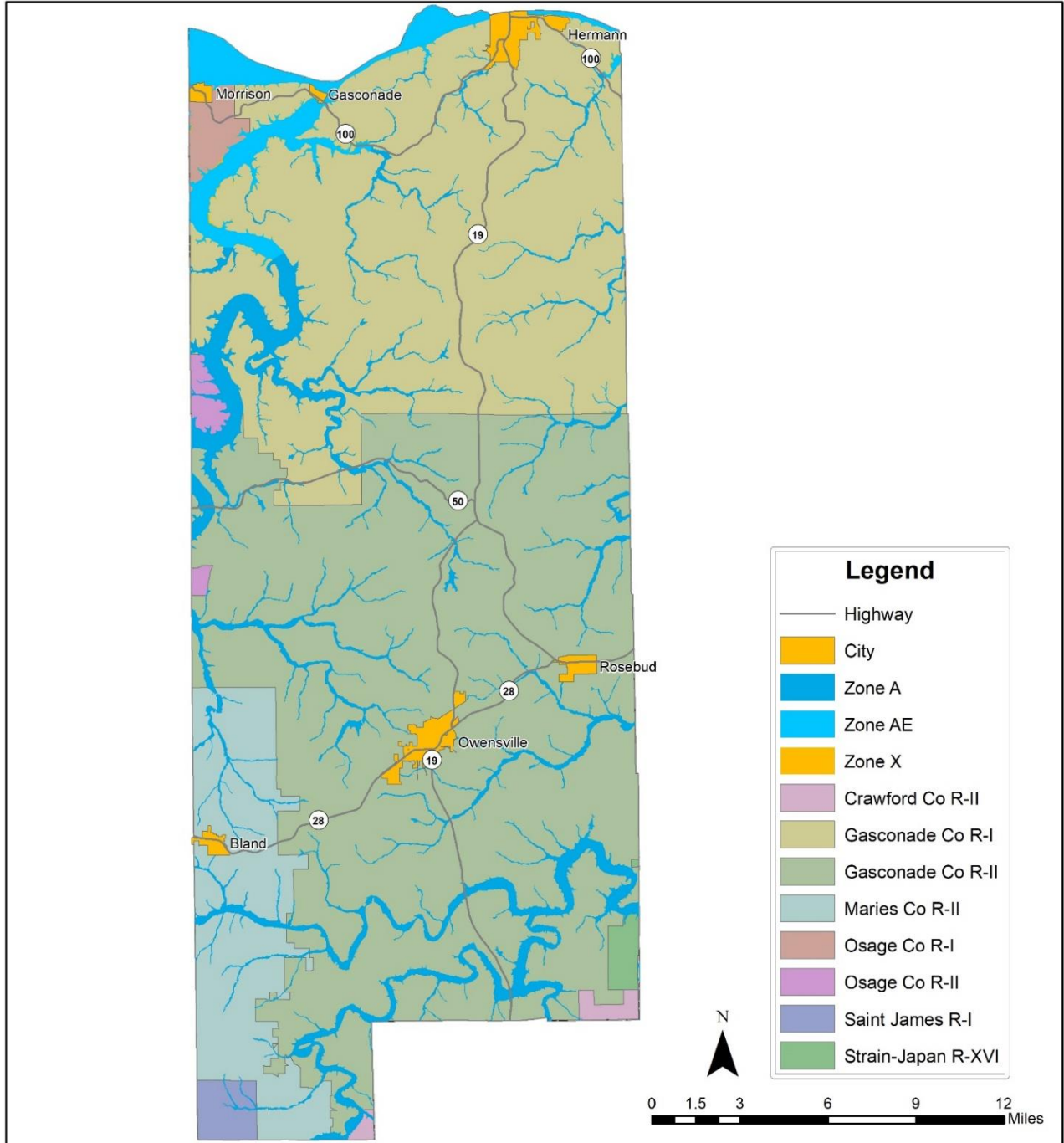
Source: ESRI's ArcGIS, Streets

Figure 3.43. City of Rosebud, Missouri Special Flood Hazard Areas (SFHAs)



Source: ESRI's ArcGIS, Streets

Figure 3.44 Gasconade County School Districts and Special Flood Hazard Areas (SFHAs)




<p>4 Industrial Dr, St. James, MO 65559</p>	<p>Gasconade County School Districts and Special Flood Hazard Area</p> <p>This map was created by the Meramec Regional Planning Commission's GIS Department. To the best of the author's knowledge, the data presented here is accurate. However, the author or MRPC assumes no responsibility for the accuracy of the data presented on this map.</p> <p><small>Document: X:\GIS\GIS\Project Folders\Gasconade HMP\Gasconade School Districts and Flood Area\School District and Flood Area.mxd</small></p>	
<p>Date Created 8/19/2021</p>		

Table 3.41. Summary of Gasconade County NCEI Flood Events by Location, 1999-2019

Location	# of Events
Gasconade County	2
Gasconade	1
Hermann	1
Morrison	2
Mt Sterling	3

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. After review of NCEI data, Bland and Morrison are the communities most prone to flash flooding events. Unincorporated Gasconade County also has a high rate of flash flood events. **Table 3.42** provides information in regards to flash flood events between 1999 and 2019.

Table 3.42. Gasconade County NCEI Flash Flood Events by Location, 1999-2019

Location	# of Events
Gasconade County - Countywide	3
Gasconade County – South Portion	1
Bland	3
Hermann Municipal Airport	1
Woollam	1
Morrison	3
Redbird	1
Hermann	2
Mt Sterling	1

Source: National Centers for Environmental Information

Strength/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 road beds. In some instances, steep slopes that are saturated with water may cause mud or rock slides

onto roadways. These damages can cause costly repairs for state, county, and city road and bridge maintenance departments. When sewer back-up occurs, this can result in costly 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 1999 and 2019, there were 147 recorded flood-related crop insurance claims with total losses of \$2,205,326.27 due to flooding within Gasconade County³⁰. **Table 3.43** shows crop losses for the period 1999 through 2019 (years with no losses are not shown).

Table 3.43. Recorded USDA Crop Insurance Losses (Flood) for Gasconade County 1999 – 2019

Year	Number of Payments	Total
1999	5	\$11,787.00
2000	1	\$424.00
2001	8	\$32,793.00
2002	6	\$14,889.00
2003	1	\$1,635.00
2004	2	\$4,735.00
2005	5	\$3,423.00
2007	2	\$3,383.50
2008	13	\$157,639.30
2009	20	\$66,950.40
2010	2	\$3,426.00
2011	5	\$72,798.75
2013	23	\$940,861.00
2014	1	\$1,074.00
2015	20	\$502,976.79
2016	17	\$83,050.33
2017	3	\$64,531.50
2018	2	\$31,367.00
2019	11	\$207,581.70
TOTAL	147	\$2,205,326.27

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

National Flood Insurance Program (NFIP) Participation

Table 3.44 depicts jurisdictions within the planning area that participate in NFIP. In addition, **Table 3.45** provides the number of policies in force, amount of insurance in force, number of closed losses, and total payments for Gasconade County and cities.

³⁰ <http://www.rma.usda.gov/data/cause.html>

Table 3.44. NFIP Participation in Gasconade County

Community ID #	Community Name	NFIP Participant (Y/N)	Current Effective Map Date	Regular-Emergency Program Entry Date
290801	Gasconade County	Y	07/18/11	09/04/87
290139	Bland	Y	07/18/11 (M)	08/24/84
290140	Gasconade	Y	07/18/11	12/18/84
290141	Hermann	Y	07/18/11	03/05/76
290142	Morrison	Y	07/18/11	09/18/86
290143	Owensville	Y	07/18/11	06/03/78
-	Rosebud	N	-	-

Source: NFIP Community Status Book,, <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 3.45. NFIP Policy and Claim Statistics as of 11/05/2020

Community Name	Policies in Force	Insurance in Force	Closed Losses	Total Payments
Gasconade County	41	\$3,088,400	158	\$3,271,612
Gasconade	6	\$706,500	29	\$417,296
Hermann	35	\$4,727,600	143	\$3,550,482
Morrison	6	\$170,200	3	\$79,000
Owensville	NA	NA	1	\$1,145

Source: NFIP Community Status Book, [11/05/2020]; SEMA
*Closed Losses are those flood insurance claims that resulted in payment.

Gasconade County has the highest number of policies and losses, however, Hermann has the highest total payments with \$3,550,482.00.

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 Phelps County was held in December 2018 and flood study review meetings were held in November of 2019 and December of 2019.

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.

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.

According to SEMA (Table 3.46), as of 11/05/2020, there are 37 repetitive loss properties unincorporated Gasconade County. There have been 152 losses to those properties with total payments of \$2,623,819.38. The city of Hermann has 14 repetitive loss properties which have had 60 losses with total payments of \$3,048,656.88. The city of Gasconade has three repetitive loss property with seven losses with total payments of \$230,630.69. There have been 11 mitigated properties, one in Gasconade County and ten in the city of Hermann.

Table 3.46. Repetitive Loss Data for Gasconade County

Jurisdiction	# of Properties	# Mitigated	Building Payments	Content Payments	Total Payments	# of Losses
Gasconade County	37	1	\$2,200,218.66	\$423,600.72	\$2,623,819.69	152
Gasconade	3	0	\$161,160.03	\$69,470.66	\$230,630.69	7
Hermann	14	10	\$1,562,136.11	\$1,486,520.77	\$3,048,656.88	60

There are seven Severe Repetitive Loss properties in Gasconade County. The properties have not been mitigated and the total amount of \$1,011,177.83 has been paid over a total of 45 NFIP claims. (See below for explanation of data limitations.)

*Due to Federal restrictions on data sharing, the state was unable to provide full Repetitive Loss data or current Severe Repetitive Loss data. The Property Type was not available for Repetitive Loss properties and the Severe Repetitive Loss data, which was obtained from the 2018 MO State Hazard Mitigation Plan, does not specify if the properties are mitigated or non-mitigated.

Table 3.47. Severe Repetitive Loss Data for Gasconade County

Number of SRL Properties	Number of Paid NFIP Claims	Total Paid Losses	Average Payment
7	45	\$1,011,177.83	\$22,470.62

Previous Occurrences

Table 3.48 provides information regarding Presidential Flooding Disaster Declarations between 1999 and 2019 for Gasconade County.

Table 3.48. Gasconade County Presidential Flooding Disaster Declarations 1999 to 2019

Declaration No.	Date	State	Incident Description
DR-1463	05/04/2003	Missouri	Missouri Severe Storms, Tornadoes, and Flooding
DR-1676	1/12/2007	Missouri	Missouri Severe Winter Storms and Flooding

Declaration No.	Date	State	Incident Description
DR-1749	3/17/2008	Missouri	Missouri Severe Storms and Flooding
DR-4250	12/23/2015	Missouri	Missouri Severe Storms, Tornadoes, Straight-line Winds, and Flooding
DR-4317	4/28/2017	Missouri	Missouri Severe Storms, Tornadoes, Straight-line Winds, and Flooding
DR-4451	4/29/19	Missouri	Missouri Sever Storms, Tornadoes, and Flooding

Source: FEMA, Disaster Declarations for Missouri, Flooding

Data was obtained from the NCEI regarding flash and river flooding over the last 20 years. **Table 3.49** and **Table 3.50** provide this information. Additionally, narratives available for each event are included.

Table 3.49. NCEI Gasconade County Riverine Flood Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages (\$)	Crop Damages (\$)
2001	1	0	0	0	0
2002	1	0	0	0	0
2007	1	0	0	5,000	10,000
2008	1	0	0	0	0
2010	1	0	0	0	0
2013	1	0	0	1,000	2,000
2015	1	0	0	160,000	0
2016	1	0	0	0	0
2017	1	0	0	0	0
Total	9	0	0	166.00K	12.00K

Source: NCEI, data accessed [11/6/2020]

Narratives on flood events:

- 06/04/2001:** The Mississippi River flooded in May, and in June the Missouri River took over. Heavy rain across the Missouri River Basin sent the river over its banks to heights in some places not seen since the flooding in 1995. Despite the high river levels, damages were minimal compared to what they could have been. This is because many homes and businesses were relocated out of the flood plain after the devastating flooding of the early and mid-90s. The bulk of the flooding this time occurred in newly established wetlands or in farmhands on the river side of levees. Some towns however were affected.
- 05/08/2002:** Several heavy rain events caused the Missouri River to flood from Central Missouri east to its confluence with the Mississippi River. Most of the flooding started around the 8th and ended by the 20th. The exception being at Gasconade, MO where the river remained in flood until May 28. The river peaked from about 6 to 11 feet over flood stage. Several roads along the river were closed at various times and many acres of farm land went under water. The Katy Trail Sate Park, a bike and hiking trail that runs along the river from Central Missouri to St. Charles, was damaged at several locations along the river. Damage to homes and businesses was virtually nonexistent due to relocations and buy outs after the Great Flood of 1993.
- 05/08/2007:** The Missouri River flooded parts of the northern border of Gasconade County from Gasconade to Hermann. Two city parks in Hermann were flooded, otherwise flooding

was limited to farmland along the river and to some roads near the river in the Hermann area.

4. **09/14/2008:** Up to 5 inches of rain fell in a short amount of time as the remnants of Hurricane Ike moved through the region causing flooding. Numerous roads were flooded countywide and numerous creeks were well out of their banks due to the heavy rain.
5. **06/05/2010:** The Missouri River went into flood early in the month and stay that way into July. Moderate flooding occurred which only affected some roadways and farmland along the river.
6. **06/01/2013:** The Missouri River started June in flood and hit major flood levels very early in the month cresting on the 1st. The river fell below flood stage on the 7th. Damage was limited to some closed roads and flooded farmland.
7. **12/27/2015:** Between 6 and 9 inches of rain fell across Gasconade County during a 2 day period. All of this rain caused the creeks and rivers to rise. The Gasconade River and Missouri River went into flood with several points cresting at major levels. Almost 20 structures were either damaged or destroyed from the river flooding. Damage estimates so far were around \$160 Thousand.
8. **01/01/2016:** After a record rainfall event during the last week of December, rivers across the region remained in moderate to major flood through the first week of January.
9. **05/01/2017:** A strong spring storm system brought multiple rounds of thunderstorms and heavy rain to the southeast half of Missouri during the last couple days of April. Rainfall totals surpassed nine inches in some locations and this led to historic flooding along some of the tributaries of the Missouri and Mississippi Rivers. Areas along the Meramec River were especially hard hit as new records were set at Steelville, Sullivan, and Eureka. The previous records had just recently been set during the late December flooding of 2015. Two major highways, I-44 and I-55 were shut down for a number of days due to the record river flooding from this event.

Table 3.50. NCEI Gasconade County Flash Flood Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages (\$)	Crop Damages (\$)
2000	1	0	0	0	0
2002	3	0	0	0	0
2008	1	0	0	0	0
2009	2	0	0	0	0
2010	3	0	0	30,000	0
2012	1	0	0	0	0
2013	1	0	0	0	0
2015	2	0	0	0	0
2016	1	0	0	0	0
2019	1	0	0	0	0
Total	16	0	0	30.00K	0

Source: NCEI, data accessed [11/6/2020]

Narratives on flash flood events:

1. **05/06/2000:** Rainfall up to 6 inches fell on Gasconade County causing most small streams and creeks to quickly overflow their banks. No major damage was noted, but several roads were closed for several hours due to floodwater.
2. **05/09/2002:** Another round of 2-4 inches of rain on already saturated ground led to more flash flooding across the area. Numerous roads across the area became impassable due to high water. Many of the small creeks and streams, already high because of previous rain, quickly flooded again.
3. **05/12/2002:** The third heavy rain event of the month brought 3-6 inches of rain over Mother's Day weekend resulting in widespread flash flooding across much of Central and Eastern Missouri. Some weather watchers reported nearly a foot of rain in a 15 day period. Countless creeks and small streams flooded leaving roads underwater. In rural areas, many roads and bridges were severely damaged by floodwater. Urban areas were also overrun by water as storm water drainage systems were quickly overwhelmed. Many people in cities suffered flooded basements. In Centralia, in Boone County, street flooding left people stranded. In Montgomery County, Routes Y, K, J, CC, E and others were flooded and closed. In Franklin County, several roads were closed in Pacific, Robertsville, Catawissa and others. In Gasconade County, Routes N and D were flooded and closed. In Lincoln County, several roads were closed in Troy, Winfield and across the south portion of the county. In St. Louis County, roads were flooded, especially in southern and western areas.
4. **08/18/2002:** Rainfall of 3 to 4 inches flooded several roads across southern Gasconade County. Street flooding was also reported in several areas of Owensville.
5. **03/31/2008:** Three to four inches of rain fell over Gasconade county over a short period of time on already saturated soils. Numerous roads were closed due to flooding including the intersection of Highways B and C south of Bland, Piezuck Road and Highway 19 on the north side of Owensville, Kings Highway in Mount Sterling, as well as Moore Road and Highway 19 in Bay. Water was flowing over U.S. Highway 50 east of Mount Sterling, but it was not closed.
6. **05/08/2009:** Up to 4 inches of rain fell in a short amount of time causing flash flooding. Numerous roads were flooded for a time including Wildcat Road, Van Horn Road and Glaser Hollow Road.
7. **07/04/2009:** Between 5 and 6 inches of rain fell in a short amount of time causing flash flooding in portions of Hermann. Frene Creek rose quickly and caused extensive damage to the driveway that leads into the Hermann Middle School parking lot. Thirty to thirty-five feet of the roadway and bridge were destroyed by the rushing waters.
8. **06/08/2010:** Up to 5 inches of rain fell in a short amount of time on already saturated soils causing flash flooding. Numerous roads were flooded and a couple of roads and culverts were washed out. Route Y west of Owensville was flooded for a time. Also, the road leading to the the bridge on the south entrance to Peaceful Valley Lake subdivision was washed out due to the heavy rains and had to be repaired.
9. **07/09/2010:** Up to five inches of rain fell in a short amount of time on already saturated soils causing flash flooding. Several roads were flooded including Stollmeyer Road.
10. **09/18/2010:** Between 3 and 5 inches of rain fell onto already saturated soils causing flash

flooding. Frene Creek in Hermann rose quickly and came out of its banks next to the city park where dozens of people were camping for the third annual Hermann Cyclocross race. The police and fire department were able to get everyone out of the campground, though two vehicles were flooded as well as numerous tents, bikes and one popup camper that could not be moved quickly enough. No injuries were reported.

11. **03/15/2012:** Up to two inches of rain fell in a short amount of time causing flash flooding. Several roads were flooded including Highway A just north of Bland.
12. **05/31/2013:** Up to four inches of rain fell in a short amount of time causing flash flooding. Several roads throughout the county were flooded, including several near Stone Hill Winery in Hermann.
13. **06/19/2015:** Up to 3 inches of rain fell onto already saturated soils causing flash flooding. Numerous roads were flooded throughout the county.
14. **12/26/2015:** Between 5 and 6 inches of rain fell causing flash flooding. Numerous roads were flooded including U.S. Highway 50 near Mt. Sterling and Route A in multiple areas between Routes Y and D. Also, Routes W and K were closed due to flash flooding from Second Creek.
15. **08/02/2016:** A large storm complex moved slowly across Missouri during the early morning hour of August 2nd. Rainfall amounts up to 6 inches with locally higher amounts caused flash flooding over portions of north central and central Missouri.
16. **06/22/2019:** An MCS dropped southeastward across the forecast area. Very heavy rain fell across the region and with the soil already saturated from previous rains, there were numerous reports of flash flooding in central Missouri.

Probability of Future Occurrence

From the data obtained from the NCEI ³¹, there were 9 riverine flood events (**Table 3.49**) over a period of 21 years. This information was utilized to determine the annual average percent probability of riverine flooding (**Table 3.51**). The probability of riverine flooding in Gasconade County per year is 42.9 percent (9 events/21 years x 100). Furthermore, data was obtained for flash flooding within the county. Gasconade County endured 16 flash flooding events (**Table 3.50**) over a 21 year period. The probability of flash flooding in Gasconade County per year is 76.2% (16 events/21 years x 100) (**Table 3.52**).

Table 3.51. Annual Average % Probability of Riverine Flooding in Gasconade County

Location	Annual Avg. % P	Avg. Number of Events
Gasconade County	42.9%	0.429

*P = probability; see page 3.24 for definition.

³¹ <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

Table 3.52. Annual Average % Probability of Flash Flooding in Gasconade County

Location	Annual Avg. % P	Avg. Number of Events
Gasconade County	76.2%	0.762

*P = probability; see page 3.24 for definition.

Changing Future Conditions Considerations

As discussed in the 2018 Missouri Hazard Mitigation Plan, there is a high probability that total rainfall from heavy rainfalls will increase in the 21st century across the globe. As the number of heavy rain events increase, more flooding can be expected.³² Increased development – more roofs and paved areas - can also increase run-off and exacerbate flooding and stormwater issues. These changes will likely result in an increased frequency and severity of floods in Gasconade County. This change is already being seen in the last 20 years, with heavy rainfall events becoming more severe and occurring more often and severe flooding occurring more frequently. Flood levels on the Gasconade River broke records three times in the past six years.

If rainfall frequency and intensity continue to increase as expected, this will put additional stress on natural hydrological systems and community stormwater systems. Higher groundwater levels can result in more intensive flooding if the ground is already saturated and flood waters typically recede more slowly when groundwater levels are high.³³ Other considerations include planning for more expansive stormwater capacity, better drainage and erosion control.³⁴

Vulnerability

Vulnerability Overview

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 can break loose or sustain a puncture as a result of flooding. 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 flood 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. Additional information on scour bridges can be found on page 3.16. 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.

For the vulnerability analysis of flooding for Gasconade County, data was obtained from the 2018

³² 2018 Missouri State Hazard Mitigation Plan

³³ Ibid.

³⁴ Ibid.

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. Gasconade 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.

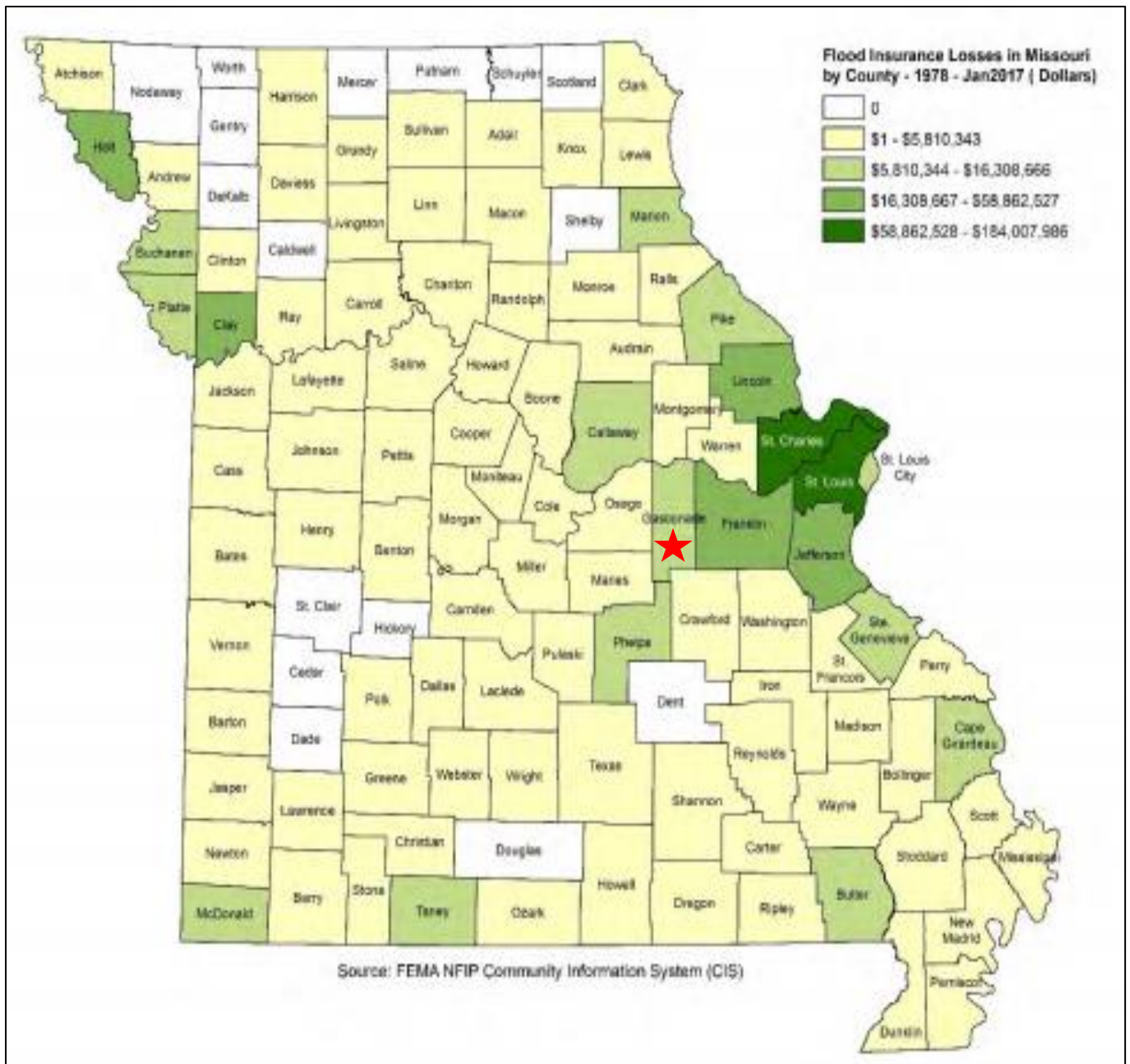
This method was preferred of the three methods, along with RiskMAP flood risk datasets.

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. Two buyouts of repetitive loss properties has occurred in the city of Waynesville and one in unincorporated Gasconade County.

Figure 3.45 depicts the amount of flood insurance losses in Missouri by county for the period 1978-January 2017. Gasconade County falls in the \$5,810,344 - \$16,308,666 range of payments.

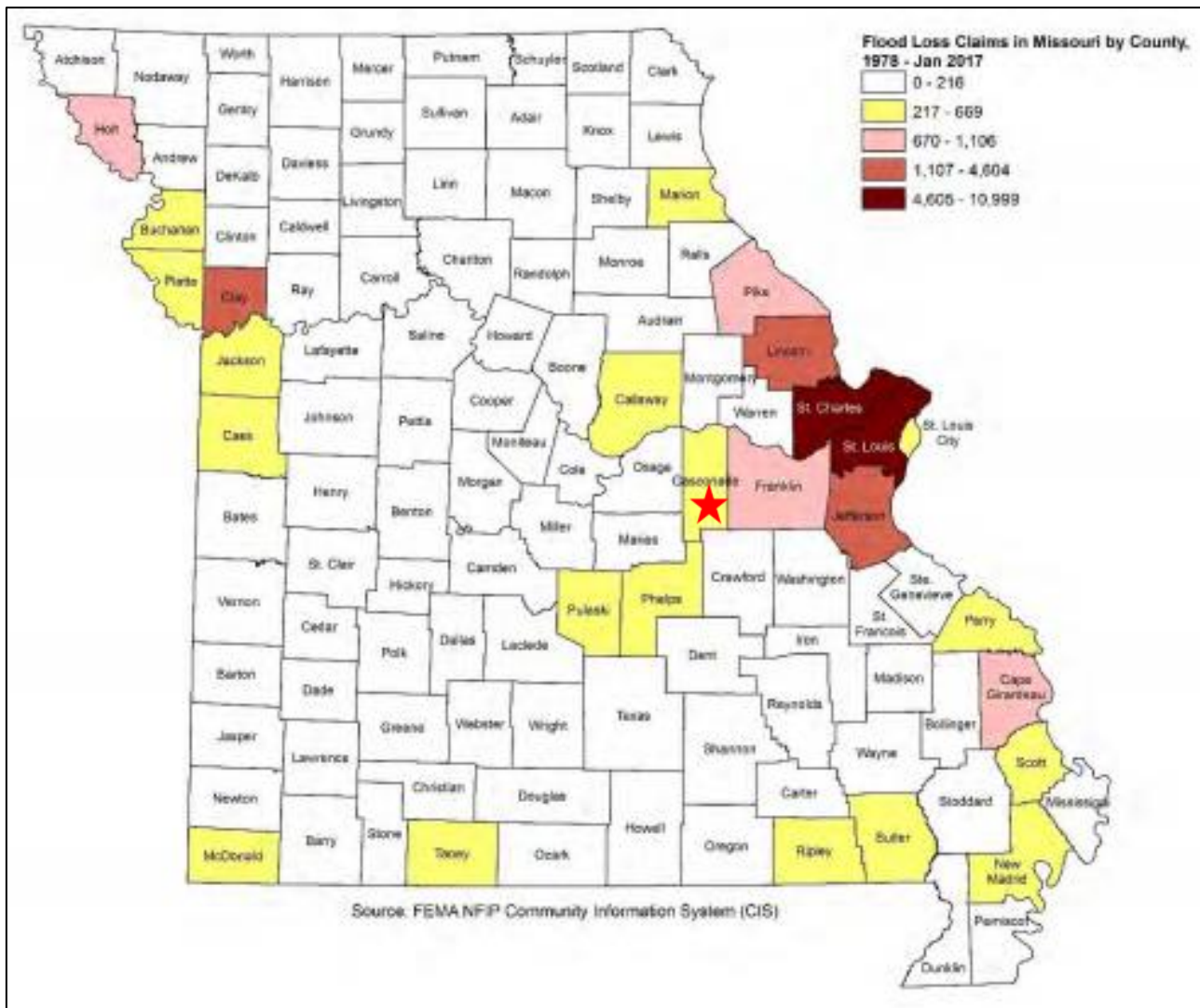
Figure 3.45. Map of Funds Paid Historically for Flood Insurance Losses in Missouri by County 1978 - January 2017



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.46 illustrates the number of flood loss claims made in Missouri during the same time period. Gasconade County had 217 – 669 claims during that timeframe.

Figure 3.46. Flood Loss Claims in Missouri by County, 1978 – January 2017



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade 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 3.53** provides information regarding total direct building loss and income loss to Gasconade County. **Table 3.54** provides information on exposure of buildings. According to the Missouri Spatial Data Information Service (MSDIS) there are 192 residential structures at risk of flood. Hazus shows the number of building exposed to flood damage at 154, with 67 potentially substantially damaged in a one percent annual chance of a flood.

Table 3.53. Total Direct Building Loss and Income Loss to Gasconade 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
\$1,888,630,000	\$53,253,000	\$35,440,000	\$762,000	\$89,455,000	\$163,000	\$89,618,000	2.82

Source: 2018 Missouri State Hazard Mitigation Plan

Table 3.54. Gasconade County Structures Exposure

# MS DIS Residential Structures Exposed	# Hazus Buildings Exposed	# Substantially Damaged
192	154	67

Source: 2018 Missouri State Hazard Mitigation Plan

This same analysis indicates that 1,305 people would be displaced in Gasconade County and 222 would need to be sheltered in the event of a major flood.

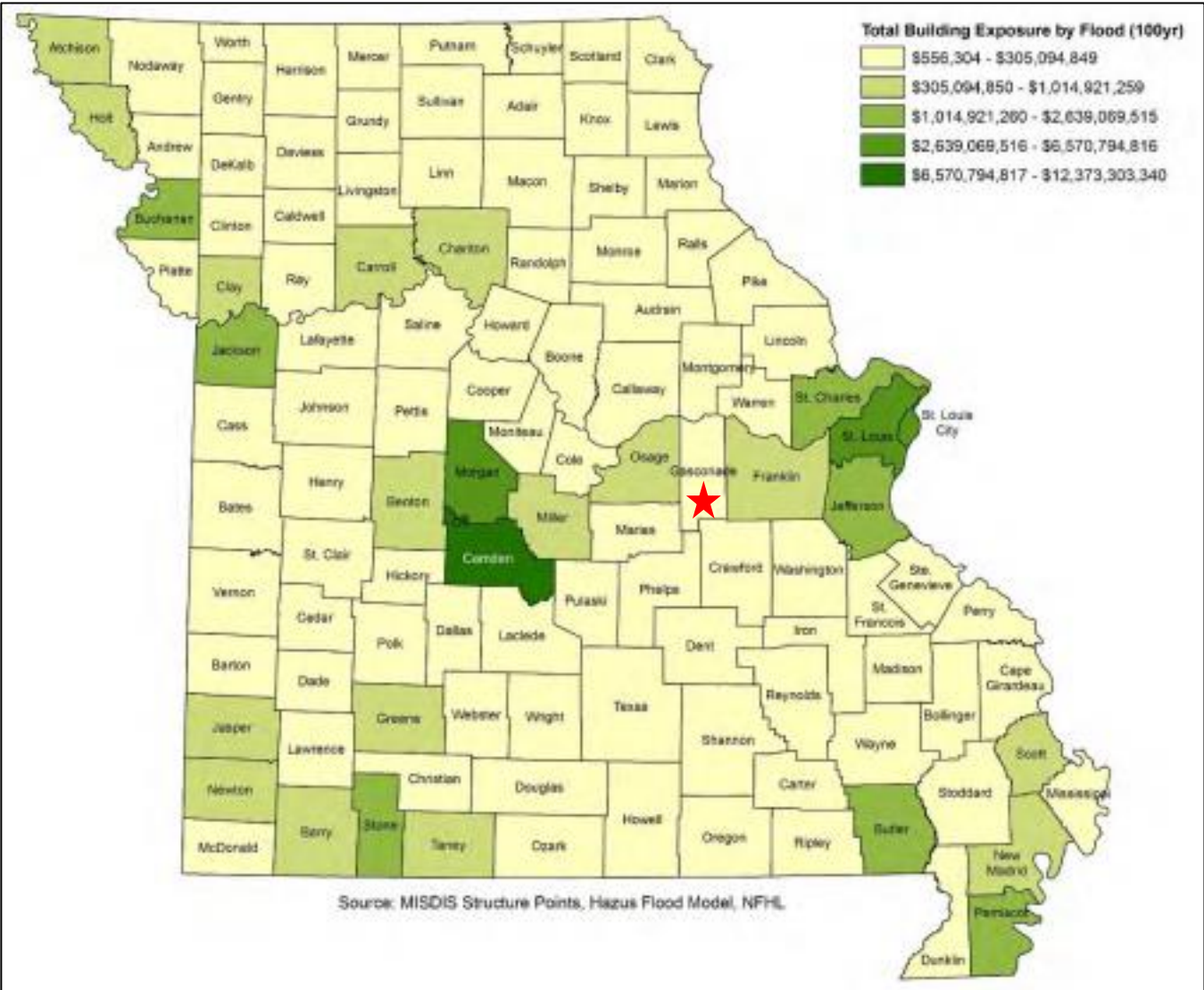
Table 3.55 presents the results of the primary indicators for Gasconade County – residential, agricultural, commercial, education, government and industrial. This table illustrates the number of affected structures and estimated losses. **Figure 3.47** shows the building exposure for the Hazus Base-Flood Scenario. **Figure 3.48** illustrates the building impacted ratio for a 100-year flood.

Table 3.55. Gasconade 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
192	\$36,012,668	381	\$86,487,000	79	\$43,553,651	0	\$0	1	\$799,579	0	\$0	451	\$166,852,898

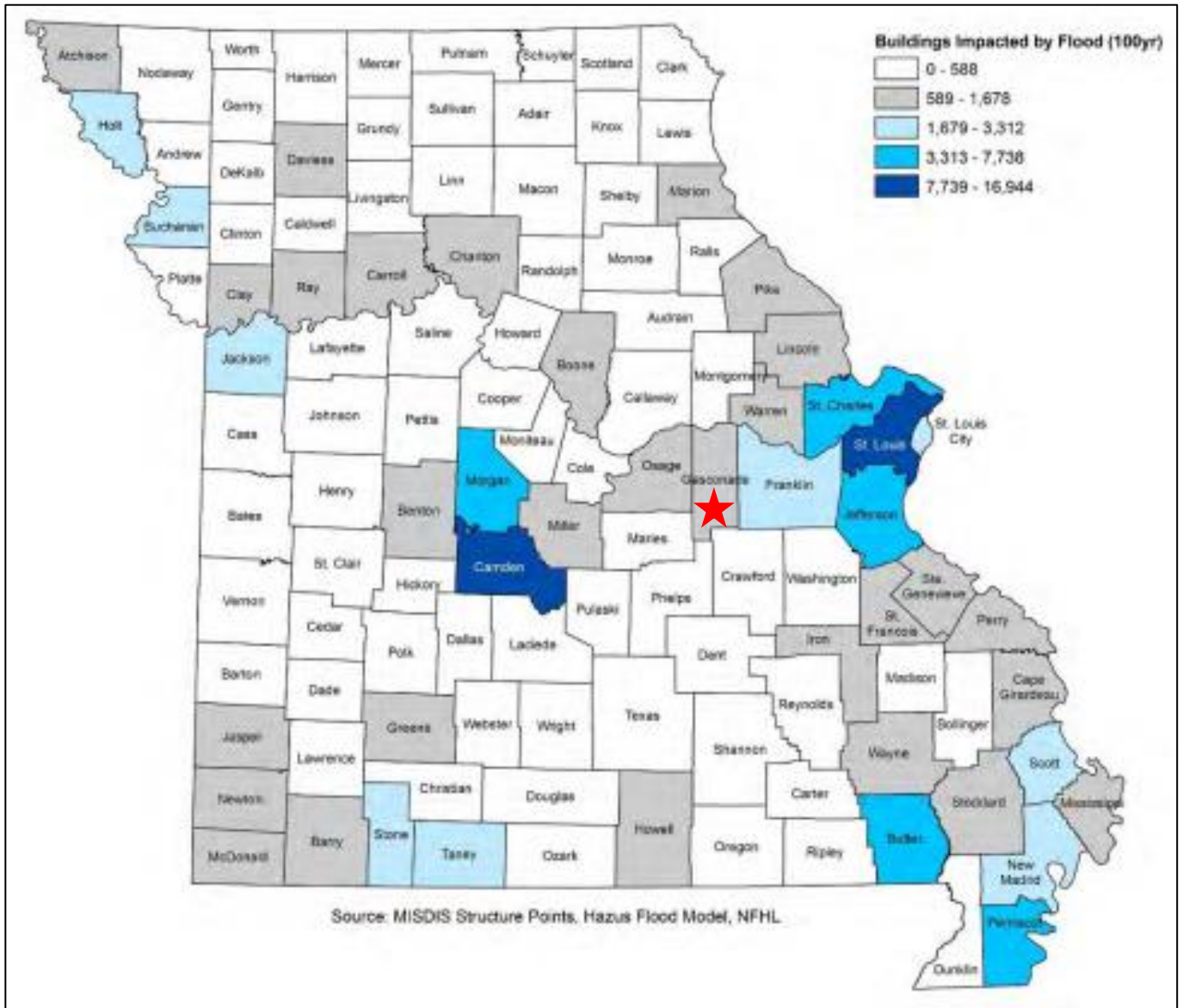
Source: 2018 Missouri State Hazard Mitigation Plan

Figure 3.47. Hazus Countywide Base-Flood Scenarios: Building Exposure



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.48. Hazus Countywide Base-Flood Scenarios: Building Impacted Ratio



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

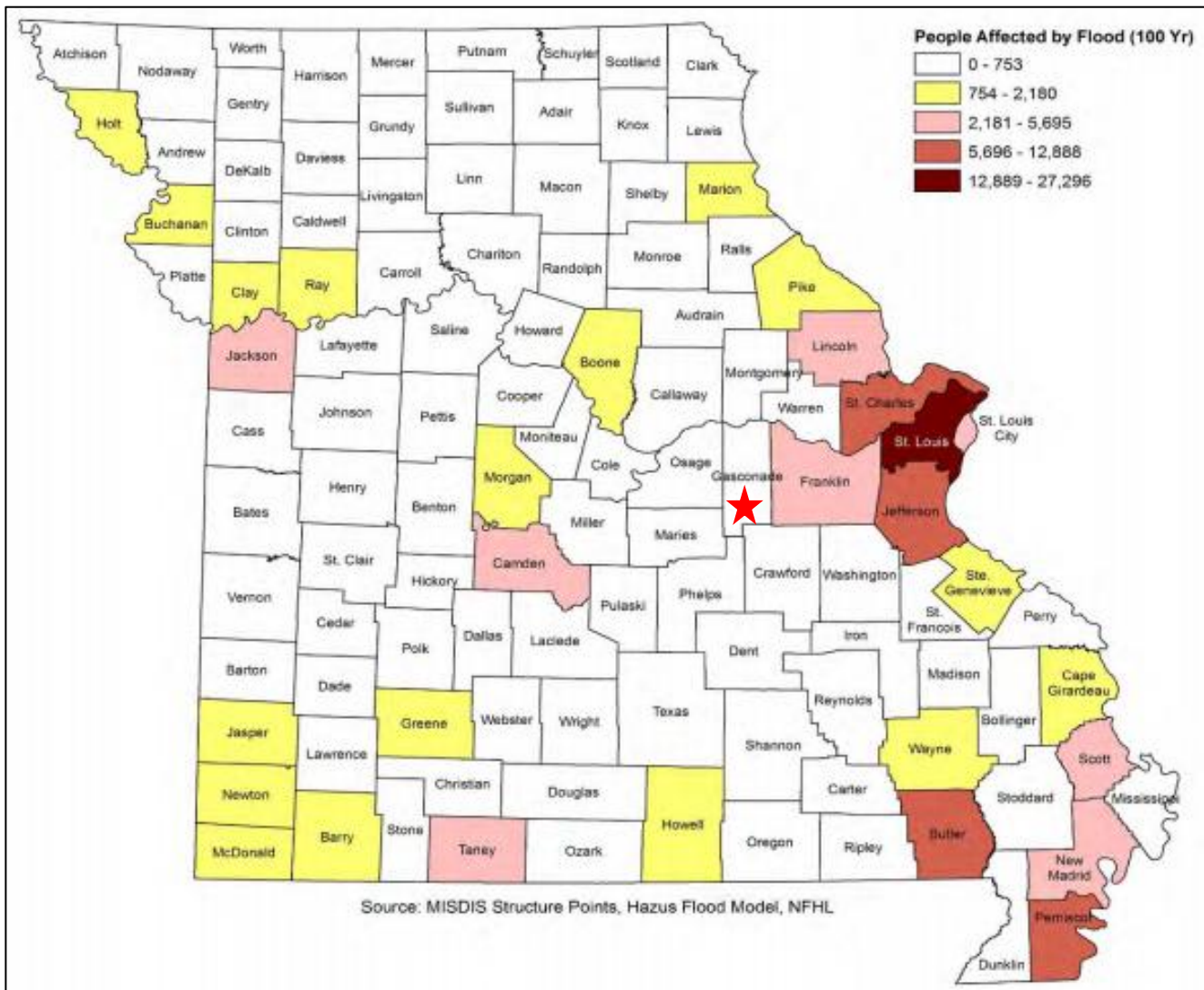
Lastly, the State determined the estimated number of displaced households and need for shelters within Gasconade County in the event of a 100 year flood. **Table 3.56** and **Figure 3.49** illustrate this information.

Table 3.56. Estimated Displaced People and Shelter Needs for Gasconade County

County	Displaced People	Displaced Population Requiring Shelter
Gasconade	1,305	222

Source: 2018 Missouri State Hazard Mitigation Plan

Figure 3.49. Hazus Countywide Base-Flood Scenarios: Displaced People



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Potential Losses to Existing Development

Every jurisdiction in Gasconade County contains a portion of the 100 Year Floodplain except for Rosebud. According to the HAZUS model, Gasconade County has a building loss ratio of 2.82% for countywide base-flood scenarios, which is relatively high in relation with other counties in the state. Additionally, the county has a high number of repetitive loss properties. With the annual average probability for flooding at 43% and 76% for flash floods, Gasconade County’s existing development is vulnerable. Especially development located in low-lying areas, near rivers or streams, or where drainage systems are not adequate are all prone to flooding.

According to the 2020 Questionnaire, no school districts within the county have buildings located within the floodplain. Lastly, several buildings damaged historically to flooding have been mitigated, leaving fewer areas of potential destruction. The City of Gasconade does have one railroad bridge that was updated several years ago that is now more prone to debris jams which increases the chances of flooding the city.

Impact of Previous and Future Development

Impact of future development is correlated to floodplain management and regulations set forth by the county and jurisdictions³⁵. 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 Gasconade County, Hermann, and Gasconade. Unincorporated Gasconade County and the city of Morrison have the most recorded NCEI flood events. Since 1999 there have been 25 incidents of flooding or flash flooding in Gasconade County; (**Table 3.49** and **Table 3.50**). The city of Hermann has 14 repetitive loss properties, whereas the county has 37 repetitive loss properties.

Those areas at greatest risk to riverine flooding are those populated areas along the Missouri River and Gasconade River.

A small portion of the cities of Bland and Owensville, and significant portions of the cities of Gasconade, Hermann, and Morrison reside in a SFHA.

The city of Hermann has portions of Highways 19, 100, and Gutenberg Natural Gas that could be threatened by riverine flooding. The city of Morrison has portions of Highway 100, Shawnee Creek Bridge, and the Union Pacific Railroad and the City Hall Building that could be threatened by riverine flooding.

The city of Rosebud is not a member of the NFIP and does not have any identified floodplain areas within the city boundaries. But the community is still vulnerable to flash floods and affected by closures to roads around the city.

Problem Statement

The county has already adopted a Floodplain Management Ordinance concerning construction in the floodplain. The county should consider buyouts of properties that are flood prone and have had repetitive losses to mitigate future disasters. Local governments should make a strong effort to further improve warning systems to insure 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.

³⁵ 2015 Boone County Hazard Mitigation Plan

3.4.6 Land Subsidence/Sinkholes

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
- <http://www.dnr.mo.gov/geology/geosrv/envgeo/sinkholes.htm>
<http://strangesounds.org/2013/07/us-sinkhole-map-these-maps-show-that-around-40-of-the-u-s-lies-in-areas-prone-to-sinkholes.html>
- <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.

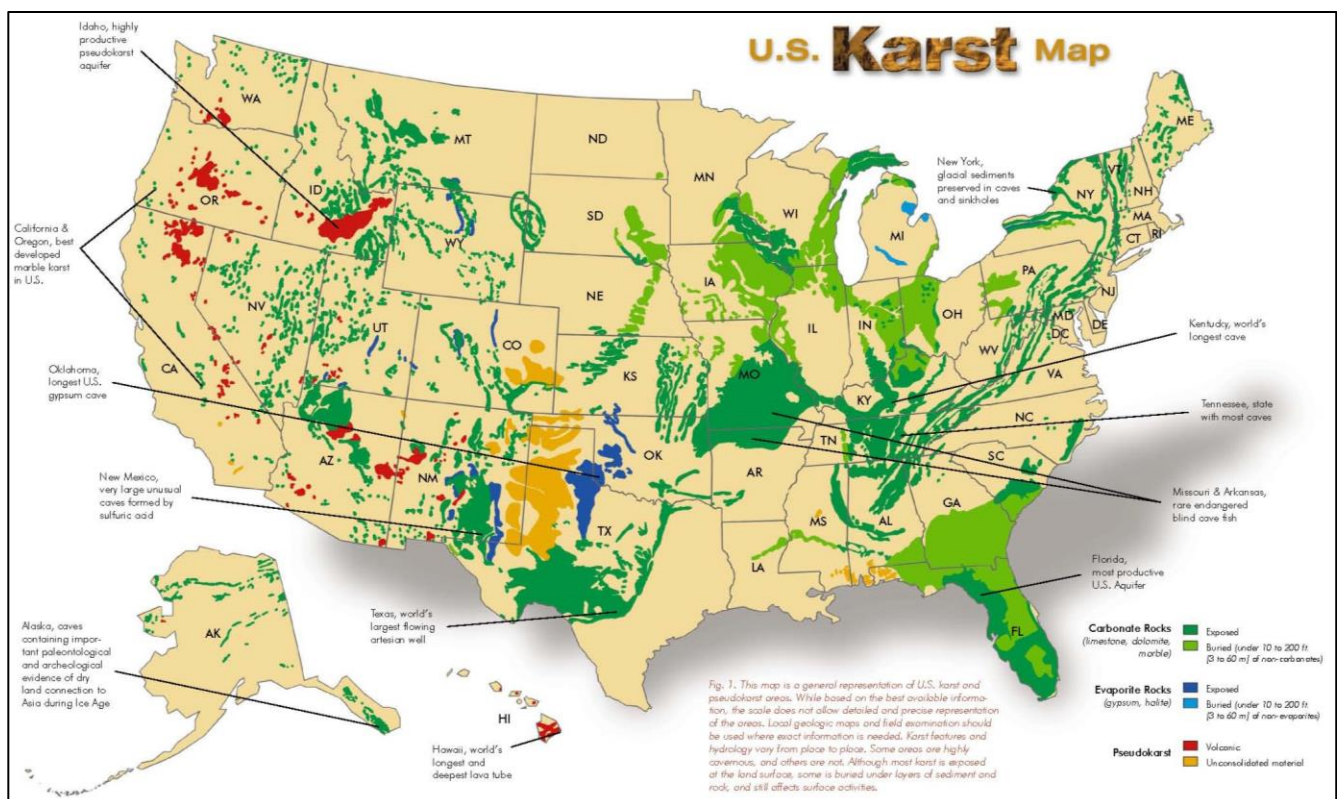
According to the U.S. Geological Survey (USGS), the most damage from sinkholes tends to occur in Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania. Fifty-nine percent of Missouri is underlain by thick, carbonate rock that makes Missouri vulnerable to sinkholes. Sinkholes

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

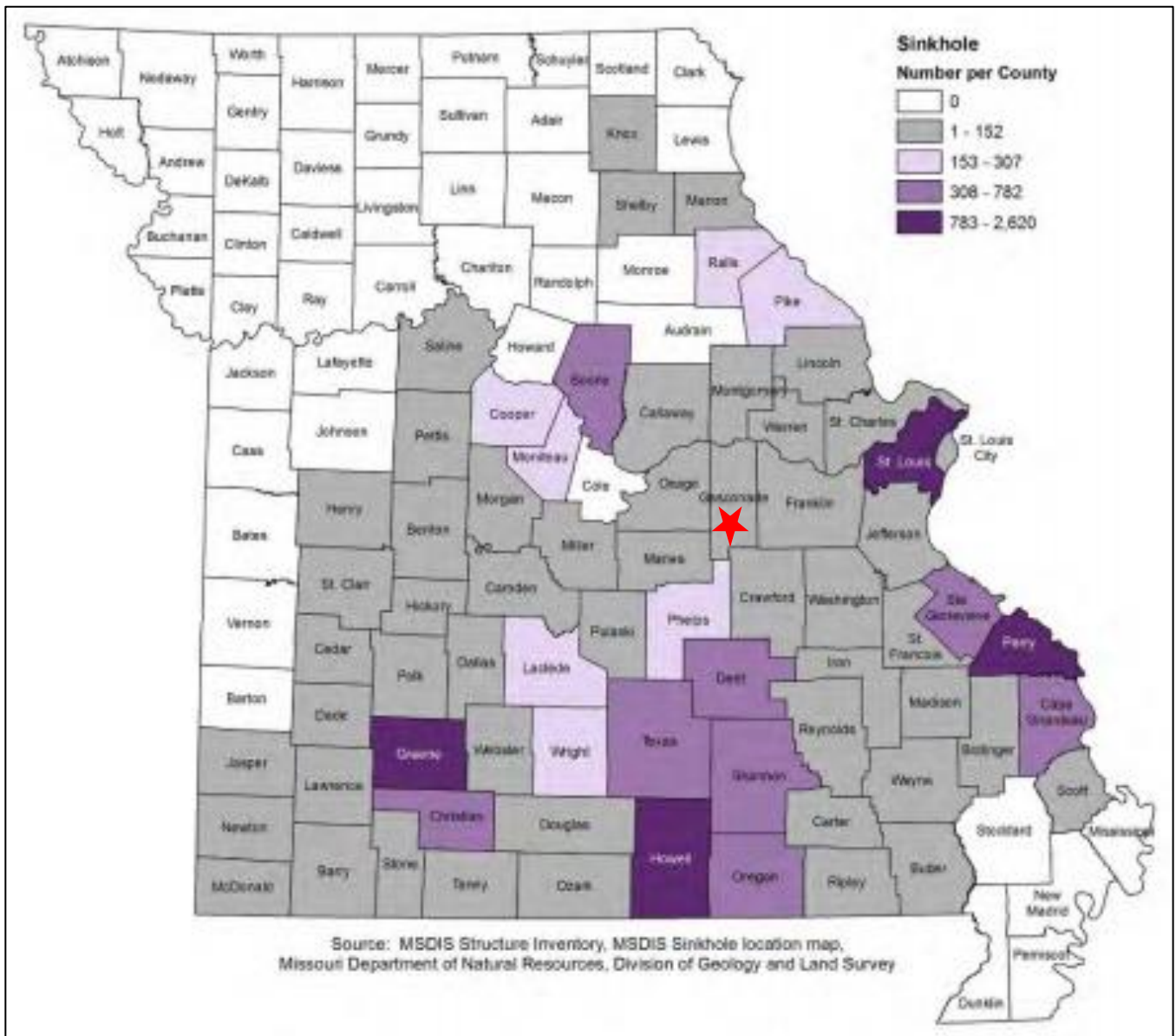
Figure 3.50 depicts karst topography across the United States. Missouri's karst topography is comprised of carbonate rocks such as limestone, dolomite, and marble. Variability in areas prone to sinkholes does not differ greatly across the county. According to the 2018 Missouri State Hazard Mitigation Plan there are two sinkholes that have been recorded within Gasconade County (**Figure 3.51**). In addition, the Plan states that there are 1,366 mines in Gasconade County - as shown in **Figure 3.52**. According to the Missouri Department of Natural Resources, Gasconade County primarily produces crushed stone such as limestone, dolomite, granite, and felsite. Activities such as mining or drilling are known to be responsible for the formation of sinkholes.

Figure 3.50. U.S. Karst Map



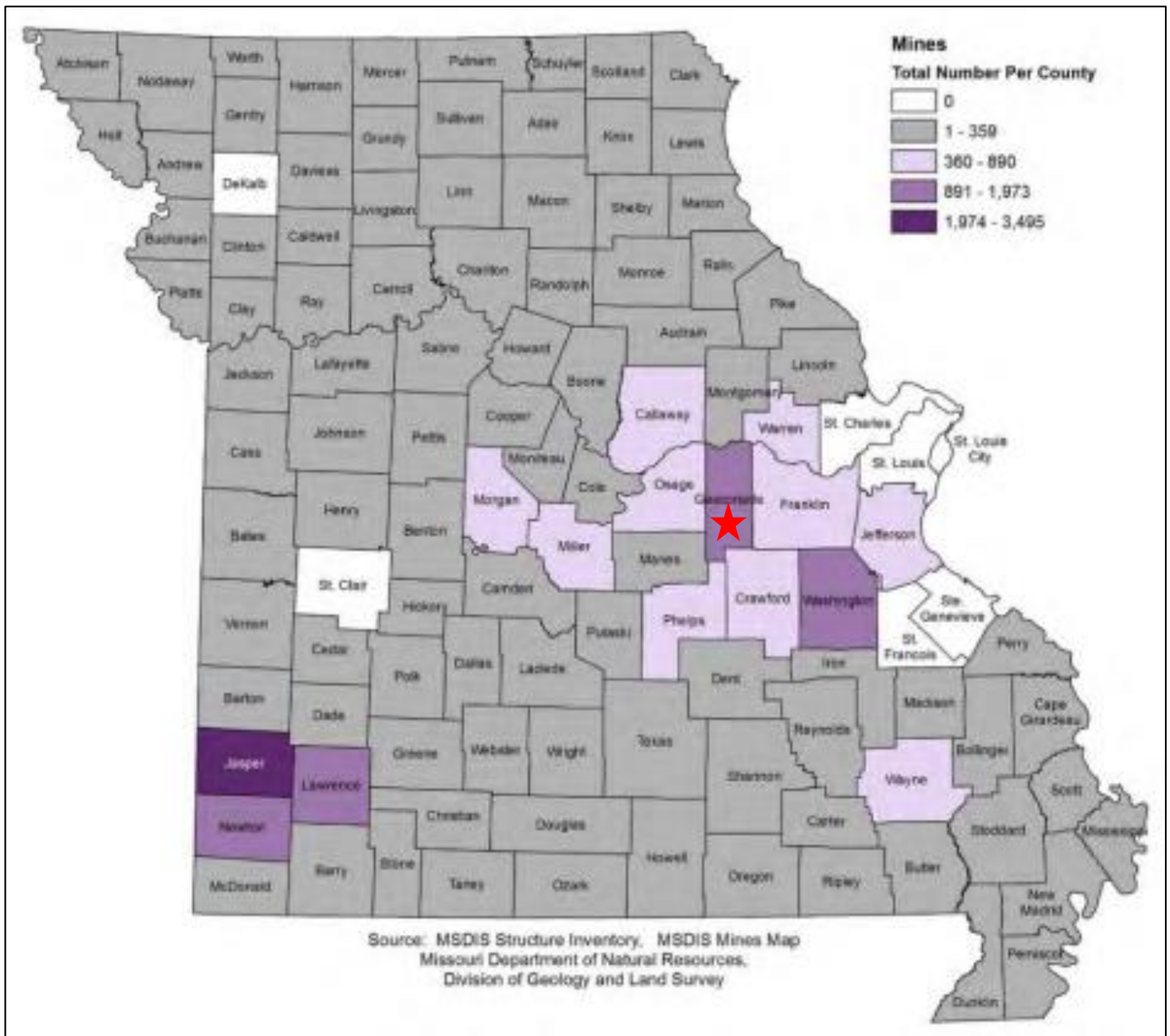
Source: http://www.northeastern.edu/protect/wp-content/uploads/US_KarstMap.jpg

Figure 3.51. Sinkholes Counts per County



Source: 2018 Missouri Hazard Mitigation Plan; *Red star indicates Gasconade County

Figure 3.52. Mines Counts Per County



Source: 2018 Missouri Hazard Mitigation Plan; *Red star indicates Gasconade County

Strength/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.³⁶

³⁶ 2018 Missouri Hazard Mitigation Plan

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 Gasconade County, incidents have occurred in other parts of southern Missouri. Fortunately, there are no recorded incidents of death due to sinkholes in the county. Recorded sinkholes are rural in nature and reside within unincorporated parts of the county.

Probability of Future Occurrence

Due to the lack of data for previous sinkhole events in Gasconade County, a probability could not be calculated.

Changing Future Conditions Considerations

The Missouri State Hazard Mitigation Plan states that an increase in droughts and extreme weather such as torrential rain and flooding, can result in an increase in sinkholes. Heavy rains often expose or contribute to the development of sinkholes, and periods of drought, with drops in groundwater, can also result in the development of sinkholes. It is expected that future development, coupled with climate change and its corresponding extreme weather events will result in an increase in sinkhole issues in Gasconade County.

Vulnerability

Vulnerability Overview

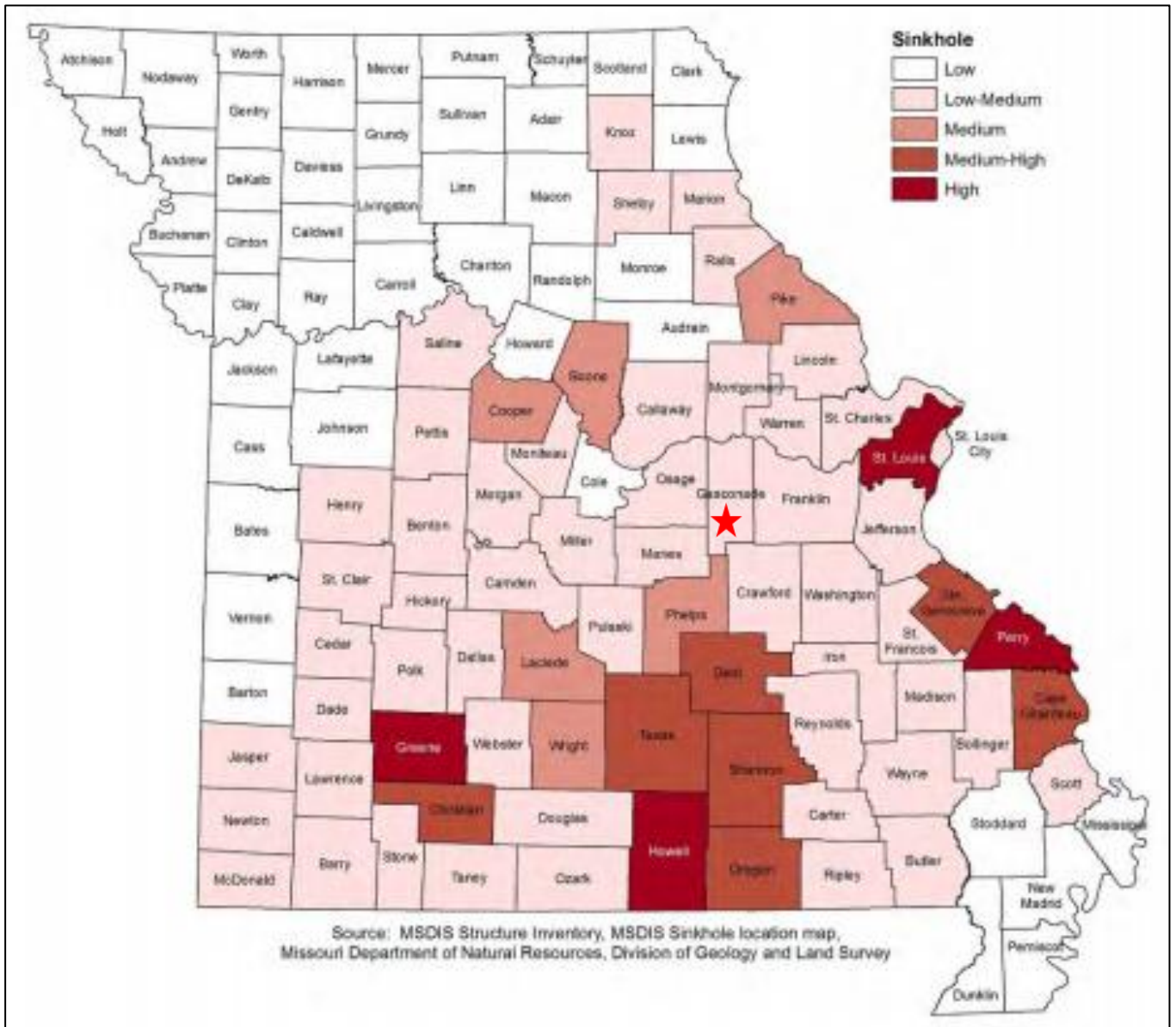
Unfortunately, no statistics are available for the number of subsurface locations that may potentially collapse in the future, forming a sinkhole. According to the state plan, if a county has fewer than 200 sinkholes, the risk is considered 2 - low-medium. For mines, the state plan calculates that Gasconade County’s risk is rated as 5 – High. See **Table 3.57**, **Figure 3.53** and **Figure 3.54** further illustrate the sinkhole and mining rating values respectively.

Table 3.57. Sinkhole/Mine Rating Values for Gasconade County

Factor	1 (Low)	2 (Low-medium)	3(Medium)	4 (Medium-high)	5 (High)
Sinkholes per county	0	1-200	201-400	401-800	801+
Mines per county	0-100	101-250	251-500	501-750	751+

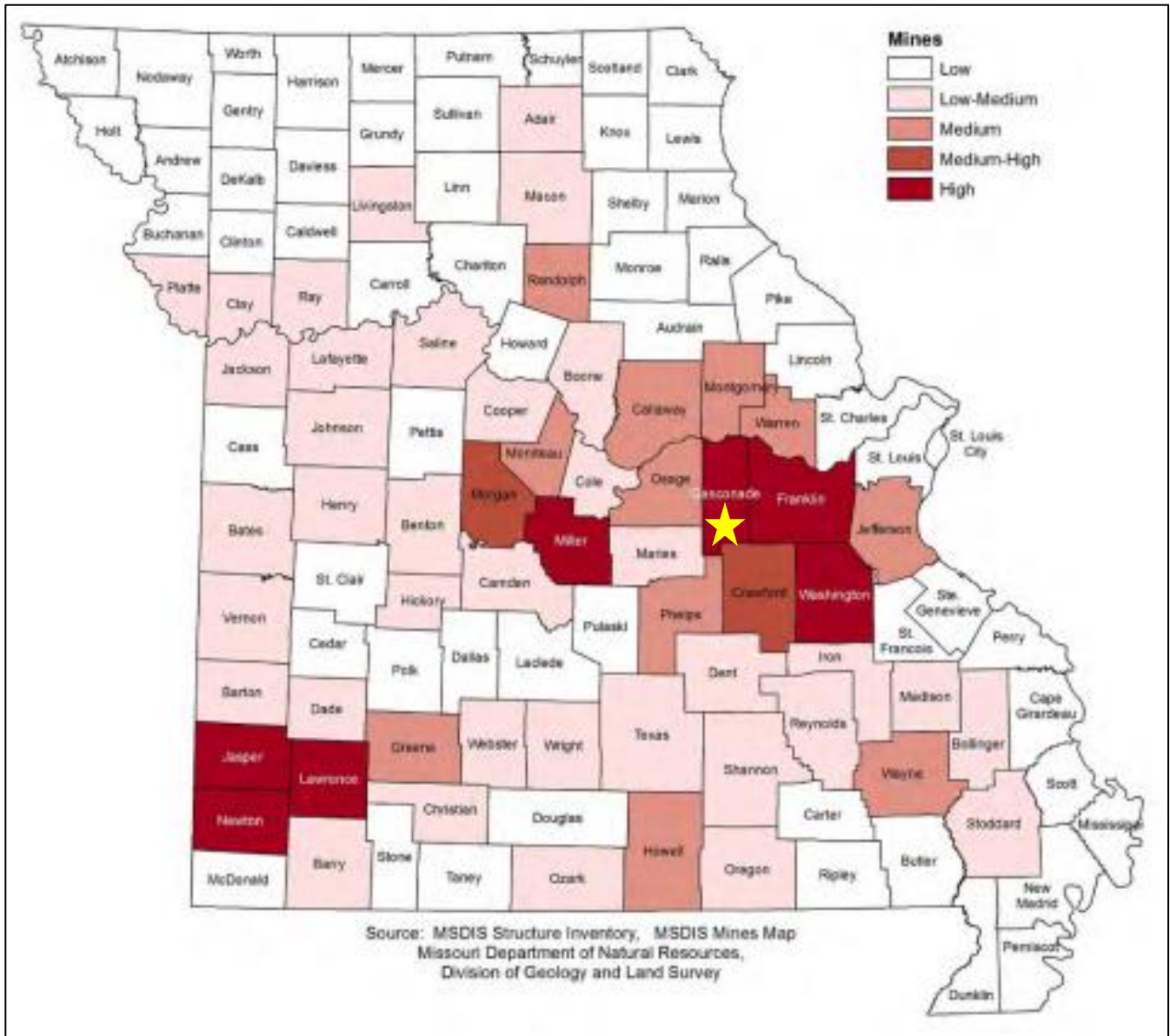
Source: 2018 Missouri Hazard Mitigation Plan, **Yellow highlight** shows values for Gasconade County

Figure 3.53. Sinkhole Rating Value by County



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

Figure 3.54. Mine Rating Value By County



Source: 2018 Missouri Hazard Mitigation Plan, *Yellow star indicates Gasconade County

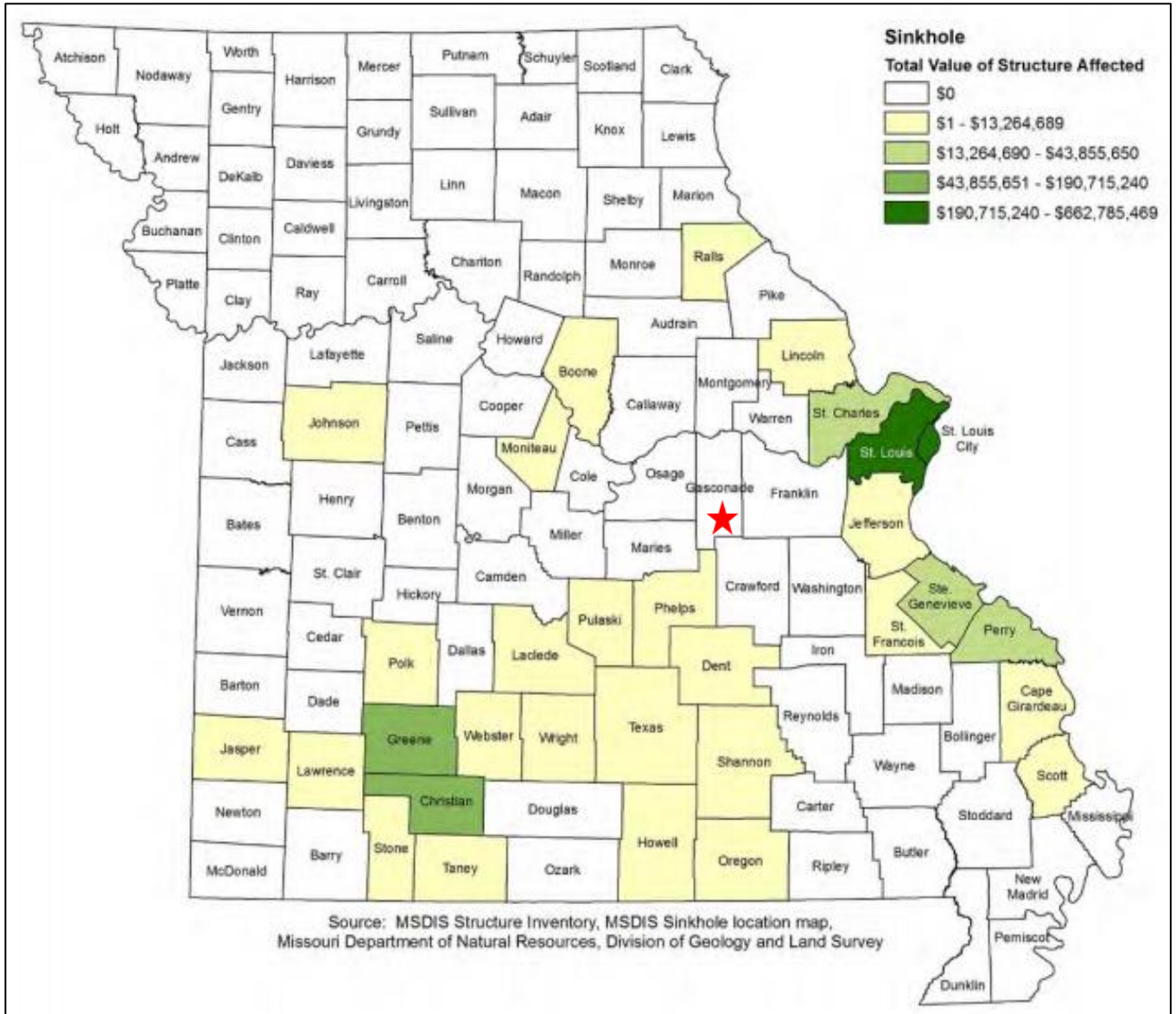
Potential Losses to Existing Development

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 vicinity³⁷. 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 Gasconade County.

³⁷ <https://ufonline.ufl.edu/infographics/how-to-spot-a-sinkhole/>

The 2018 Missouri Hazard Mitigation Plan devised a method of estimating potential losses using GIS data. **Figure 3.55** shows the ranking of structures that could potentially be impacted by sinkholes by county. This map shows that Gasconade County has \$0 total value of structures affected.

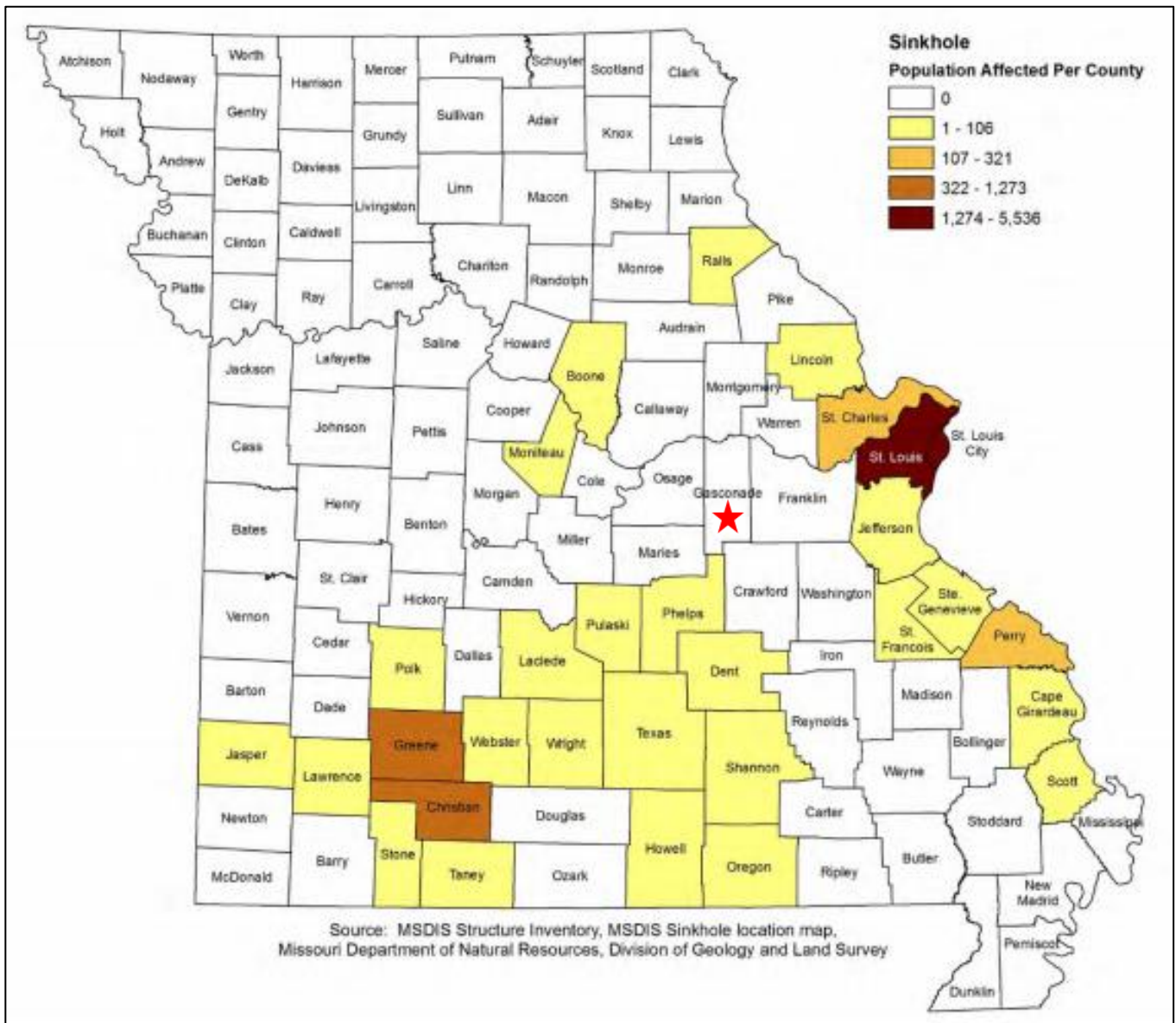
Figure 3.55. Ranking of Structures Potentially Impacted by Sinkholes by County



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

Figure 3.56 shows the population potentially impacted by sinkholes; Gasconade County shows that 0 of the county population could be affected by sinkholes.

Figure 3.56. Ranking of Population Potentially Impacted by Sinkholes by County



Source: 2018 Missouri Hazard Mitigation Plan, *Red star indicates Gasconade 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, Gasconade County’s risk in regards to these hazards is moderately low.

Hazard Summary by Jurisdiction

According to the state plan, Gasconade County’s risk is low. Based on the location of known sinkholes, the jurisdiction most likely to be impacted by sinkholes is Unincorporated Gasconade County.

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.

3.4.7 Levee Failure

Some sources of data for this hazard include:

- 2018 Missouri State Hazard Mitigation Plan, Chapter 3, Section 3.3.2, Page 3.124
https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf
- National Levee Database, <https://levees.sec.usace.army.mil/#/>
- FEMA Map Service Center for Flood Insurance Rate Maps and Flood Insurance Studies, msc.fema.gov/portal; <https://www.fema.gov/fema-levee-resources-library>
- Missouri Hazard Mitigation Viewer
<http://bit.ly/MoHazardMitigationPlanViewer2018> - Website
<https://drive.google.com/file/d/1bPkc0jgF9ofwQLnTL9N0u-oPFWi9hkst/view> - User Guide
 - Counties with existing levees
 - Population exposure to levees on the National Inventory of Levees by County
 - Building exposure to levees on the National Inventory of Levees by County
- MSDIS Structure Inventory and All Hazard Risk Dataset
(available in both GIS and Excel format)
<https://drive.google.com/drive/folders/0Bzq99s866kWocFB5Y3hCRIRuWWM>

Hazard Profile

Hazard Description

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

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

Overtopping: When a Flood Is Too Big

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

Breaching: When a Levee Gives Way

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

Earthen levees can be damaged in several ways. For instance, strong river currents and waves can erode the surface. Debris and ice carried by floodwaters—and even large objects such as boats or barges—can collide with and gouge the levee. Trees growing on a levee can blow over, leaving a

hole where the root wad and soil used to be. Burrowing animals can create holes that enable water to pass through a levee. If severe enough, any of these situations can lead to a zone of weakness that could cause a levee breach. In seismically active areas, earthquakes and ground shaking can cause a loss of soil strength, weakening a levee and possibly resulting in failure. Seismic activity can also cause levees to slide or slump, both of which can lead to failure.

Geographic Location

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

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

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

For purposes of the levee failure profile and risk assessment, those levees indicated on the Preliminary DFIRM as providing protection from at least the 1-percent annual chance flood will be discussed and further analyzed. It is noted that increased discharges are being taken into account in revision of the flood maps as part of the RiskMap efforts. This may result in changes to the flood protection level that existing levees are certified as providing.

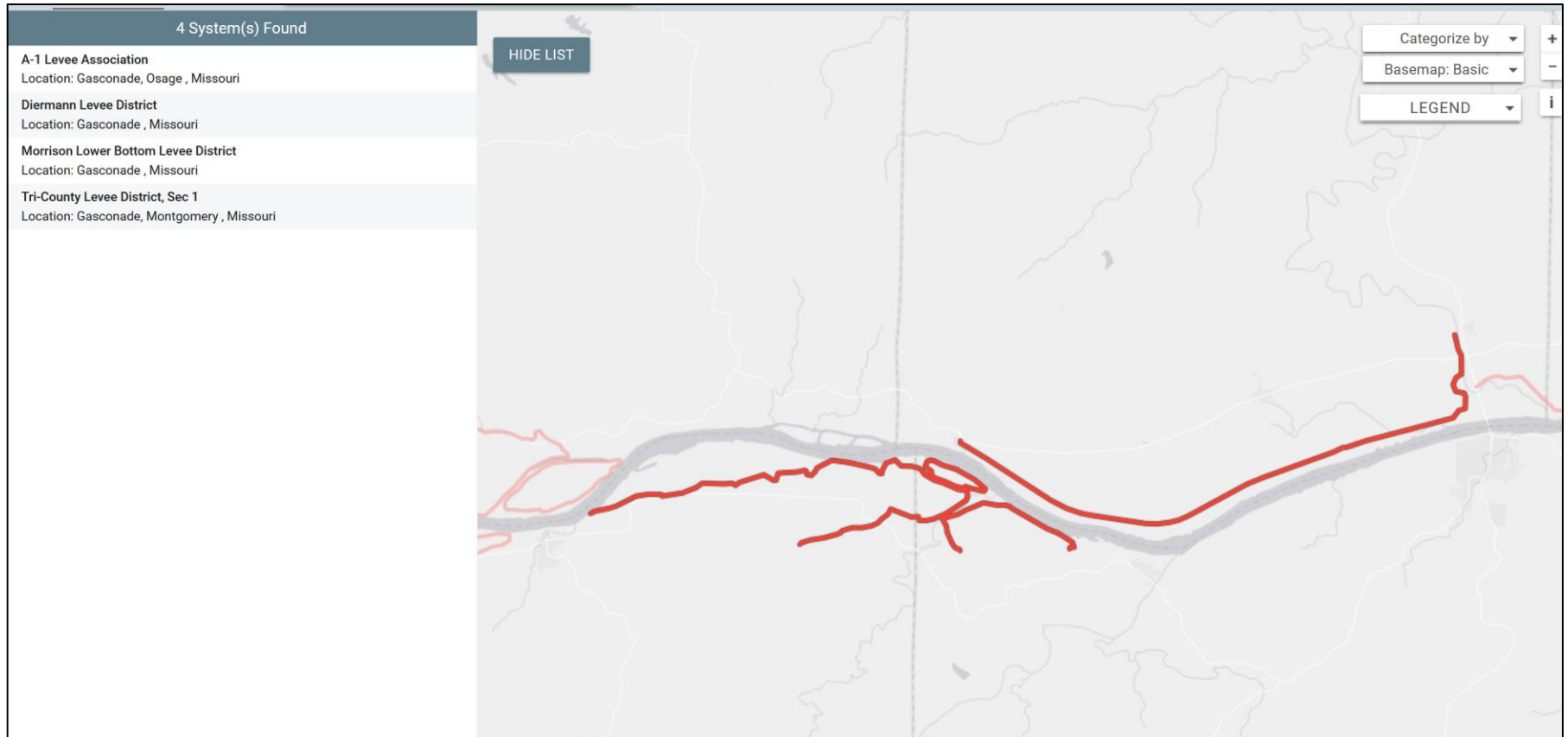
According to the USACE, there are four levees within Gasconade County. Detailed levee data can be found in **Table 3.58**. Leveed areas can be seen in **Figure 3.57**. None of the levees are certified to protect from the 1-percent annual chance flood event and therefore none of them appear on FIRMs.

Table 3.58. Gasconade County Levees

County	System Name/Sponsor	Length (miles)	Inspection Date	Inspection Rating	Leveed Area Type	Leveed Area Acreage
Gasconade	Diermann Levee District	2.75	27-Feb-14	Minimally Acceptable	Agricultural	173.73
Gasconade	A-1 Levee Association	11.83	6-Aug-12	Minimally Acceptable	Agricultural	4,969.26
Gasconade	Tri-County Levee District, Sec 1	12.13	6-Aug-14	Acceptable	Agricultural	7,690.05
Gasconade	Morrison Lower Bottom Levee District	3.67	9-Aug-12	Minimally Acceptable	Agricultural	950.63

Source: <https://levees.sec.usace.army.mil/#/>

Figure 3.57. Gasconade County Levees - USACE



Source: <https://levees.sec.usace.army.mil/#/>

Strength/Magnitude/Extent

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

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

Previous Occurrences

Table 3.59. USACE Previous Occurrences of Levees in Gasconade County

System Name/Sponsor	Risk Level	# of Failures	Annual % Risk
Diermann Levee District	Low	4	20
A-1 Levee Association	Low	4	10
Tri-County Levee District, Sec 1	Low	2	10
Morrison Lower Bottom Levee District	Low	3	20

Source: USACE National Levee Database, <https://levees.sec.usace.army.mil/>

Diermann Levee District system was overtopped and breached in 1993, 1994, and 1995. The levee was overtopped only in 2019. The 2015 USACE screening level risk assessment estimated the likelihood of a flood overtopping this levee in any given year at approximately 20%, or a 1 chance in 5.

A1 Levee Association system was overtopped and breached in 1993 and 1994. The levee was overtopped only in 2013 and 2019. The 2014 USACE screening level risk assessment estimated the likelihood of a flood overtopping this levee in any given year at approximately 10%, or a one chance in 10.

Tri-County Levee District Section 1 was overtopped and breached in 1993 and 1995. The 2015 USACE screening level risk assessment estimated the likelihood of a flood overtopping this levee in any given year at approximately 10%, or a 1 chance in 10.

Morrison Lower Bottom Levee District system was overtopped and breached in 1993, 1995, and 2019. The levee was overtopped only in 2013. The 2015 USACE screening level risk assessment estimated the likelihood of a flood overtopping this levee in any given year at approximately 20%, or a 1 chance in 5.

According to local officials, in 2017 a 250 foot breach occurred in a privately owned levee near the City of Gasconade; the breach, in conjunction with a debris jam and flood waters, damaged

the private farm, 18 homes and the city park. Unfortunately, due to data limitations, additional information was not available for the planning area.

Probability of Future Occurrence

According to the available data, two levee failures occurred within the last 20 years. This information was utilized to determine the annual average percent probability of levee failure. The probability of levee failure in Gasconade County per year is 10% (2 event/20 years x 100 = 10%).

Table 3.60. Annual Average % Probability of Levee Failure in Gasconade County

Location	Annual Avg. % P
Gasconade County	10%

*P = probability; see page 3.24 for definition.

Changing Future Conditions Considerations

The impact of changing future conditions on levee failure will most likely be related to changes in precipitation and flood likelihood. Climate change projections suggest that precipitation may increase and occur in more extreme events, which may increase risk of flooding, putting stress on levees and increasing likelihood of levee failure. Furthermore, aging levee infrastructure and a lack of regular maintenance (including checking for seepage and removing trees, roots and other vegetation that can weaken a levee) coupled with more extreme weather events may increase risk of future levee failure.

Vulnerability

Vulnerability Overview

The USACE regularly inspects levees within its Levee Safety Program to monitor their overall condition, identify deficiencies, verify that maintenance is taking place, determine eligibility for federal rehabilitation assistance (in accordance with P.L. 4-99), and provide information about the levees on which the public relies. Inspection information also contributes to effective risk assessments and supports levee accreditation decisions for the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA).

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

Both Routine and Periodic Inspections result in a rating for operation and maintenance. Each levee segment receives an overall segment inspection rating of Acceptable, Minimally Acceptable, or Unacceptable. **Figure 3.58** below defines the three ratings.

Figure 3.58. Definitions of the Three Levee System Ratings

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

None of the levees in the planning area are rated as unacceptable.

Potential Losses to Existing Development

Areas most vulnerable to levee failure are identified in **Figures 3.56**. These areas are in close proximity to the cities of Morrison, Gasconade, and Hermann. However, the protected leveed areas are classified as “agricultural” land. Therefore special districts and assets should not be present. Nonetheless, multiple privately owned levees exist within the county. Unfortunately these levees tend to be neglected until a failure occurs. **Table 3.61** depicts the risks to peoples and property of the four USACE levees in the County.

Table 3.61. USACE Risk Data for Levee Failure in Gasconade County

System Name/Sponsor	Risk Level	Population	Structures	Property Value	Agriculture Product Value
Diermann Levee District	Low	0	0	\$0	\$100K
A-1 Levee Association	Low	30	60	\$2.6M	\$1.8M
Tri-County Levee District, Sec 1	Low	11	14	\$2.2M	\$2.7M
Morrison Lower Bottom Levee District	Low	0	0	\$0	\$454K

Source: USACE National Levee Database, <https://levees.sec.usace.army.mil/>

Due to data limitations, potential losses to existing development could not be calculated for uninspected private levee systems. However, any development within leveed areas should anticipate losses during the event of failure.

The city of Hermann Municipal Airport could be threatened by potential levee failure. The city of Morrison has portions of Highway 100, Shawnee Creek Bridge, and Union Pacific Railroad and the City Hall Building that could be threatened during levee failure.

Impact of Previous and Future Development

Future development in leveed areas would increase the vulnerability for potential losses. Therefore, development in these areas should be avoided.

Hazard Summary by Jurisdiction

Communities in close proximity to USACE leveed areas include Morrison, Gasconade, and Hermann. However, the leveed areas are considered agricultural. Privately owned levees are present; however a maintained inventory does not exist.

Problem Statement

There are substantial data limitations for levees within Missouri. Four leveed areas within the county were identified by the USACE. However, none of them are certified to protect in the 1-percent annual flood event. Flooding is the most common hazard associated with levee failure, and is area specific. During the event of levee failure, potential loss would be similar to that of flooding.

3.4.8 Severe Thunderstorms Including High Winds, Hail, and Lightening

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
- FEMA 320, Taking Shelter from the Storm, 3rd edition,
http://www.weather.gov/media/bis/FEMA_SafeRoom.pdf
- Lightning Map, National Weather Service,
http://www.lightningsafety.noaa.gov/stats/08_Vaisala_NLDN_Poster.pdf
- Death and injury statistics from lightning strikes, National Weather Service.
- Wind Zones in the U.S. map, FEMA,
http://www.fema.gov/plan/prevent/saferoom/tsfs02_wind_zones.shtm;
- Annual Windstorm Probability (65+knots) map U.S. 1980-1994, NSSL,
http://www.nssl.noaa.gov/users/brooks/public_html/bigwind.gif
- Hailstorm intensity scale, The Tornado and Storm Research Organization (TORRO),
<http://www.torro.org.uk/site/hscale.php>;
- NCEI data;
- USDA Risk Management Agency, Insurance Claims, <http://www.rma.usda.gov/data/cause.htm>
- National Severe Storms Laboratory – hail map,
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 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 3.4.10**)

High Winds

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

Lightning

All thunderstorms produce lightning which can strike outside of the area where it is raining and 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.

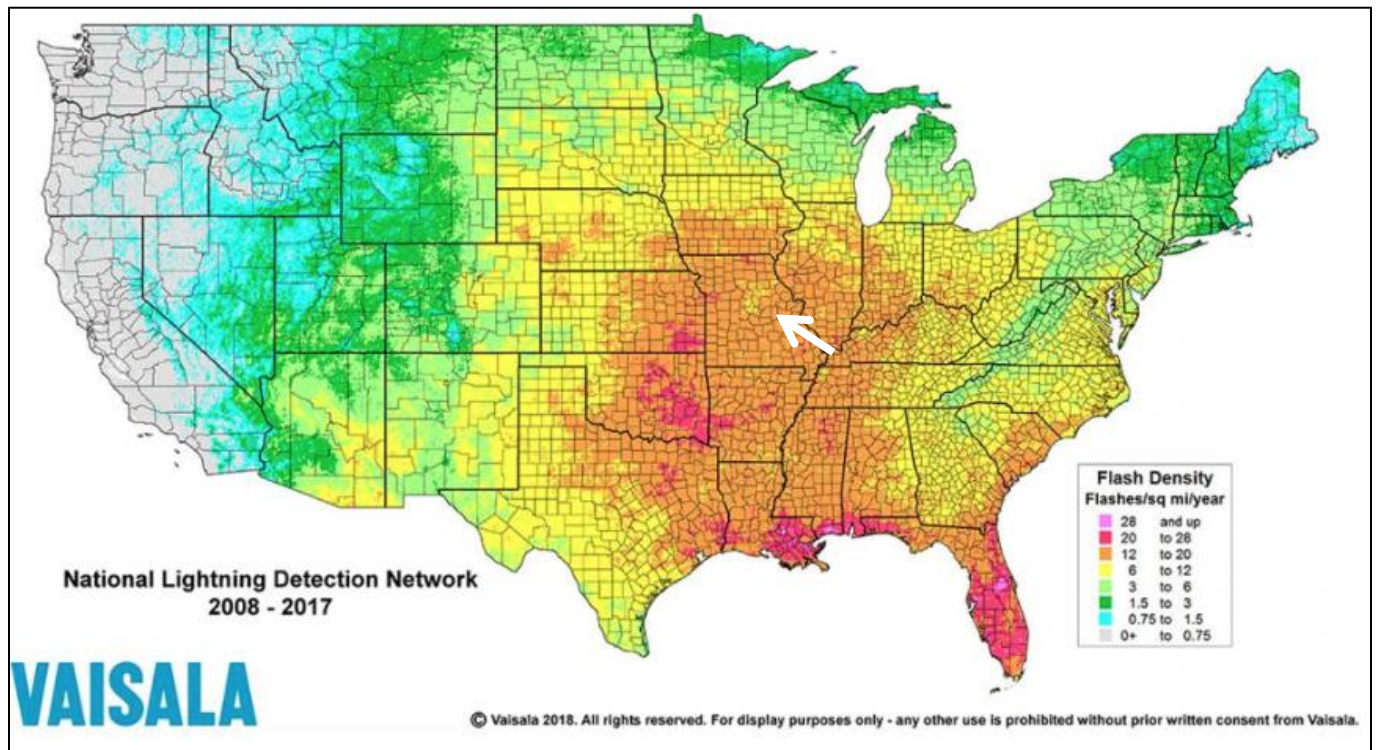
At the time when the updraft can no longer support the hailstone, it will fall down to the earth. For example, a ¼" diameter or pea sized hail requires updrafts of 24 miles per hour, while a 2 ¾" diameter or baseball sized hail requires an updraft of 81 miles per hour. According to the NOAA, the largest 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 3.59 depicts the location and frequency of lightning in Missouri. Additionally, the map indicates that the flash density of Gasconade County ranges between 12 and 20 flashes per square kilometer per year.

Figure 3.59. Location and Frequency of Lightning in Missouri



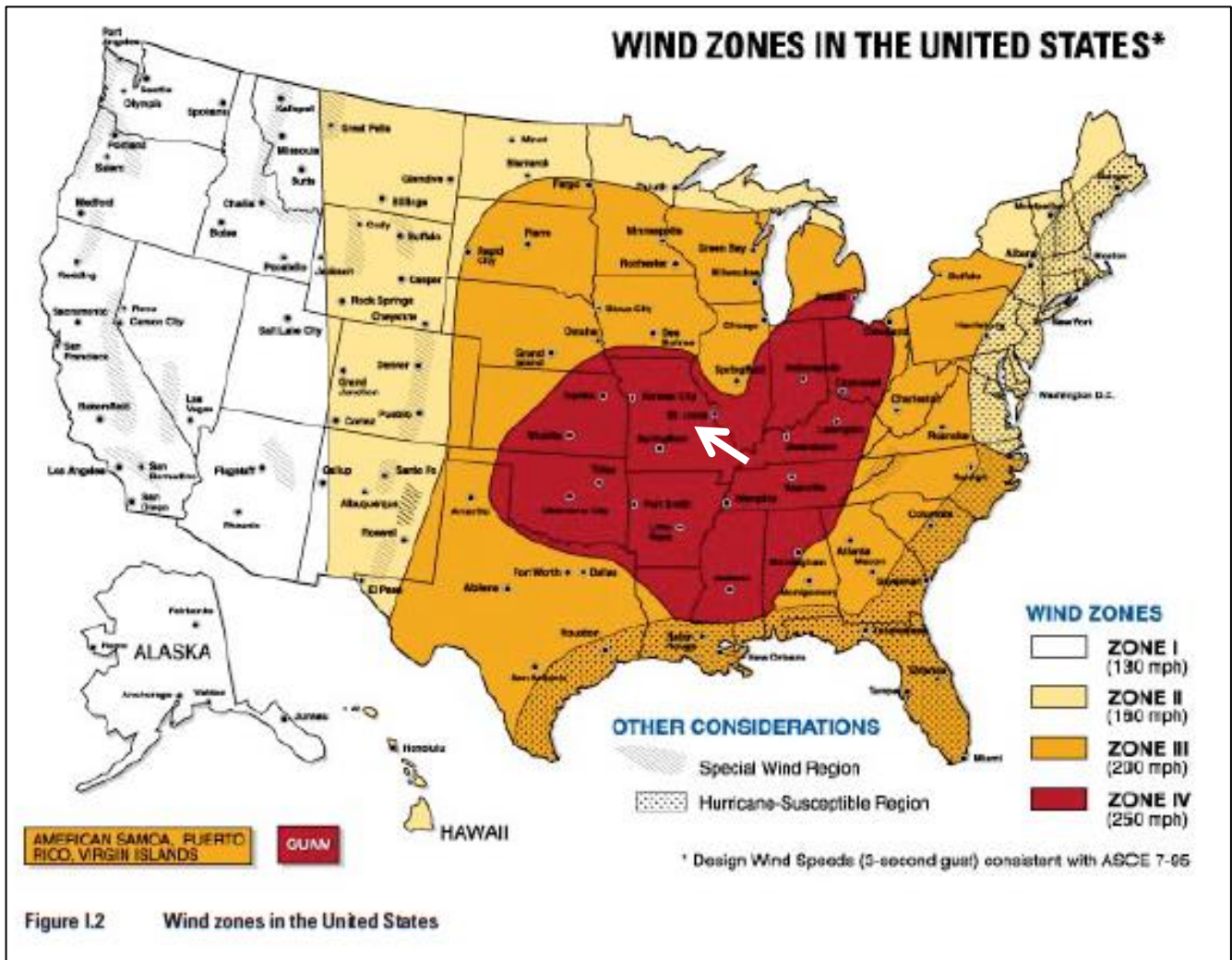
Source: National Weather Service,

<http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx>

* Gasconade 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 3.60**).

Figure 3.60. Wind Zones in the United States



Source: FEMA 320, *Taking Shelter from the Storm*, 3rd edition, https://www.fema.gov/pdf/library/ism2_s1.pdf
 *Gasconade County is indicated by a white arrow.

Strength/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 3.62** below describes typical damage impacts of the various sizes of hail.

Table 3.62. 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. <http://www.torro.org.uk/site/hscale.php>

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

Between 1999 and 2019, there were 350 recorded crop insurance claim for Thunderstorms, lightning, high wind, and hail in Gasconade 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 3.63** for events between 1999 and 2019. Moreover, thunderstorm wind and strong wind was included with high winds in **Figure 3.64**. NCEI data was obtained for lightning, and hail events between 1999 and 2019 as well (**Table 3.65** and **Table 3.66**). 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 3.63. NCEI Gasconade County Heavy Rain Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Rainfall (Inch)
2003	1	0	0	0	5
2005	1	0	0	0	6
2008	1	0	0	0	4
TOTAL	3	0	0	0	-

Source: NCEI, data accessed [11/10/2020]

Table 3.64. NCEI Gasconade County High Wind Events Summary, 1999 to 2019 (Thunderstorm)

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Estimated Gust (kts.)
1999	3	0	0	0	60
2000	5	0	0	0	62
2001	4	0	0	0	55
2002	4	0	0	10.00K	55
2003	2	0	0	20.00K	61
2004	3	0	0	0	55
2005	3	0	0	0	61
2006	2	0	0	0	60
2007	3	0	0	0	52
2008	3	0	0	0	56
2009	1	0	0	1.00K	52
2010	7	0	0	5.00K	52

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Estimated Gust (kts.)
2011	4	0	0	0	70
2012	3	0	2	0	78
2013	1	0	0	0	56
2014	3	0	0	0	56
2015	2	0	0	0	56
2016	2	0	0	0	56
2017	2	0	0	0	61
2018	1	0	0	0	56
2019	2	0	0	0	61
Total	81	0	2	36.00K	-

Source: NCEI, data accessed [11/10/2020]

Table 3.65. NCEI Gasconade County Lightning Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damage
2008	1	0	0	\$125.00K	0
Total	1	0	0	\$125.00K	0

Source: NCEI, data accessed [11/10/2020]

Table 3.66. NCEI Gasconade County Hail Events Summary, 1999 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Hail Size (inch)
2000	2	0	0	0	1.00
2001	3	0	0	0	1.25
2002	2	0	0	0	1.75
2003	4	0	0	0	1.75
2004	4	0	0	0	2.75
2005	3	0	0	0	1.00
2006	6	0	0	0	1.00
2007	2	0	0	0	.88
2008	2	0	0	0	.75
2009	2	0	0	0	1.75
2010	1	0	0	0	1.00
2011	11	0	0	0	2.75
2012	9	0	0	0	2.00
2013	2	0	0	0	1.75
2014	1	0	0	0	.75
2015	1	0	0	0	2.75
2016	2	0	0	0	1.75
2017	1	0	0	0	.88

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Max Hail Size (inch)
2018	1	0	0	0	1
Total	96	0	0	0	-

Source: NCEI, data accessed [11/10/2020]

Agriculture is an important piece of the economy for Gasconade County. The table below (**Table 3.67**) 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”, “Hail” and “Wind/Excessive Wind” as three causes of loss categories that align with this hazard. Between 1999 and 2019 a total of 344 insurance claims were paid out for damages due to excessive moisture/precipitation/rain, hail and wind/excessive wind. The total claims paid for this cause were \$4,309,808.23.

Table 3.67. Crop Insurance Claims Paid In Gasconade County from Excessive Moisture/Precipitation/Rain, Hail, and Wind/Excessive Wind 1999-2019

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
1999	Corn	Excessive Moisture/Precipitation/Rain	\$6098.00
	Soybeans		\$2979.00
2000	Soybeans	Excessive Moisture/Precipitation/Rain	\$2629.00
2001	Corn	Excessive Moisture/Precipitation/Rain	\$3872.00
	Soybeans		\$596.00
2002	Corn	Excessive Moisture/Precipitation/Rain	\$22,704.40
	Soybeans		\$19,479.00
	Grain Sorghum		\$1,008.00
2003	Corn	Excessive Moisture/Precipitation/Rain	\$10,371.00
	Soybeans		\$2,205.00
2004	Corn	Excessive Moisture/Precipitation/Rain	\$2,345.00
	Soybeans		\$6,505.00
	Wheat		\$1,831.00
2006	Soybeans	Excessive Moisture/Precipitation/Rain	\$667.00
2007	Cron	Excessive Moisture/Precipitation/Rain	\$1,796.50
2008	Corn	Excessive Moisture/Precipitation/Rain	\$234,568.00
	Soybeans		\$267,770.00
	Grain Sorghum		\$19,461.00
2009	Corn	Excessive Moisture/Precipitation/Rain	\$96,587.20
	Soybeans		\$3,673.00
	Grain Sorghum		\$4,341.00
	Wheat		\$1,687.40
2010	Corn	Excessive Moisture/Precipitation/Rain	\$137,931.73
	Soybeans		\$186,222.93
	Grain Sorghum		\$9,826.00
	Wheat		\$21,862.00
2011	Corn	Excessive Moisture/Precipitation/Rain	\$159,301.00
	Soybeans		\$109,948.00
	Grain Sorghum		\$13,631.00
	Wheat		\$5,611.00
2012	Corn	Excessive Moisture/Precipitation/Rain	\$9,488.00
	Soybeans		\$2,007.00
2013	Corn	Excessive Moisture/Precipitation/Rain	\$243,512.44
	Soybeans		\$188,258.50
	Grain Sorghum		\$25,948.00
	Wheat		\$32,969.45
2014	Corn	Excessive Moisture/Precipitation/Rain	\$3,673.00
	Soybeans		\$10,365.00
	Grain Sorghum		\$740.00
2015	Corn	Excessive Moisture/Precipitation/Rain	\$421,466.00
	Soybeans		\$597,857.80
	Grain Sorghum		\$20,730.00
	Wheat		\$5,374.00
2016	Corn	Excessive Moisture/Precipitation/Rain	\$13,535.72
	Soybeans		\$32,287.19
	Grain Sorghum		\$7,203.22

Crop Year	Crop Name	Cause of Loss Description	Insurance Paid
2017	Corn	Excessive Moisture/Precipitation/Rain	\$50,417.50
	Soybeans		\$30,818.35
	Wheat		\$14,657.00
2018	Corn	Excessive Moisture/Precipitation/Rain	\$8,034.00
	Soybeans	Excessive Moisture/Precipitation/Rain	\$80,184.00
	Corn	Hail	\$683.00
2019	Corn	Excessive Moisture/Precipitation/Rain	\$550,110.30
	Soybeans	Excessive Moisture/Precipitation/Rain	\$463,235.60
	Grain Sorghum	Excessive Moisture/Precipitation/Rain	\$10,537.00
	Wheat	Excessive Moisture/Precipitation/Rain	\$493.00
	Grain Sorghum	Wind/Excessive Wind	\$10,521.00
Total	344	-	\$4,309,808.23

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

Probability of Future Occurrence

From the data obtained from the NCEI ³⁸, annual average percent probabilities were calculated for heavy rainfall, high winds, lightning, and hail. Heavy rainfall has a 14.3 percent annual average percent probability of occurrence (3 events/21 years x 100) (**Table 3.68**). Heavy rainfall events can be found in **Table 3.63**. The annual average percent probability for high winds within the county is 100 percent (81 events/21 years x 100) with an average of 3.9 events per year (**Table 3.69**). High wind events can be found in **Table 3.64**.

Lightning events has a 4.8 percent annual average percent probability (1 events/21 years x 100). Lightning events can be found in **Table 3.65**. Lastly, the annual average percent probability of hail occurrence is 100% (96 events/21 years) with an average of 4.6 events per year (**Table 3.71**). Hail events can be found in **Table 3.66**.

Table 3.68. Annual Average % Probability of Heavy Rain in Gasconade County

Location	Annual Avg. % P
Gasconade County	14.3%

*P = probability; see page 3.24 for definition.

Table 3.69. Annual Average % Probability of High Winds in Gasconade County

Location	Annual Avg. % P	Avg. # of Events
Gasconade County	100%	3.9

*P = probability; see page 3.24 for definition.

³⁸ <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

Table 3.70. Annual Average % Probability of Lightning in Gasconade County

Location	Annual Avg. % P
Gasconade County	4.8%

*P = probability; see page 3.24 for definition.

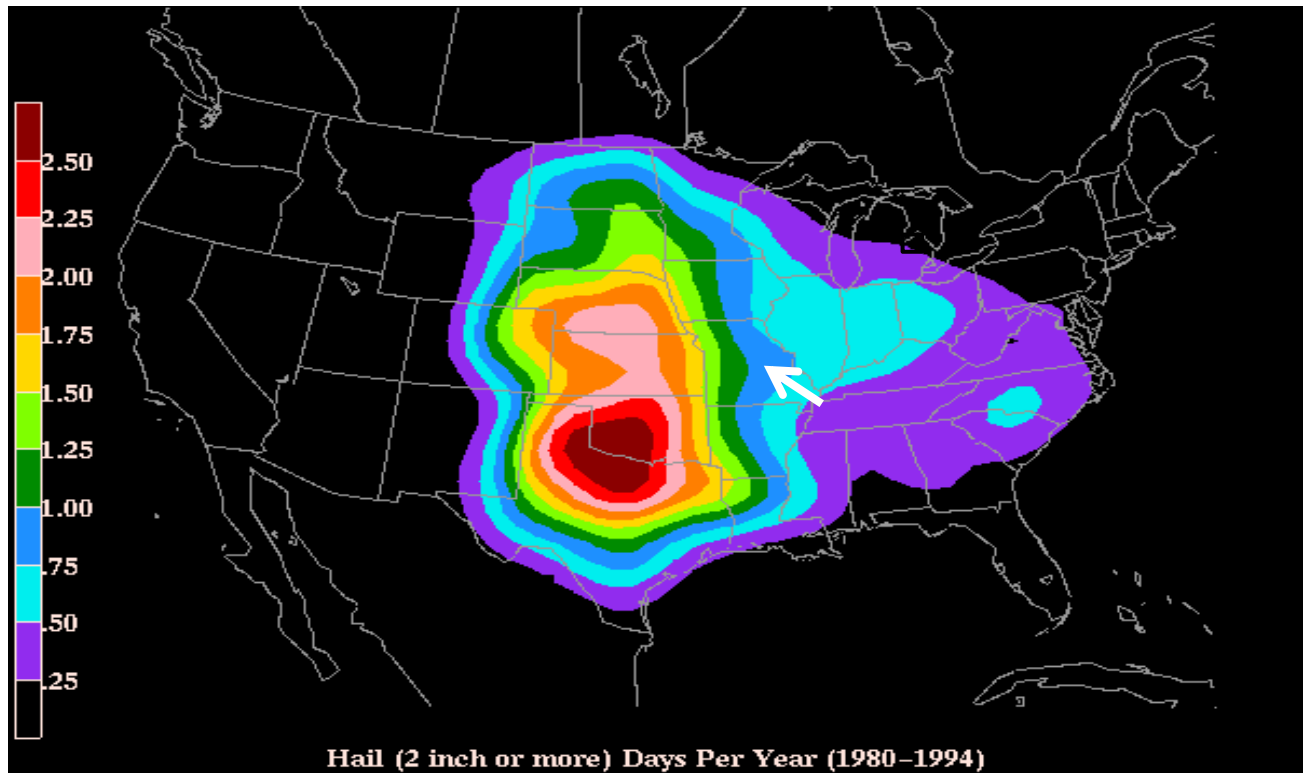
Table 3.71. Annual Average % Probability of Hail in Gasconade County

Location	Annual Avg. % P	Avg. # of Events
Gasconade County	100%	4.6

*P = probability; see page 3.24 for definition.

Figure 3.61 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 Gasconade County is identified with a white arrow.

Figure 3.61. Annual Hailstorm Probability (2" diameter or larger), 1980 - 1994



Source: NSSL, http://www.nssl.noaa.gov/users/brooks/public_html/biqhail.gif

* White arrow indicates Gasconade County

Changing Future Conditions Considerations

Analysis by NASA's Earth Observatory theorizes that the warming surface of the earth, particularly the oceans, puts more moisture into the air through evaporation and could increase potential storm energy. The presence of warm, moist air near the surface is the key component for summer storms called "convective available potential energy" or CAPE. With an increase in CAPE, there is greater potential for cumulus clouds to form and develop into storm systems. The same study provides a counter theory that the warming of the Arctic could result in less wind shear in the mid-latitudes, making powerful storms less likely.³⁹

Temperatures are predicted to rise and those rising temperatures could help create atmospheric conditions that are conducive to the development of thunderstorms and tornados in Gasconade County. Jurisdictions should consider building certified tornado saferooms, improving warning systems, strengthening building codes, reinforcing utilities and other vulnerable infrastructure and increasing public information on storm safety and mitigation activities.⁴⁰

Vulnerability

Vulnerability Overview

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.⁴¹

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

³⁹ 2018 Missouri State Hazard Mitigation Plan

⁴⁰ Ibid.

⁴¹ <http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx> and <http://www.lightningsafety.noaa.gov/> Potential Losses to Existing Development

determine vulnerability to severe thunderstorms was statistical analysis of data from several sources including: National Centers for Environmental Information (NCEI) storm events data, 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.⁴²

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
- 4) Medium-high
- 5) High

Table 3.72 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 3.73** provides the calculated ranges applied to determine overall vulnerability of Missouri counties to severe thunderstorms.

⁴² 2018 Missouri Hazard Mitigation Plan

Table 3.72. Ranges for Severe Thunderstorm Vulnerability Factor Ratings

Factors Considered	Low (1)	Low Medium (2)	Medium (3)	Medium High (4)	High (5)
Common Factors					
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
Wind					
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
Hail					
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
Lightning					
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 3.73. 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, Gasconade County has total building exposure to severe thunderstorms of \$1,888,630,000. **Table 3.74** shows housing density, building exposure, SOVI and mobile home data for Gasconade County. The county’s building exposure and housing density rating is medium, while the percent of mobile homes in the county is rated as medium at 10.6 percent of the housing stock. **Table 3.75**, 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 3.74. Gasconade 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
\$1,888,630,000	1	15.77	1	Medium	3	10.6	3

Source: 2018 Missouri Hazard Mitigation Plan

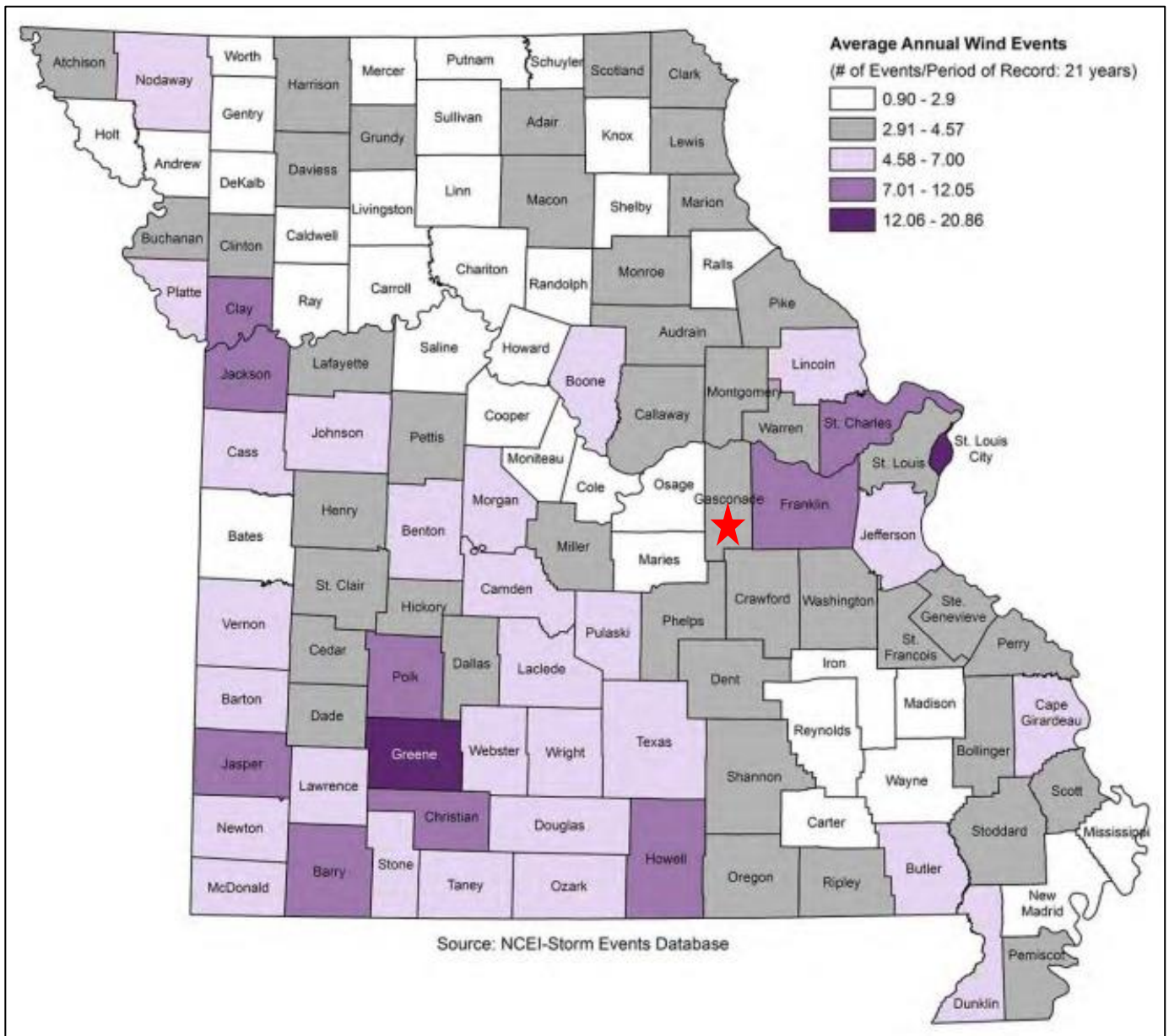
Table 3.75. Number of High Wind, Hail and Lightning Events, Likelihood of Occurrence and Associated Ratings for Gasconade County

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
81	3.857	2	98	4.667	2	1	0.048	1

Source: 2018 Missouri Hazard Mitigation Plan

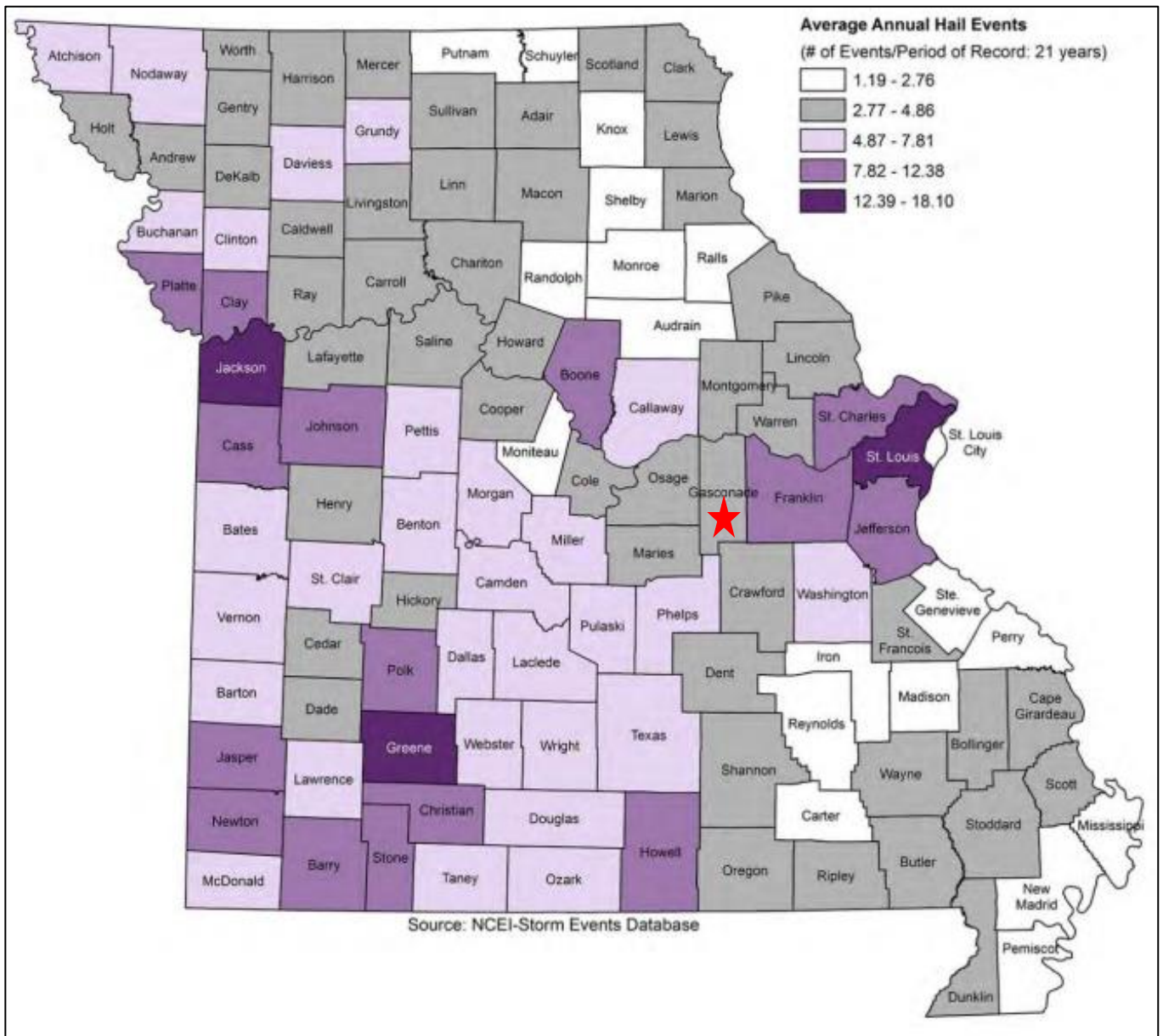
Figure 3.62 through **Figure 3.64** have been pulled from the 2018 Missouri Hazard Mitigation Plan and further depict the average annual likelihood of occurrence of high winds, hail, and lightning events in Missouri.

Figure 3.62. Average Annual High Wind Events (40 MPH and Higher)



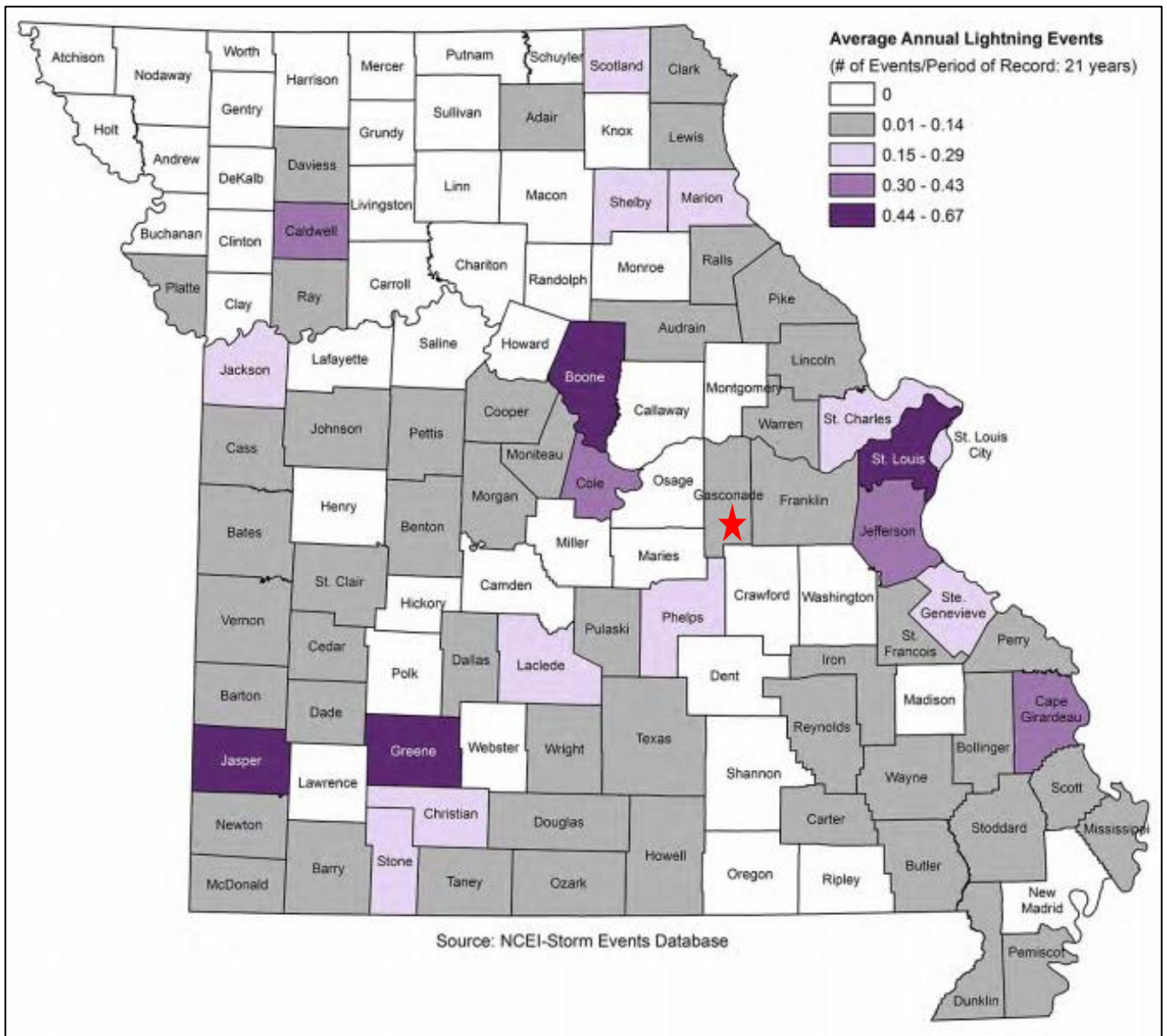
Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.63. Average Annual Occurrence of Damaging Hail Events



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.64. Average Annual Occurrence of Lightning Events



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Table 3.76 provides additional data obtained from the National Centers for Environmental Information for property loss to complete the overall vulnerability analysis.

Table 3.76. Annualized Property Loss and Associated Ratings for Gasconade 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
\$1,667	1	\$47,619	2	\$5,952	3

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 can be found in **Table 3.73**. **Table 3.77** provides the calculated vulnerability rating for the severe thunderstorm hazard. **Figure 3.65** that follows provides the mapped results of this analysis by county⁴³.

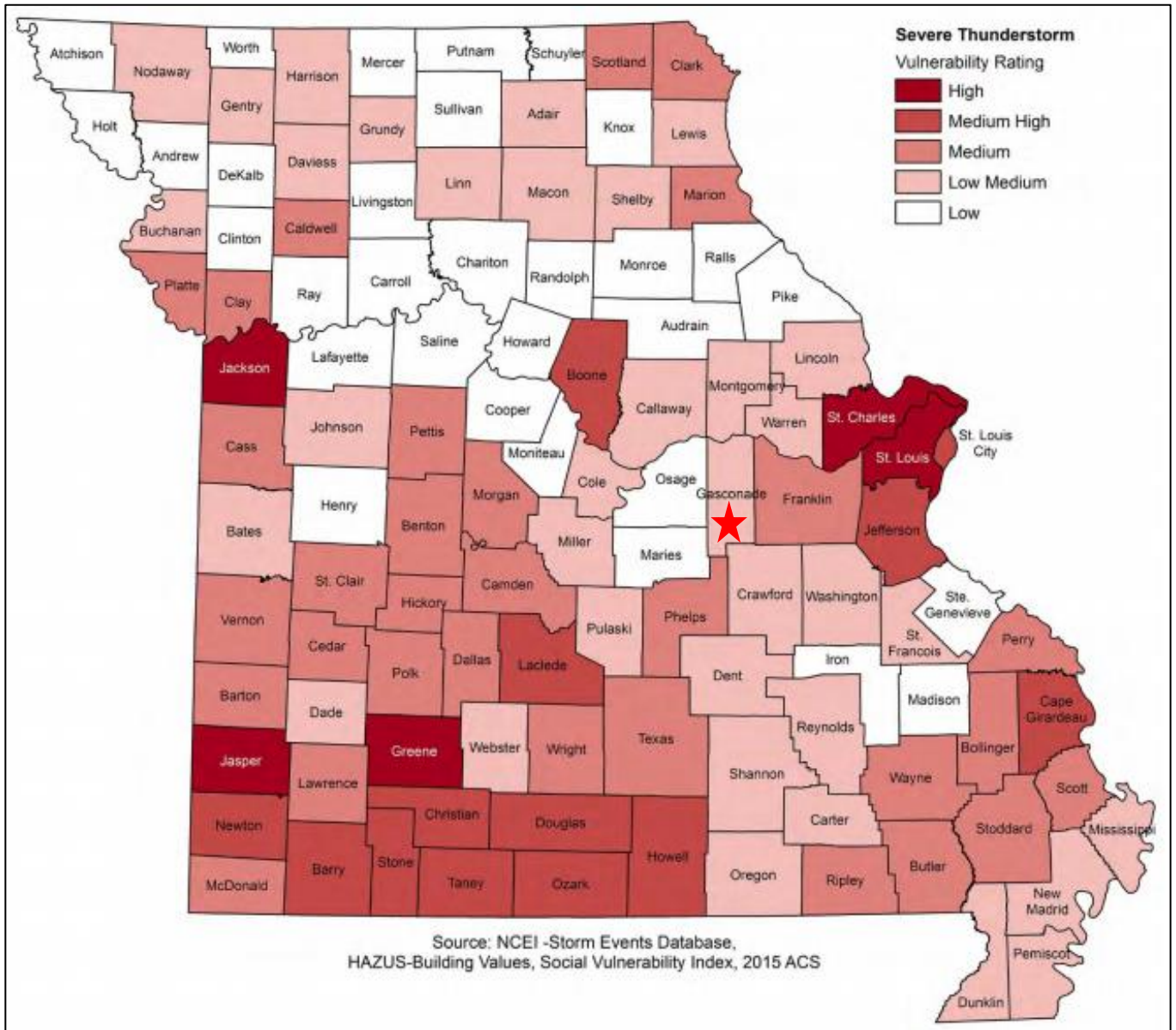
Table 3.77. Severe Thunderstorm Vulnerability Rating for Gasconade County

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

⁴³ 2018 Missouri State Hazard Mitigation Plan

Figure 3.65. Vulnerability Summary for Severe Thunderstorms



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Potential Losses to Existing Development

According to the NCEI Gasconade County experienced approximately \$161,000 in property damages from severe thunderstorms between 1999 and 2019. This is an average of \$7,666.67 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.

Previous and Future Development

Population trends from 2010 to 2019 for Gasconade County indicate that the population in unincorporated areas has fallen by an estimated 6.3 percent. The city of Gasconade's population has increased by a significant 49.8 percent. The city of Morrison, however, has fallen by 38 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 jurisdiction with the highest percent of houses built before 1939 is the City of Morrison with 56.8 percent. Additionally, the city of Rosebud 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 81 thunderstorm and wind events in Gasconade County since 1999, with over \$161,000.00 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.

3.4.9 Severe Winter Weather

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
- 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, <http://www.rma.usda.gov/data/cause.htm>
- 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.

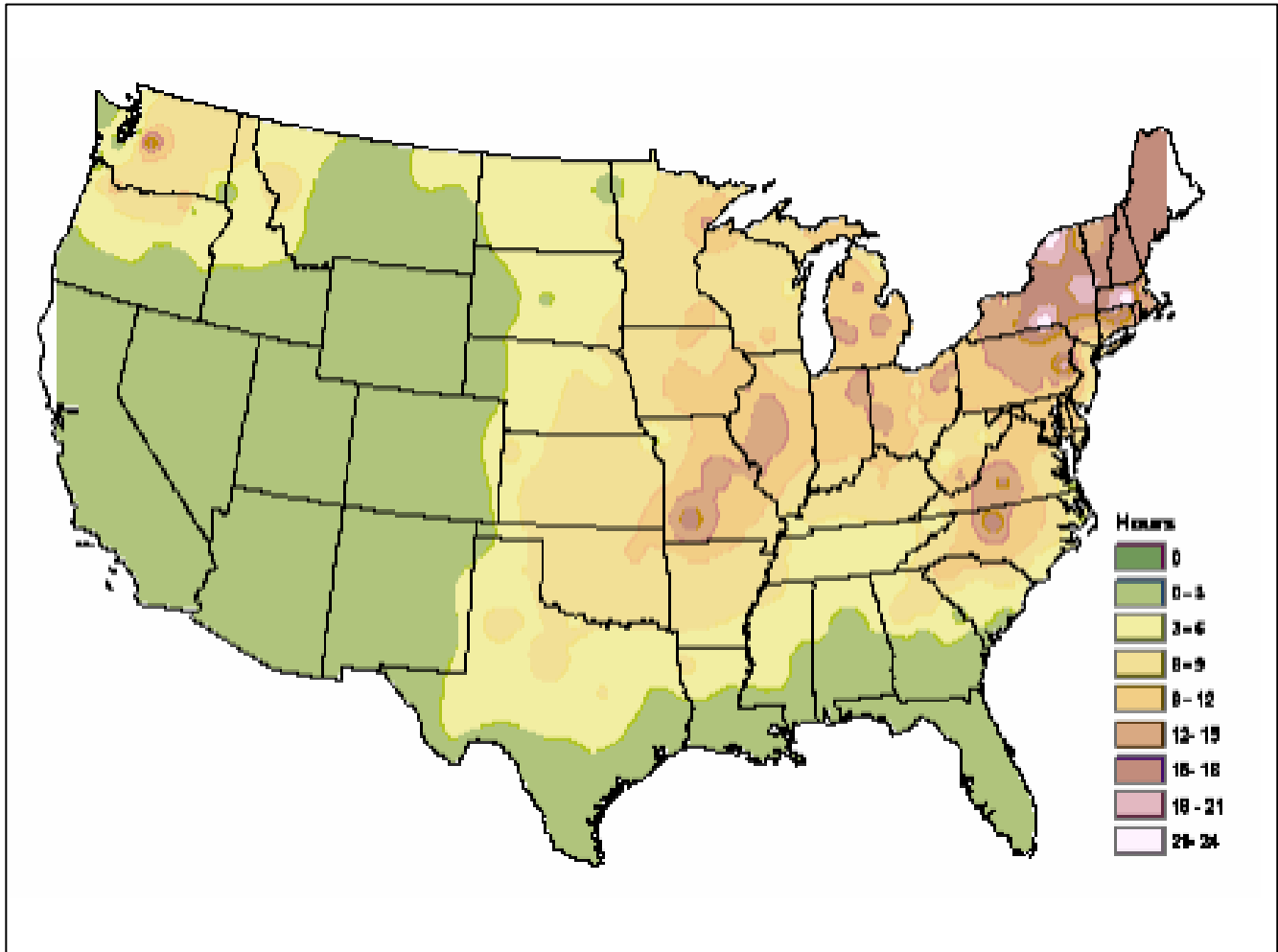
- **Blizzard**—Winds of 35 miles per hour or more with snow and blowing snow reducing visibility to less than ¼ mile for at least three hours.
- **Blowing Snow**—Wind-driven snow that reduces visibility. Blowing snow may be falling snow and/or snow on the ground picked up by the wind.
- **Snow Squalls**—Brief, 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. Gasconade 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. Gasconade County is vulnerable to heavy snow, ice, extreme cold temperatures

and freezing rain. **Figure 3.66** illustrates statewide average number of hours per year with freezing rain. Gasconade County receives approximately 9 to 12 hours.

Figure 3.66. 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 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.

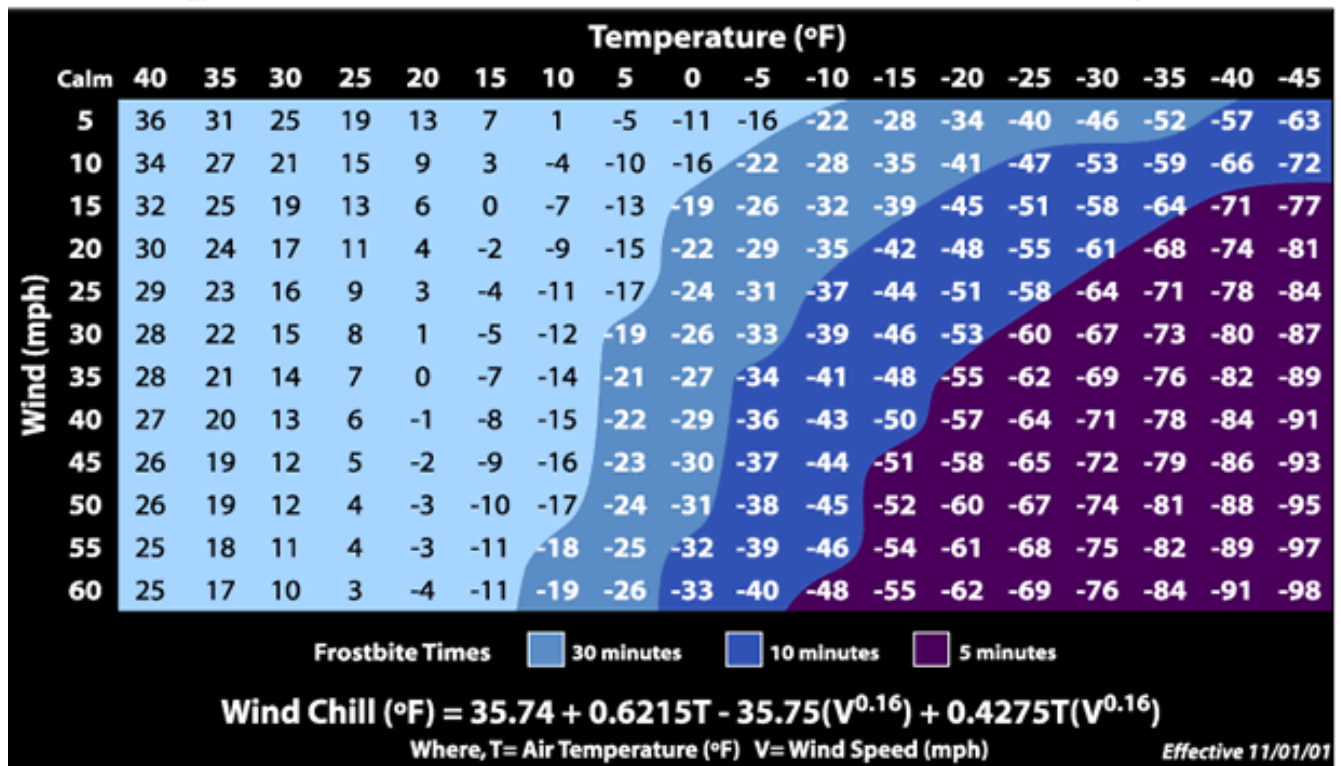
Overhead power lines and infrastructure are also vulnerable to damages from winter storms. In particular, ice accumulation during winter storms can damage power lines and equipment. Damages also occur to lines and equipment from falling trees and tree limbs weighted down by ice. Potential losses could 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 3.67** 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 Gasconade County between 1999 and 2019 for severe winter weather.

Figure 3.67. 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 1999 and 2019 (Table 3.78). 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 3.78. NCEI Gasconade County Winter Weather Events Summary, 1999 - 2019

Type of Event	Inclusive Dates	# of Injuries	Property Damages	Crop Damages
Winter Storm	1/1/1999	0	0	0
Winter Storm	1/27/2000	0	0	0
Winter Storm	3/11/2000	0	0	0
Heavy Snow	12/13/2000	0	0	0
Extreme Cold/Wind Chill	12/16/2000	0	0	0
Winter Storm	2/25/2002	0	0	0
Winter Storm	3/2/2002	0	0	0

Type of Event	Inclusive Dates	# of Injuries	Property Damages	Crop Damages
Winter Storm	3/25/2002	0	0	0
Winter Storm	12/4/2002	0	0	0
Winter Storm	12/24/2002	0	0	0
Winter Storm	1/1/2003	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	11/24/2004	0	0	0
Winter Storm	12/8/2005	0	0	0
Winter Storm	11/30/2006	0	0	0
Winter Storm	12/1/2006	0	0	0
Ice Storm	1/12/2007	0	137.00K	0
Ice Storm	12/8/2007	0	0	0
Winter Weather	2/11/2008	0	0	0
Sleet	2/21/2008	0	0	0
Winter Weather	2/23/2008	0	0	0
Cold/Wind Chill	1/1/2010	0	0	0
Winter Weather	1/6/2010	0	0	0
Heavy Snow	1/19/2011	0	0	0
Winter Storm	1/31/2011	0	0	0
Winter Storm	2/1/2011	0	0	0
Blizzard	2/1/2011	0	0	0
Winter Storm	2/21/2013	0	0	0
Heavy Snow	3/24/2013	0	0	0
Winter Storm	1/5/2014	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
Ice Storm	1/13/2017	0	0	0

Type of Event	Inclusive Dates	# of Injuries	Property Damages	Crop Damages
Heavy Snow	11/15/2018	0	0	0
Heavy Snow	1/11/2019	0	0	0
Total	38	0	137.00K	0

Source: NCEI, data accessed [11/12/2020]

Notable Winter Narratives:

1. **1/12/2007:** An arctic boundary settled south of the area on the 12th and 13th of January bringing subfreezing temperatures to the northwestern half of the county warning area. Three rounds of precipitation occurred during this period, with the first being the most destructive of all. Significant tree and limb damage was reported as a result of this storm, together with widespread power outages. More than 100,000 homes and businesses lost power during this storm. About 1.5 inches of sleet fell and a 1/2 inch of ice accumulation hit parts of Central and Northeast Missouri. From 1/4 to 1/2 inch of ice accumulated from freezing rain across Eastern Missouri and parts of Southwest Illinois. Flooding of low lying areas and low water crossings occurred across the eastern Ozarks late Friday night and Saturday morning.

Gasconade County has been included in two federal disaster declarations for ice storms since 2007.⁴⁴ Data obtained from the USDA's Risk Management Agency for insured crop losses indicates that there were no claims paid in Gasconade County between 1999 and 2019 for severe winter weather.

Probability of Future Occurrence

From the data obtained from the NCEI⁴⁵, annual average percent probabilities were calculated for winter weather within Gasconade County (**Table 3.79**). There were 38 recorded events (**Table 3.78**) over a 21 year period. There is 100 percent annual average probability of winter weather occurrence (38 events/21 years), with an average of 1.8 events per year.

Changing Future Conditions Considerations

There are both positive and negative indirect impacts from warming temperatures. Shorter winter seasons and fewer days of extreme cold may result in changes in the distribution of native plant and wildlife. The stress of climate change may cause some native species to become endangered or extinct if that species cannot adapt to changing conditions. There may also be an increase in pests and undesirable non-native species. Warmer winter conditions will result in a deduction of ice lake cover and warmer water temperatures – which can lead to harmful blooms of algae and bacteria. Increased temperatures could also mean increased rainfall in winter months that could increase the risk and severity of spring floods.⁴⁶

⁴⁴ <https://www.fema.gov/data-visualization-summary-disaster-declarations-and-grants>

⁴⁵ <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

⁴⁶ 2018 Missouri State Hazard Mitigation Plan

Table 3.79. Annual Average % Probability of Winter Weather in Gasconade County

Location	Annual Avg. % P	Avg. # of Events
Gasconade County	100%	1.8

*P = probability; see page 3.24 for definition.

Vulnerability

Vulnerability Overview

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.

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

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

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

Data was obtained from the 2018 Missouri State Hazard Mitigation Plan for vulnerability information regarding Gasconade 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
- 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 3.80 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 ratings was computed for severe winter weather. Those can be seen in **Table 3.81**. The housing density, building exposure and SOVI data for Gasconade County can be found in **Table 3.82**.

Table 3.80. Ranges for Severe Winter Weather Vulnerability Factor Ratings

Factors Considered	Low (1)	Low Medium (2)	Medium (3)	Medium High (4)	High (5)
Common Factors					
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 3.81. 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

Table 3.82. Housing Density, Building Exposure and SOVI Data for Gasconade County

Total Building Exposure (Hazus)	Building Exposure Rating	Housing Density	Housing Density Rating	SOVI Ranking	SOVI Rating
\$1,888,630,000	1	15.77	1	Medium	3

Source: 2018 Missouri Hazard Mitigation Plan

Table 3.83 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 2 or 100 percent per year. The total annualized property loss is \$6,624, which provides a total annualized property loss rating of one and an overall vulnerability rating of nine – which translates to an overall Low-Medium vulnerability rating for the county for severe winter weather.

Table 3.83. Additional Statistical Data Compiled for Vulnerability Analysis for Gasconade County

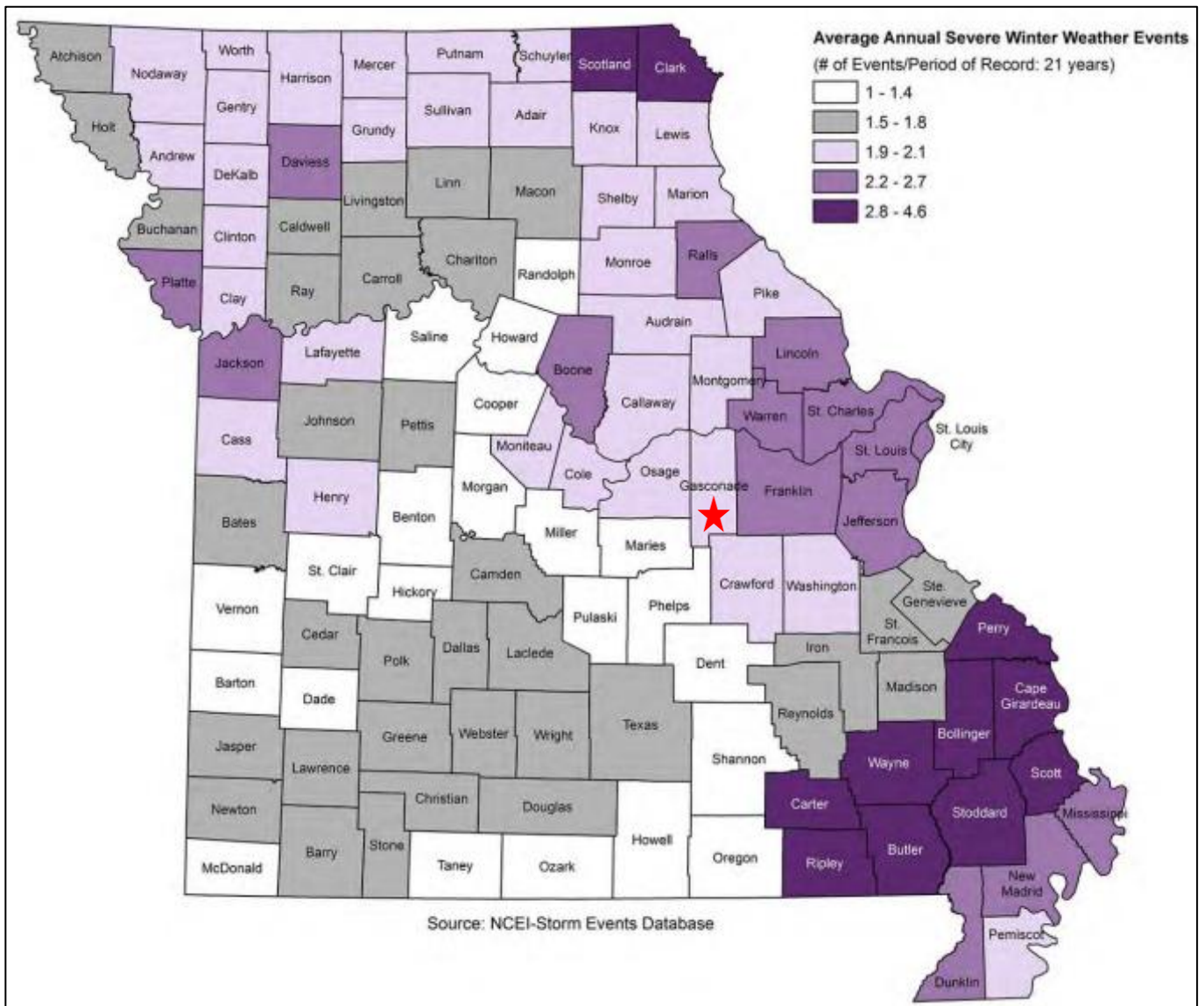
Total number of Winter Weather Events	Likelihood of Occurrence	Likelihood of Occurrence Rating	Total Annualized Property Loss	Total Annualized Property Loss Rating	Overall Vulnerability Rating	Overall Vulnerability Rating Description
42	2.0000	3	\$6,524	1	9	Low-Medium

Source: 2018 Missouri Hazard Mitigation Plan

Figure 3.66 illustrates the average annual occurrence of severe winter weather statewide. Gasconade County falls into the Low category of 1.9 to 2.1 events per year.

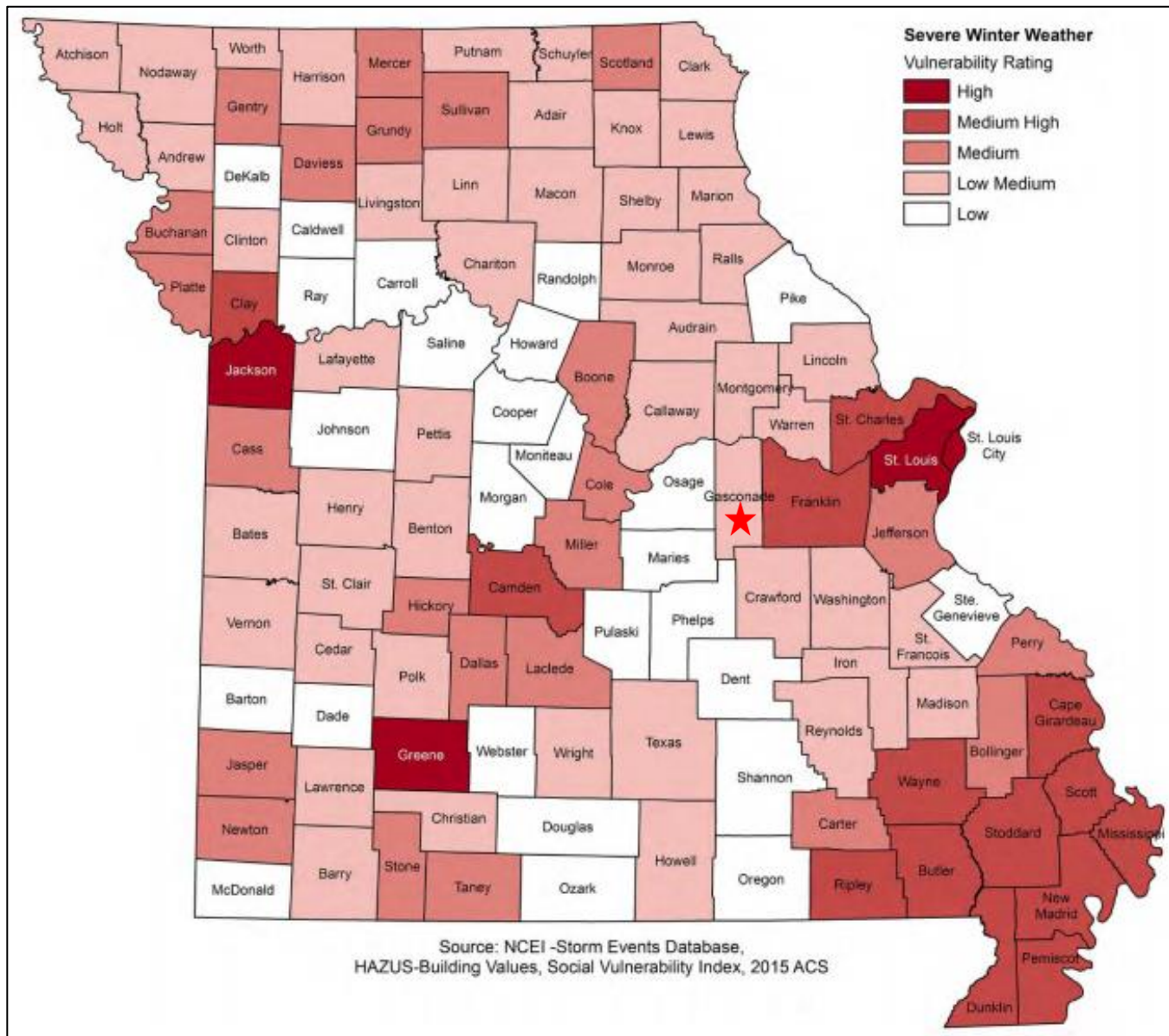
Figure 3.6967 provides an illustration of the vulnerability summary of all Missouri counties for severe winter weather. Again, Gasconade County falls into the Low-Medium rating for overall vulnerability.

Figure 3.68. Average Annual Occurrence of Severe Winter Weather Events



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

Figure 3.69. Vulnerability Summary for Severe Winter Weather



Source: 2018 Missouri Hazard Mitigation Plan, *Red star indicates Gasconade 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, Gasconade County can expect annual property losses of \$6,524 due to severe winter storms.

Impact of Previous and 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, 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. The city of Rosebud 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, Gasconade County is expected to experience at least one severe winter weather event annually; however the county has a low-medium 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.

3.4.10 Tornado

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
- NWS Enhanced F Scale for Tornado Damage including damage indicators and degrees of damage 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; <https://www.fema.gov/fema-p-320-taking-shelter-storm-building-safe-room-yourhome-or-small-business>
- Tornado Alley in the U.S. map, <http://tornadochaser.com/education/tornado-alley/>
- National Centers for Environmental Information, <http://www.NCEI.noaa.gov/stormevents/>
- Tornado History Project, map of tornado events, <http://www.tornadohistoryproject.com/tornado/Missouri>
- 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 08**, 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 Gasconade County.

Strength/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 Enhance Fujita Scale, based on the original Fujita Scale developed by Dr. Theodore Fujita, a renowned severe storm researcher). The EF- Scale (**Table 3.84**) 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 3.84. 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

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.85**. 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 3.85. 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 3.86 illustrates NCEI data reported for tornado events and damages from 1999 to 2019 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.

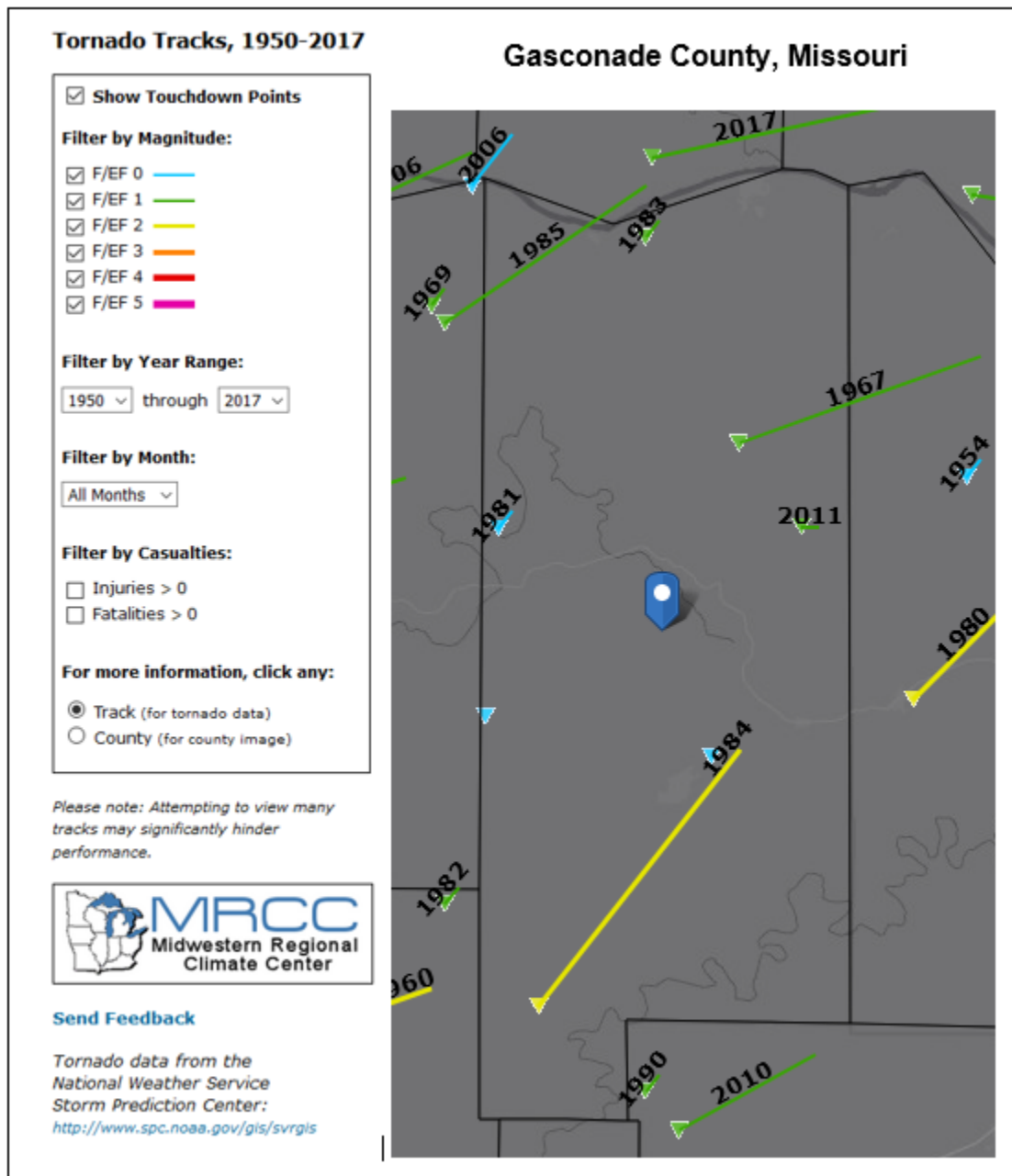
Table 3.86. Recorded Tornadoes in Gasconade County, 1999 – 2019

Date	Beginning Location	Ending Location	Length (miles)	Width (yards)	F/EF Rating	Death	Injury	Property Damage	Crop Damages
1/07/2008	3W Woollam	3WNW Woollam	.28	50	EF0	0	0	0	0
2/27/2011	3SW Stony Hill	2SSW Stony Hill	.74	175	EF1	0	0	0	0
6/07/2014	2NE Owensville	2NE Owensville	.05	20	EF0	0	0	0	0
Total	3	-	1.07	245	-	0	0	0	0

Source: National Centers for Environmental Information, <http://www.ncdc.noaa.gov/stormevents/>

Figure 3.70 depicts historic tornado paths across Gasconade County.

Figure 3.70. Gasconade County Map of Historic Tornado Paths (1950 – 2017)



Source: Midwest Regional Climate Center, <https://mrcc.illinois.edu/gismaps/cntytor.htm#>

According to the USDA Risk Management Agency’s record, there were no insurance payments in Gasconade County for crop damages as a result of tornadoes between 1999 and 2019.

Probability of Future Occurrence

From the data obtained from the NCEI⁴⁷, an annual average percent probability was calculated for tornadoes within Gasconade County (**Table 3.87**). There is a 14 percent annual average probability of a tornado occurrence (3 events/21 years x 100). Tornado events can be found in **Table 3.86**. In addition,

⁴⁷ <http://www.ncdc.noaa.gov/stormevents/choosedates.jsp?statefips=29%2CMISSOURI>

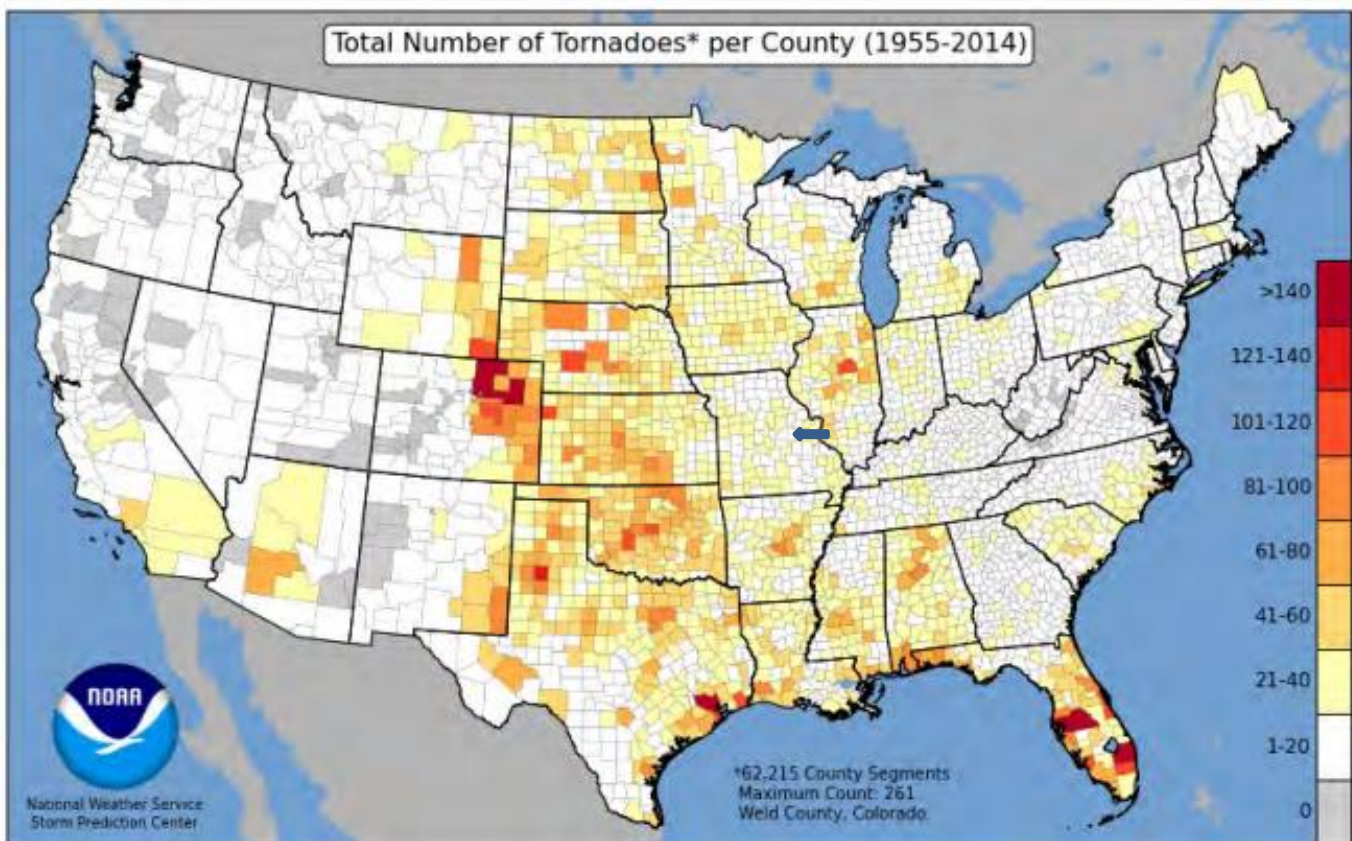
Figure 3.71, obtained from the 2018 Missouri State Hazard Mitigation Plan, also illustrates tornado probabilities across the United States and further shows Gasconade County's average probability of 10 percent.

Table 3.87. Annual Average % Probability of Tornadoes in Gasconade County

Location	Annual Avg. % P
Gasconade County	14%

*P = probability; see page 3.24 for definition.

Figure 3.71. Tornado Activity in the United States



Source: 2018 Missouri State Hazard Mitigation Plan, *Blue arrow indicates Gasconade County

Changing Future Conditions Considerations

There is still not enough data to know how the frequency and severity of tornadoes will change in a warming world. Research suggests that changes in heat and moisture content in the atmosphere could play a role in making tornado outbreaks more frequent and more severe in the U.S. The research concluded that the number of days with large tornado outbreaks have been increasing for the past 70 years and that densely concentrated tornado outbreaks are increasing as well.⁴⁸

⁴⁸ 2018 Missouri Hazard Mitigation Plan

Vulnerability

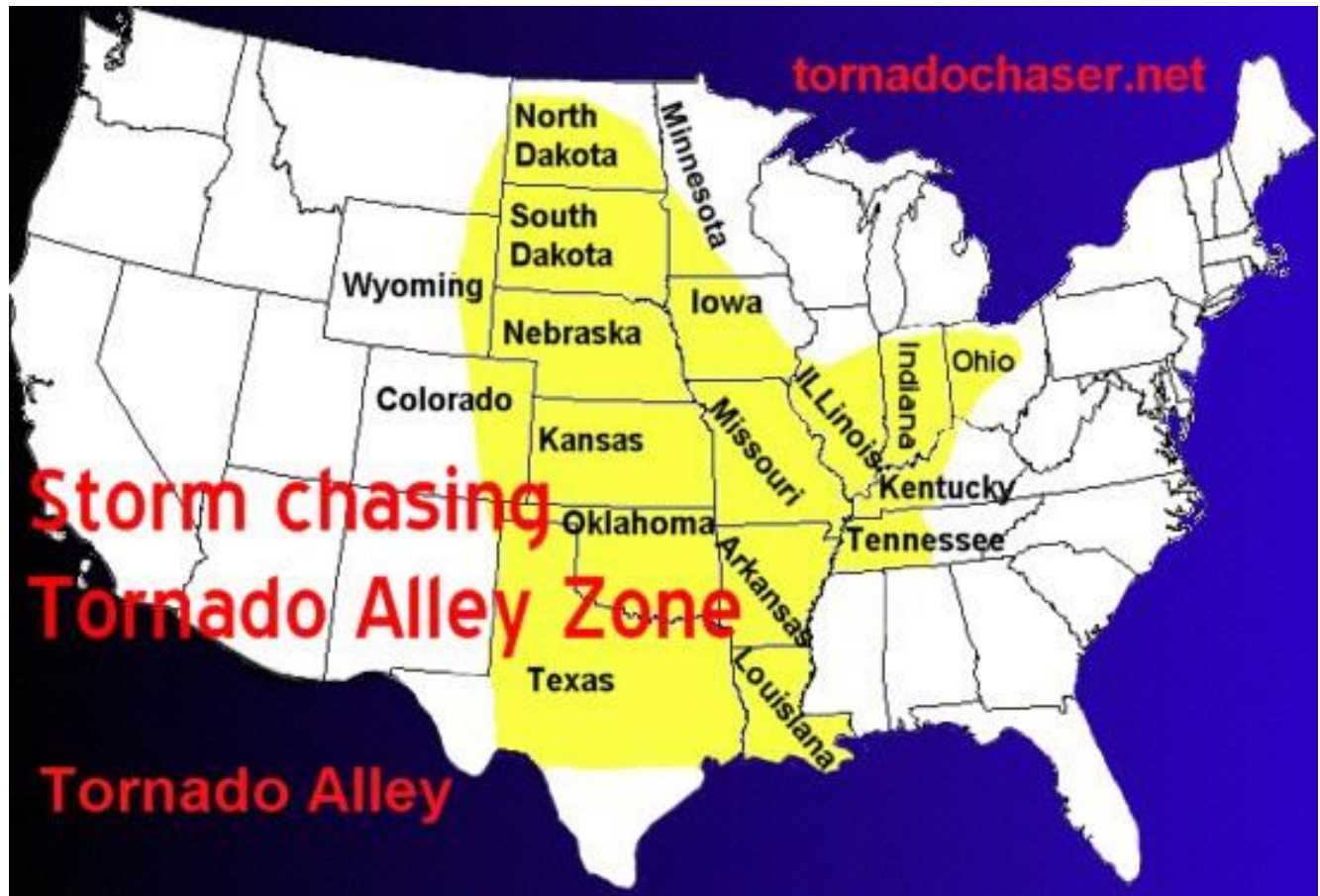
Vulnerability Overview

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.⁴⁹ Gasconade County resides in a region of the United States that has a high frequency of dangerous and destructive tornadoes. This region seen in **Figure 3.72** is referred to as “Tornado Alley”.

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.

⁴⁹ 2018 Missouri Hazard Mitigation Plan

Figure 3.72. Tornado Alley in the U.S.



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

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 3.88 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 3.89** illustrates the ranges for tornado combined vulnerability rating.

Table 3.88. Ranges for Tornado Vulnerability Factor Ratings

Factors Considered	Low (1)	Low-medium (2)	Medium (3)	Medium-High (4)	High (5)
Common Factors					
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 3.89. 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 3.90 provides data on building exposure, population density, SOVI and mobile home data for Gasconade County that is used to determine overall vulnerability.

Table 3.90. Building Exposure, Population Density, SOVI and Mobile Home Data for Gasconade County

Total Building Exposure (Hazus)	Exposure Rating	Population Density	Population Rating	SOVI Ranking	SOVI Rating	Percent Mobile Homes	Mobile Home Rating
\$1,888,630,000	1	28.69	1	Medium	3	10.6	3

Source: 2018 Missouri Hazard Mitigation Plan

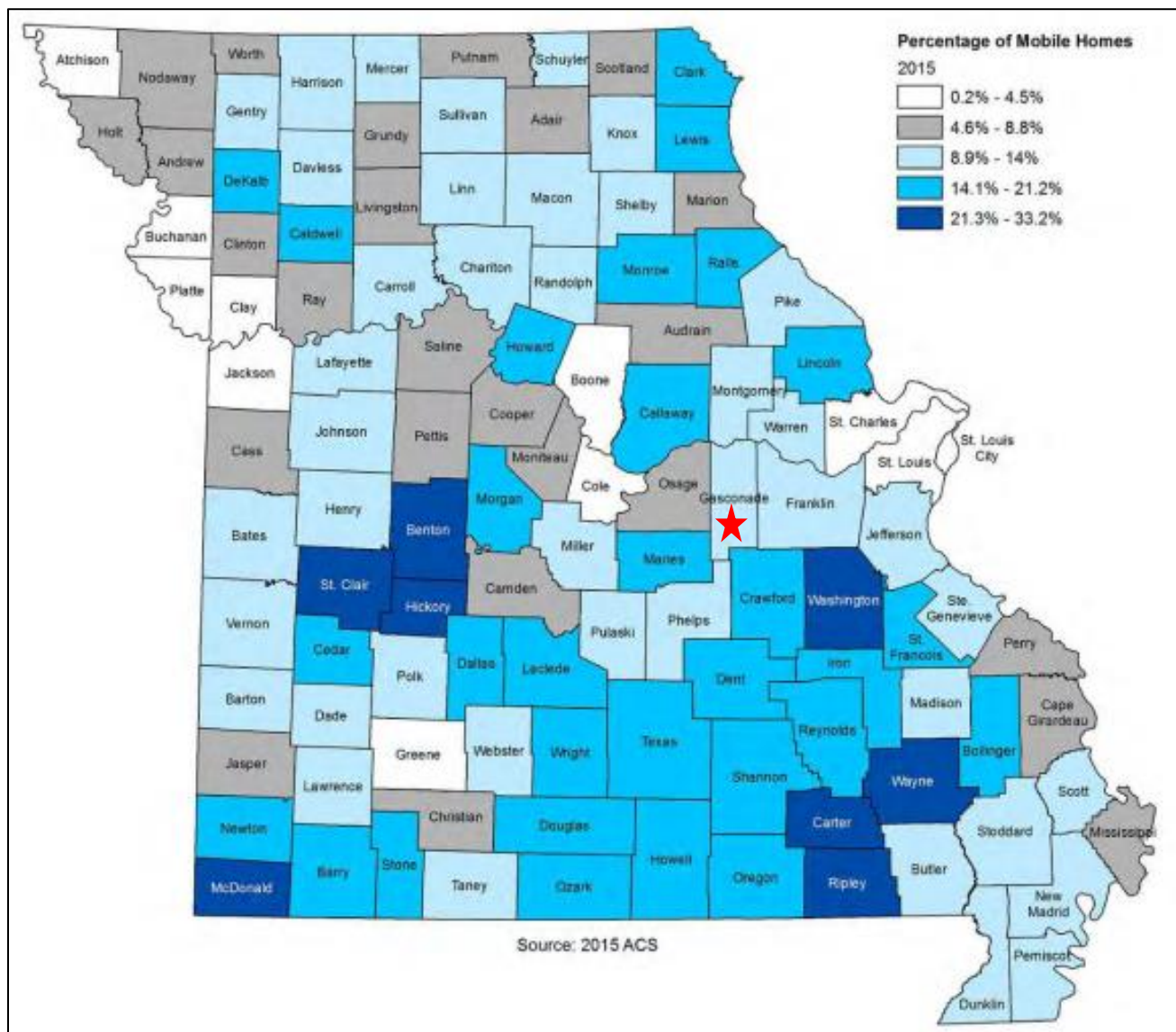
Table 3.91 provides additional data, obtained from the National Centers for Environmental Information to complete the overall vulnerability analysis and the total overall vulnerability rating for tornadoes. **Figure 3.73** shows the percent of mobile homes per county throughout the state with Gasconade County determined to have medium high mobile home density at 8.9 percent to 14 percent. **Figure 3.74** provides the average annual occurrence of tornadoes in Missouri and illustrates that Gasconade County falls into the low quadrant for historical events – 11 to 20 percentile. Finally, **Figure 3.75** shows the county’s overall vulnerability to tornadoes – Low – Medium.

Table 3.91. Likelihood of Occurrence, Annual Property Loss and Overall Vulnerability Rating for Tornadoes for Gasconade 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
8	0.119	1	\$377,616	2	11	Low-Medium

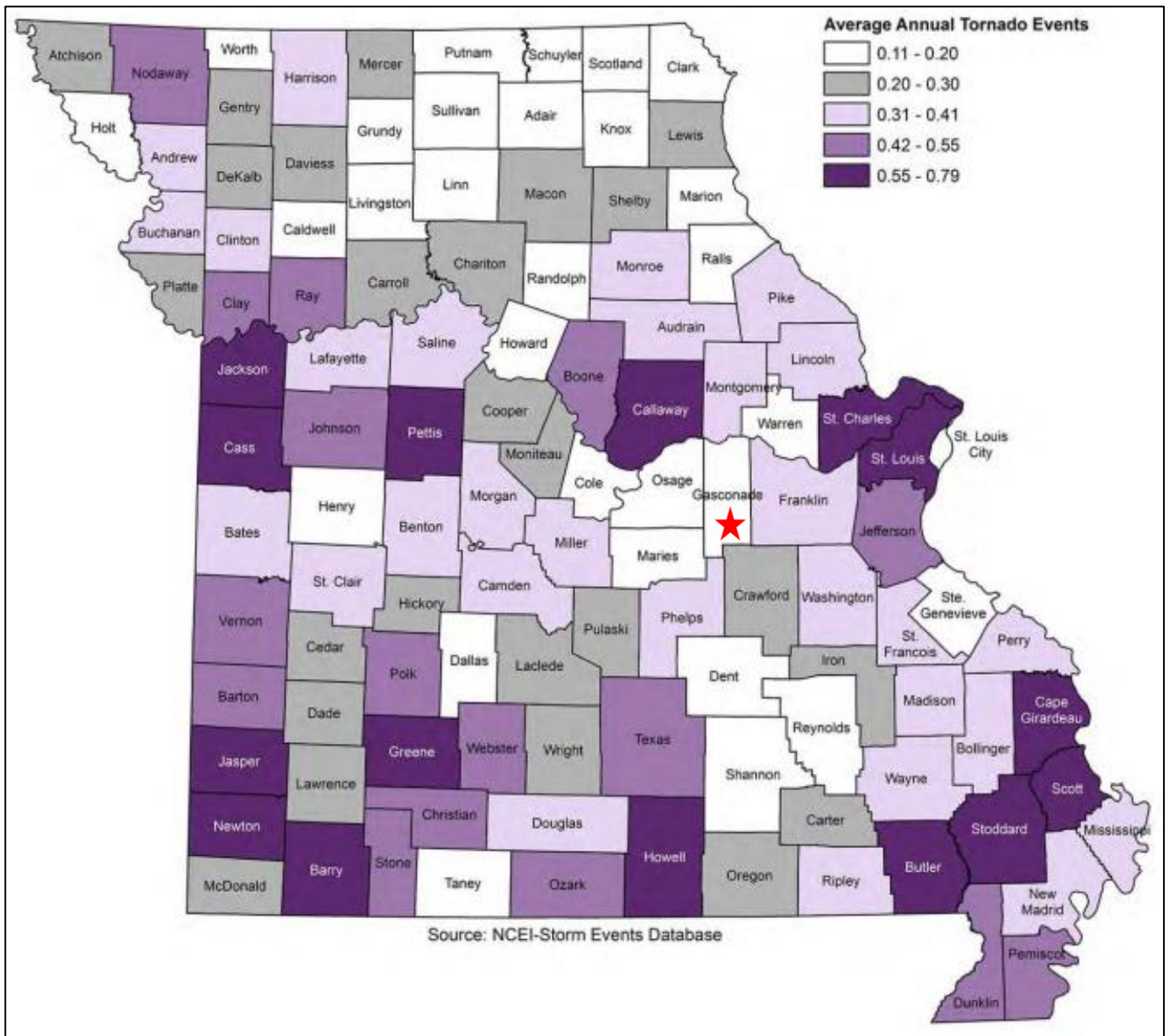
Source: 2018 Missouri Hazard Mitigation Plan

Figure 3.73. Missouri – Percent of Mobile Homes Per County



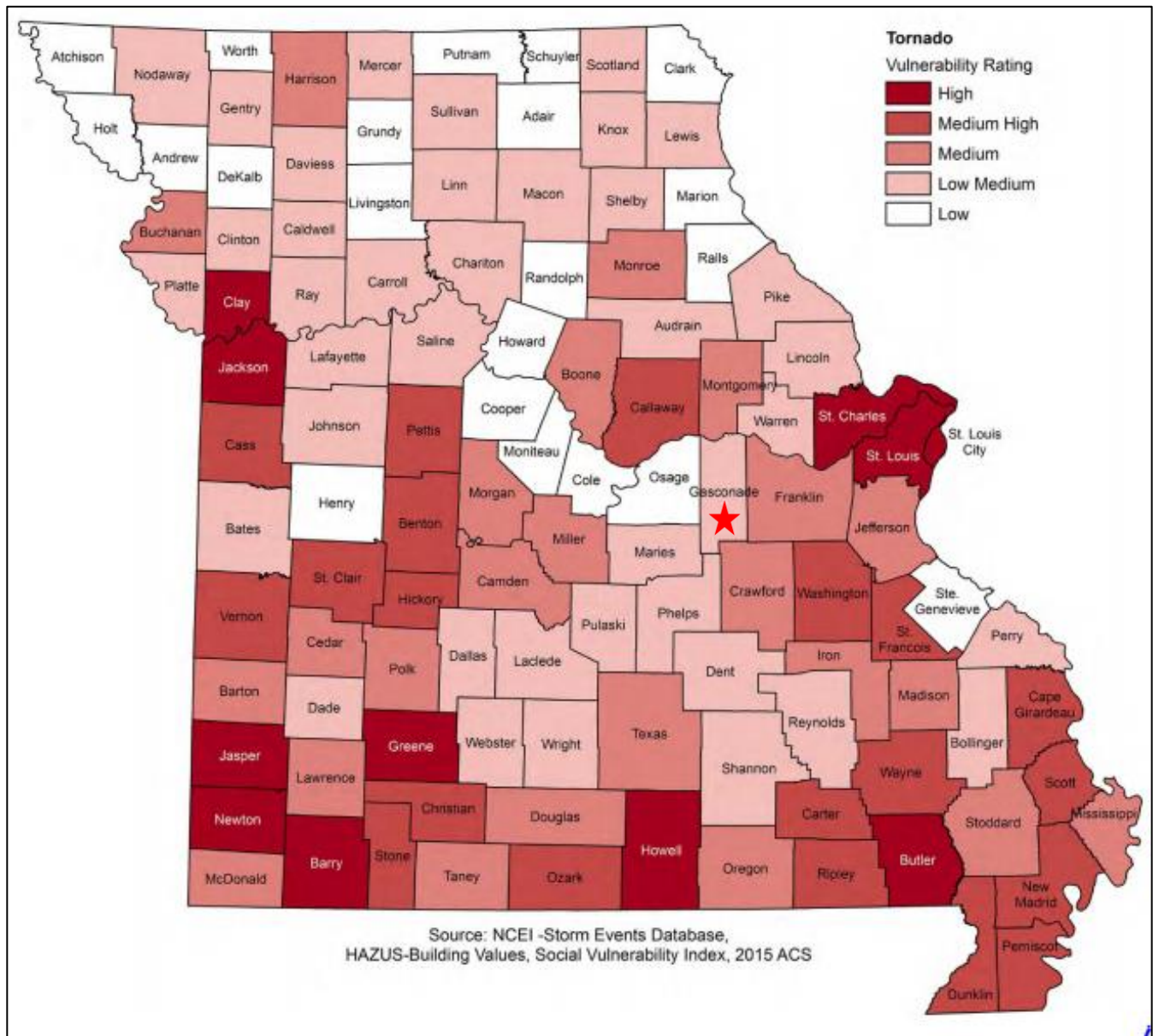
Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.74. Average Annual Occurrence for Tornadoes



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.75. Overall Vulnerability to Tornadoes



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Potential Losses to Existing Development

The annualized damage for Gasconade County due to tornadoes is \$1,132,245 (previous 60 years). With this information we can estimate that each year there will be approximately \$18,870.75 in loss to existing development. Additionally, the largest recorded tornado in the planning area has been an EF-1. Utilizing this information, we can infer that there is potential for another tornado of equivalence.

Impact of Previous and 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.

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 3.31** for jurisdictions most vulnerable to damage due to the age of the structure. Based on structure age, the city of Morrison would have higher vulnerability due to 56.8 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 Gasconade County and its jurisdictions. From the information provided in **Table 3.92**, the city of Rosebud, with 40 mobile homes – 19.5 percent of housing in the count, is most vulnerable to losses due to the number of mobile homes residing within the jurisdiction.

Table 3.92. Percentage of Mobile Homes in Gasconade County, 2019

Jurisdiction	Number of Mobile Homes	Percentage of Mobile Homes*
Unincorporated Gasconade County	623	12.4%
Bland	45	14.1%
Gasconade	14	9.2%
Hermann	47	4.0%
Morrison	7	15.9%
Owensville	36	2.8%
Rosebud	40	19.5%

Source: U.S. Census Bureau, 2015-2019 5-Year American Community Survey

*Number of mobile homes per jurisdiction/total occupied housing units per jurisdiction

**Total housing units for all jurisdictions = 8,178

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.

3.4.11 Wildfires

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
- Missouri Department of Conservation Wildfire Data Search at
<https://mdc12.mdc.mo.gov/Applications/MDCFireReporting/Home/FireReportSearch>
- Statistics, Missouri Division of Fire Safety;
- National Statistics, US Fire Administration;
- Fire/Rescue Mutual Aid Regions in Missouri;
- Forestry Division of the Missouri Dept. of Conservation;
- National Fire Incident Reporting System (NFIRS),
<http://www.dfs.dps.mo.gov/programs/resources/fire-incident-reporting-system.php>
- University of Wisconsin Slivis Lab, <http://silvis.forest.wisc.edu/data/wui-change/>
- 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.

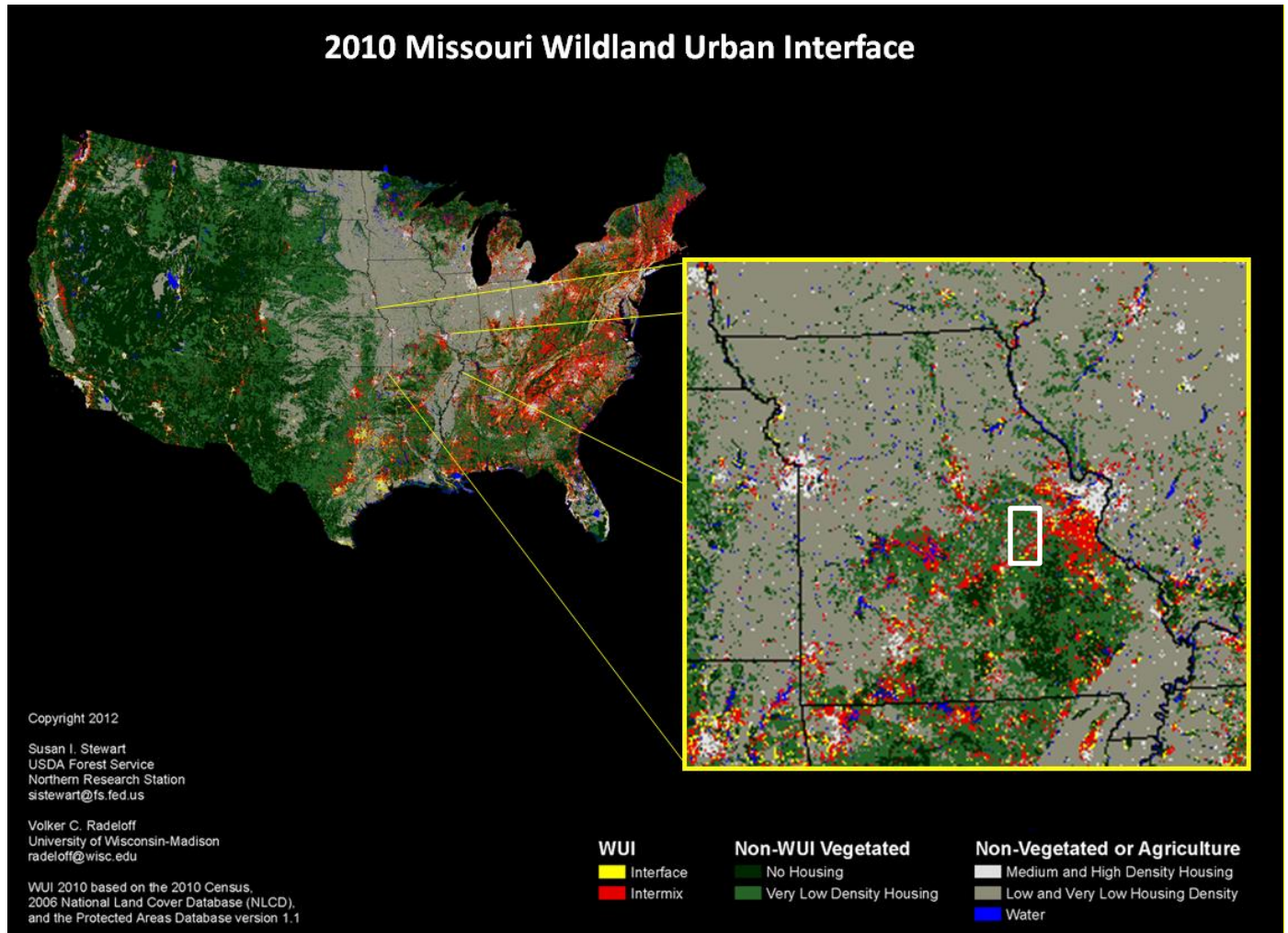
Most of Missouri fires occur during the spring season between February and May. The length and severity of both structural and wildland fires depend largely on weather conditions. Each year, an average of about 3,200 wildfires burn more than 52,000 acres of forest and grassland in Missouri. Spring in 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

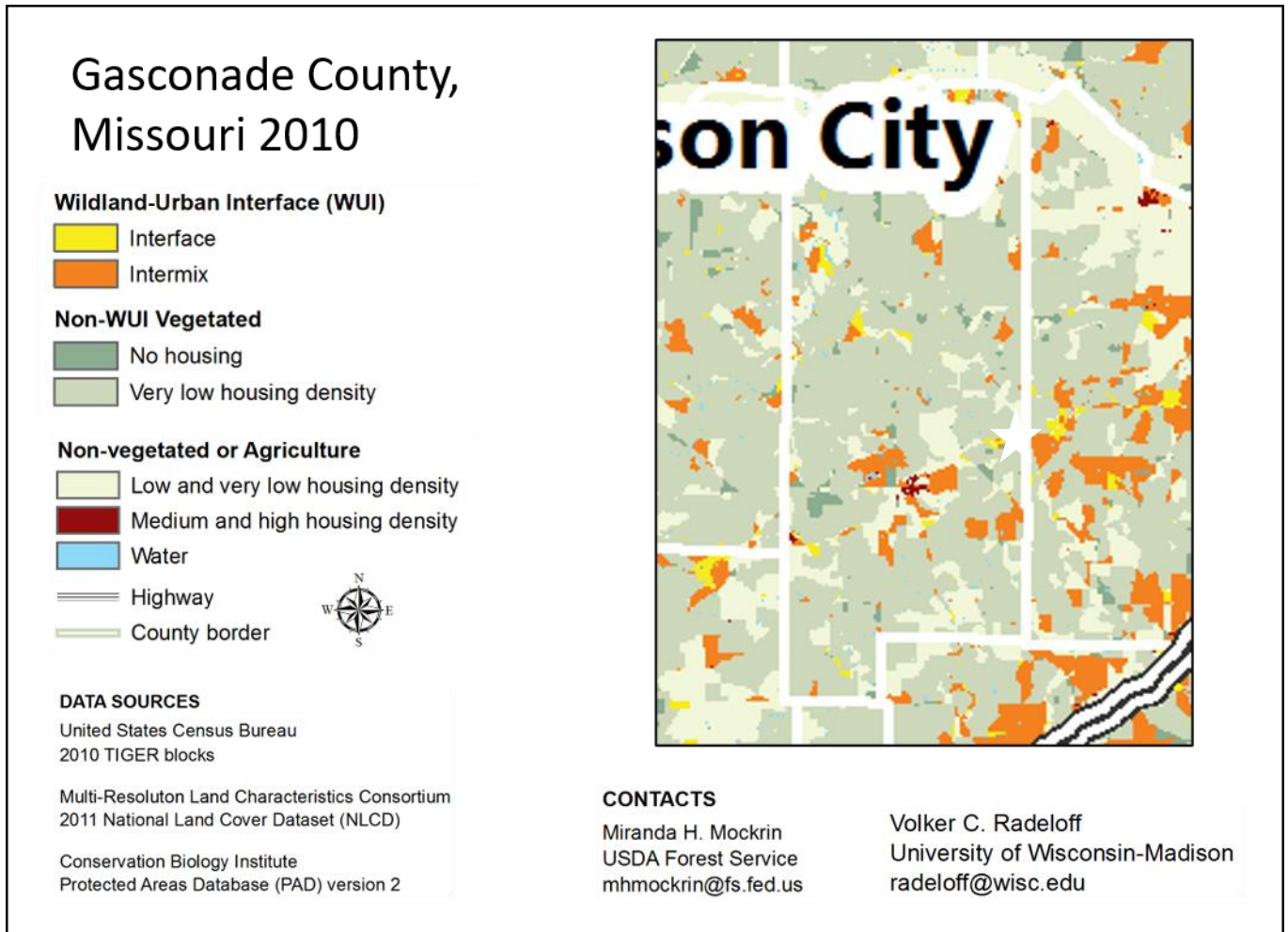
The risk of wildfire does not vary widely across the planning area. However, damages due to wildfires are expected to be higher in communities with more wildland–urban interface (WUI) areas. WUI refers to the zone of transition between unoccupied land and human development and needs to be defined in 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 3.76**). To determine specific WUI areas and variations, data was obtained from ArcGIS, Streets and SILVIS (**Figure 3.77**). According to the WUI area map of Gasconade County, all cities partially reside in a WUI area.

Figure 3.76. 2010 Missouri Wildland Urban Interface (WUI)



Source: <http://silvis.forest.wisc.edu/maps/wui/>; White square roughly estimates Gasconade County's location

Figure 3.77. Gasconade County Wildlife Urban Interface



Source: 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 2000 and 2019 there were 205 wildfires reported in Gasconade County, according to wildfire reporting to the Missouri Department of Conservation⁵⁰. This is an average of 10.25 wildfires per year. The size of the fires varied from as small as .02 acre to as large as 685.83 acres. **Table 3.93** shows the cause of wildfires, number of wildfires and acres burned for the period 2000-2019. Unknown fires account for the largest number of fires and debris fires account for the greatest number of acres burned.

Table 3.93. 2000-2019 Gasconade County Wildfires by Cause

Cause	Number	Acres	% Number	% Acres
Equipment	5	14	2.4%	0.6%
Debris	71	885.02	34.6%	39.5%
Arson	4	3.5	2.0%	0.2%
Campfire	1	.91	1.0%	0.04%
Children	1	5	1.0%	0.2%
Unknown	82	408.81	40.0%	18.3%
Unreported	11	741	5.4%	33.1%
Smoking	1	1	1.0%	0.04%
Miscellaneous	29	180.48	14.1%	8.1%
Totals	205	2239.55	100%	100%

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 Conservation⁵¹ (Appendix: F), 205 wildfire events occurred in Gasconade County between 2000 and 2019. This information was utilized to determine the annual average percent probabilities of wildfires. Since multiple occurrences are anticipated per year (205 events/20 years), the probability of wildfires per year is 100% with an average of 10.25 events per year **Table 3.94**.

⁵⁰ <http://mdc7.mdc.mo.gov/applications/FireReporting/Report.aspx>

⁵¹ <http://mdc7.mdc.mo.gov/applications/FireReporting/Report.aspx>

Table 3.94. Annual Average Percentage Probability of Wildfires in Gasconade County

Location	Annual Avg. % P	Avg. Number of Events
Gasconade County	100%	10.25

*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.⁵²

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.⁵³

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 Gasconade County should expect to have 7.62 wildfires per year, impacting 87 acres (**Table 3.95**).

The state plan also indicates that Gasconade County is at the low possible likelihood for building damage from wildfires – likely from the low population numbers in the county. **Figure 3.78** illustrates the likelihood of wildfire events based on data from 2004-2016. **Figure 3.79** provides a map that illustrates the average annual acreage burned.

⁵² 2018 Missouri Hazard Mitigation Plan

⁵³ Ibid

Table 3.95. Statistical Data for Wildfire Vulnerability in Gasconade County

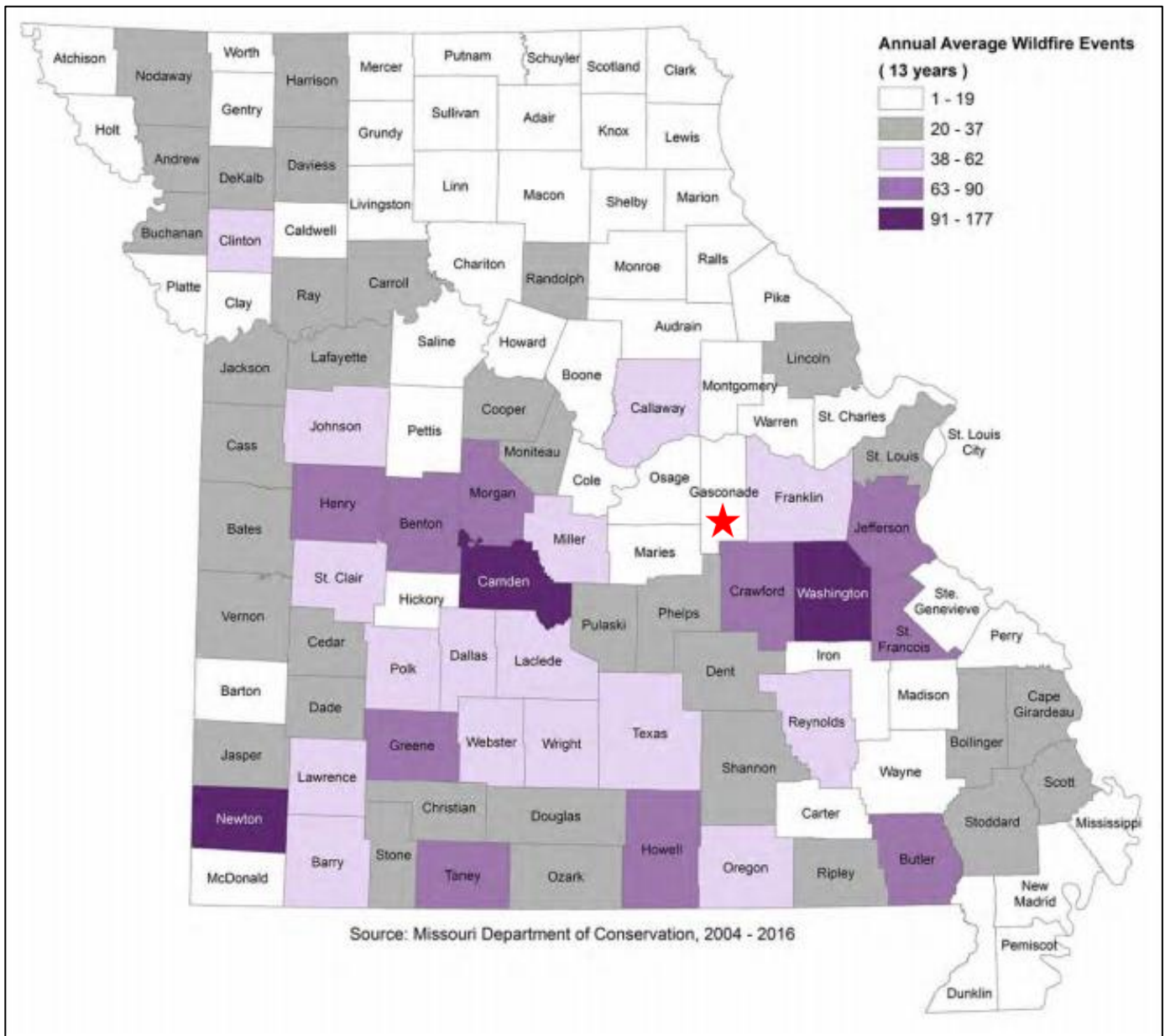
Number of Wildfires 2004-2016	Likelihood of Occurrence (#/year)	Total Acres Burned	Average Annual Acreage Burned
99	7.62	1,135.77	87

Source: 2018 Missouri State Hazard Mitigation Plan

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.

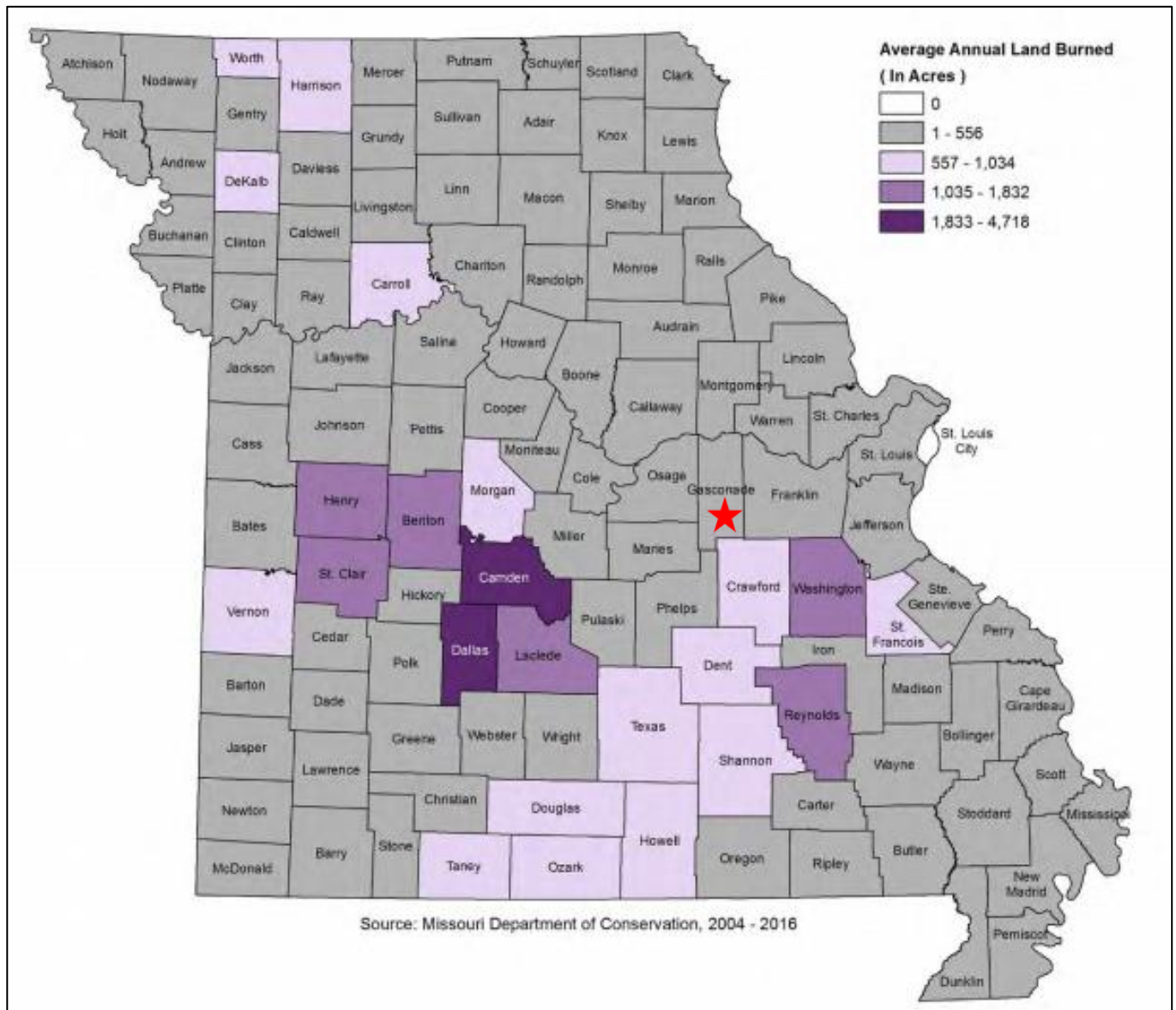
The results of that analysis, including estimated number of structures, value of structures and population are illustrated in **Table 3.96**. The total estimated number of structures vulnerable to wildfires is 2,875. The overall value of structures vulnerable to wildfire in Gasconade County is estimated at \$681,678,674. To further illustrate vulnerability in Gasconade 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 3.80**. Gasconade County shows that it has between 0 and 3,217 structures within these areas. **Figure 3.81** shows the estimated value of structures in the WUI interface and intermix areas. **Figure 3.82** illustrates the number of people at risk to wildfire in the WUI interface and intermix areas.

Figure 3.78. Likelihood of Wildfire Events, 2004-2016



Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Figure 3.79. Average Annual Acreage Burned



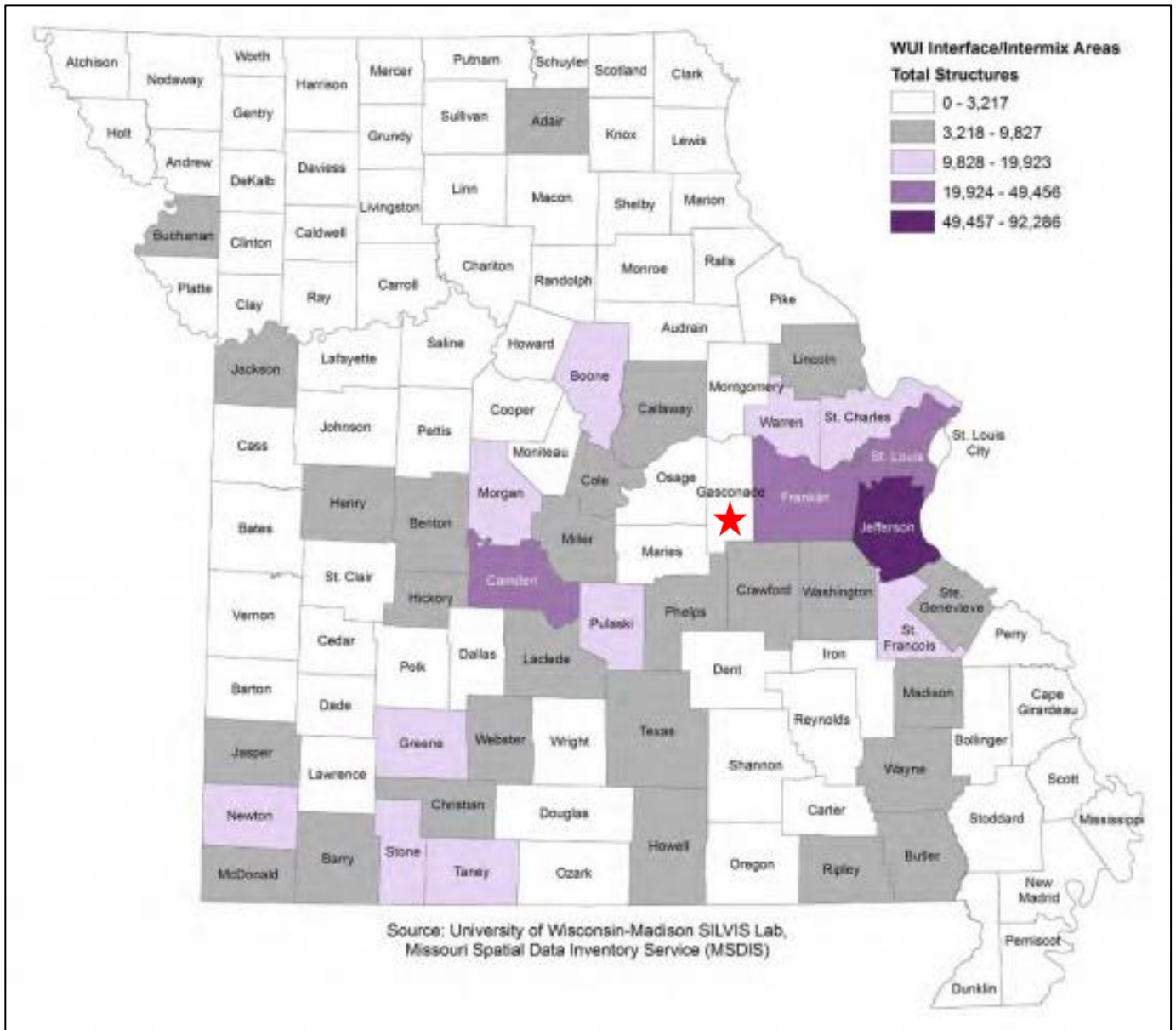
Source: 2018 Missouri State Hazard Mitigation Plan, *Red star indicates Gasconade County

Table 3.96. Estimated Numbers and Values of Structures and Population Vulnerable to Wildfire in Gasconade County

Gasconade County	Number of Structures	Value of Structures	Population
Agriculture	617	\$140,059,000	
Commercial	215	\$118,532,088	
Education	12	\$20,398,800	
Government	14	\$11,194,105	
Industrial	22	\$17,300,556	
Residential	1,995	\$374,194,124	
Totals	2,875	\$681,678,674	4,788

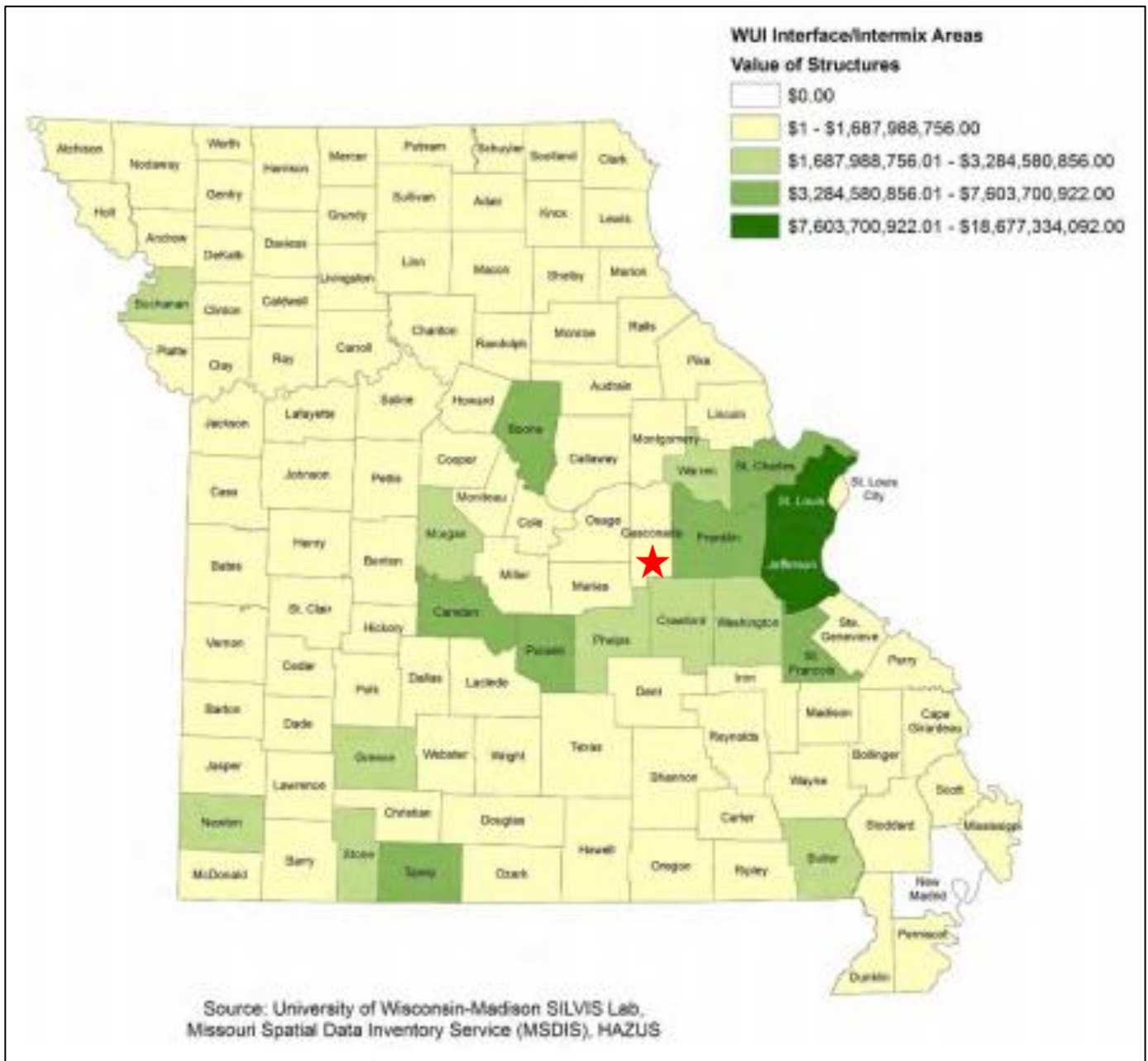
Source: 2018 Missouri State Hazard Mitigation Plan

Figure 3.80. Number of Structures in WUI Interface and Intermix Areas



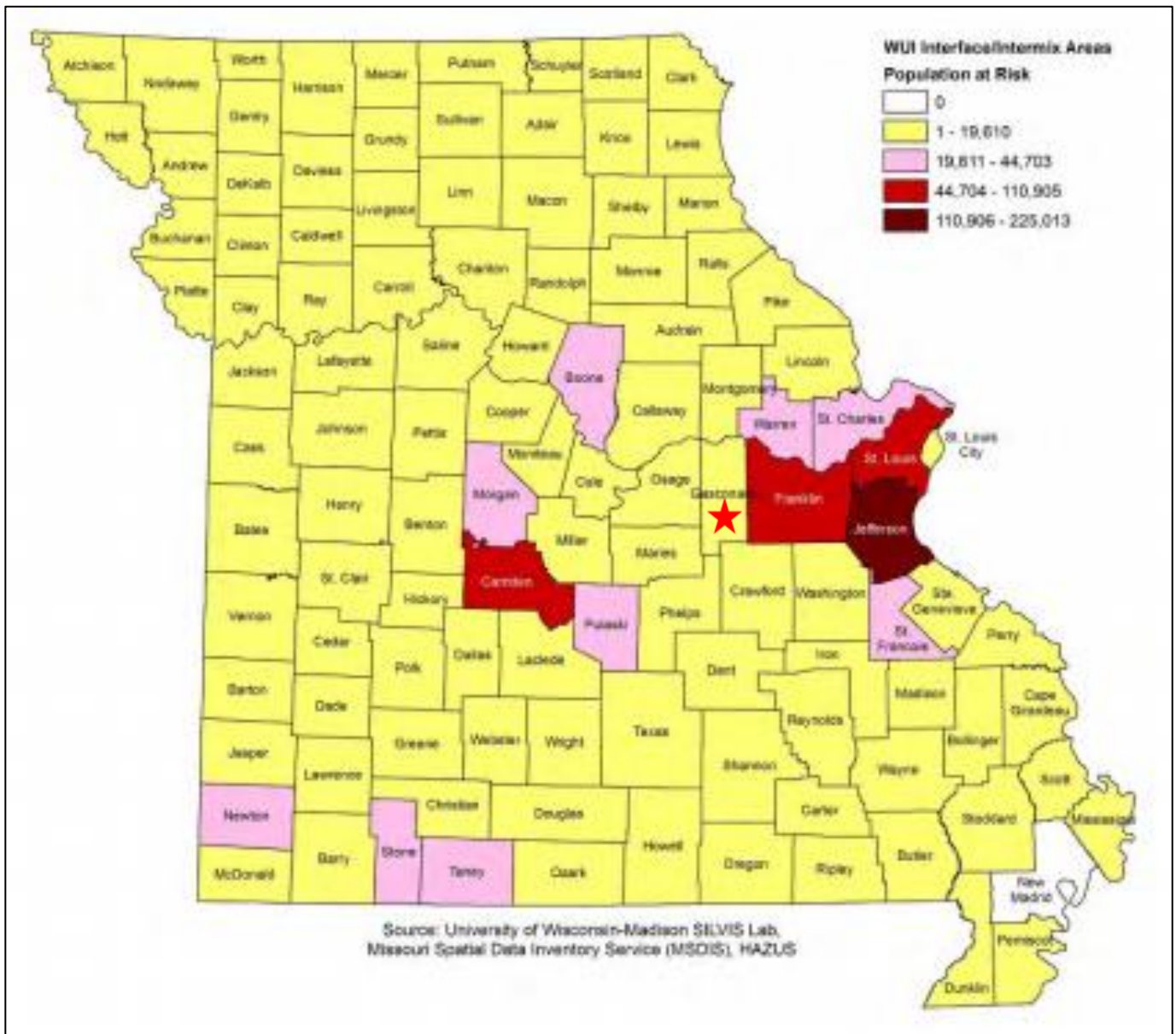
Source: 2018 Missouri Hazard Mitigation Plan, *Red star indicates Gasconade County,

Figure 3.81. Value of Structures in the WUI Interface and Intermix Areas



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

Figure 3.82. Population at Risk to Wildfire in WUI Interface and Intermix Areas



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

Potential Losses to Existing Development

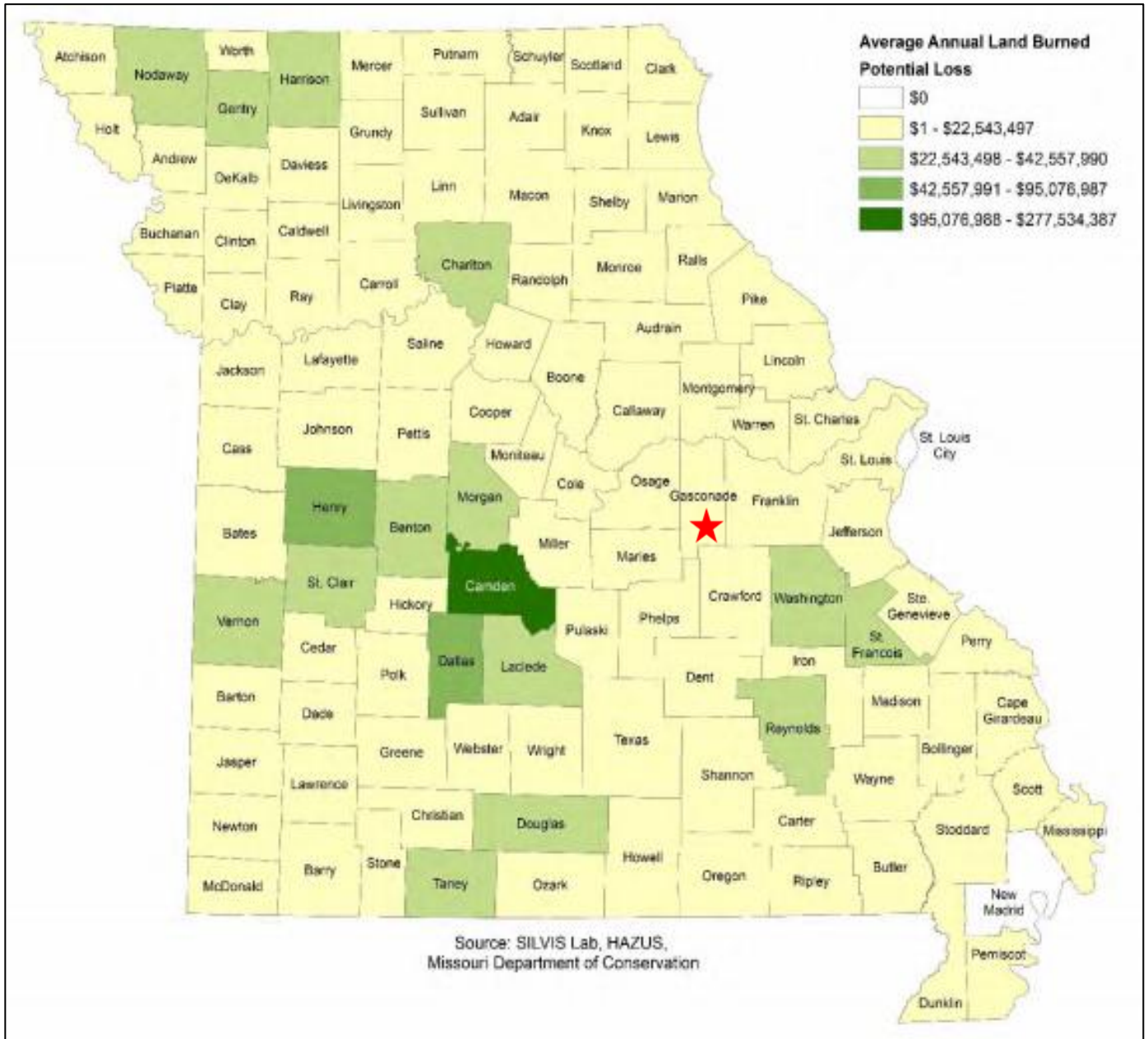
As there was not data available on Gasconade County specific losses, data was used from the 2018 Missouri State Hazard Mitigation Plan. The factors considered for estimating potential losses due to wildfires were average acreage burned each year per county and the average value of structures per acre in the WU-Interface/Intermix areas. **Table 3.97** and **Figure 3.83** that follows provide the potential loss figures for Gasconade County based on this methodology.

Table 3.97. Wildfire Potential Loss Estimates for Gasconade County

Total WUI Acreage	Total Structure Value Within WUI	Average Value/Acre within WUI	Average Annual Acreage Burned	Potential Loss
28,233.36	\$681,678,674	\$24,144	87	\$2,100,566

Source: 2018 Missouri Hazard Mitigation Plan

Figure 3.83. Annualized Wildfire Damages



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

Impact of Previous and 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 Gasconade County should have a negligible adverse impact on the community, as it would affect a small percentage of the population. 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. Both cities and school districts are in WUI areas but are closer to fire services.

Problem Statement

An estimated 2,875 structures and 4,788 people are vulnerable to wildfires in Gasconade 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.

4 MITIGATION STRATEGY

4	MITIGATION STRATEGY	4.1
4.1	<i>Goals.....</i>	4.1
4.2	<i>Identification and Analysis of Mitigation Actions.....</i>	4.2
4.3	<i>Implementation of Mitigation Actions</i>	4.5

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 Gasconade County’s existing hazard mitigation plan originally approved by FEMA in 2004 and updated and approved by FEMA on January 30, 2017. Therefore, the goals from the updated 2017 Gasconade 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. As the existing goals were broad, still applicable, and supported the 2018 State Hazard Mitigation Plan goals, the MPC saw no reason to make any changes. The Gasconade County goals are as follows:

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.

4.2 Identification and Analysis of Mitigation Actions

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 the planning tasks, participation requirements, how to get public input, the data collection questionnaires and discussed the applicable hazards and 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 has been no deaths due to natural hazard events. Action items from the 2017 plan were distributed to the group for review. 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.

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. The group decided which action items had been completed, which needed to be dropped due to lower priority, which were repetitive or could be combined with other similar action items 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 prior to 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 the first two planning meetings. 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.

Based on the status updates, there were seven completed actions; 13 actions were deleted because they scored as low priorities and/or did not meet SMART criteria; and 14 continuing actions.

Table 4.1 provides a summary of the completed and deleted actions from the previous plan.

Table 4.1. Summary of Completed Actions from the Previous Plan

Completed Actions	Completion Details (date, amount, funding source)
1.1.2 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.	MPC determined that local emergency plans for county, cities and school districts were up-to-date. Upon review, the MPC determined that promoting emergency planning for businesses did not meet SMART criteria was not a high priority and chose to remove that part of the action item from the plan.
1.1.6 Ensure school staff are trained in natural hazards and familiar with school emergency plans including evacuation and safety procedures.	All school districts indicated that this was established in school policy and procedures and stated it was complete.
3.1.3 Educate parents on school safety protocols.	School districts indicated that this action item is complete due to this being established in school policy and procedures.
5.1.2 Coordinate and integrate hazard mitigation activities where appropriate with emergency operations plans and procedures.	All jurisdictions indicated that this action item had been completed.
6.1.1 Work with SEMA Region I coordinator and State Hazard Mitigation Officer to learn about new mitigation funding opportunities.	SEMA provides notification of hazard mitigation funding opportunities and MRPC does regular grant alerts to all jurisdictions. The MPC determined this action item had been completed.
6.1.2 Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are met.	County and cities all stated that this is an established policy.
6.1.7 Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property.	The MPC agreed that this was accomplished through the hazard mitigation planning process and documented in the plan.

Source: Previously approved County Hazard Mitigation Plan; MPC committee; data collection questionnaires

4.2 Summary of Deleted Actions from the Previous Plan

Deleted Actions	Reason for Deletion
1.1.4 Monitor developments in data availability concerning the impact of levee failure, dam failure, tornados, sinkholes, land subsidence, and wildfire upon Gasconade County and all jurisdictions through local, state, and federal agencies.	Identical action items that have been removed due to SEMA reviewer stating that they do not meet SMART criteria. These action items were added at the request of SEMA/FEMA during a previous update. The MPC also determined these were not high priorities.
1.2.1 Disseminate information on the importance of and funding sources for constructing storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms.	The MPC determined that this action item did not meet the SMART criteria and chose to remove the action item from the plan.

Deleted Actions	Reason for Deletion
2.1.1 Provide information on self-inspection programs to critical facilities to assess earthquake and tornado resistance.	Upon review, due to not meeting the SMART criteria and falling to a low priority – this action item was deleted.
2.1.7 Monitor developments in data availability concerning the impact of levee failure, dam failure, tornados, sinkholes, land subsidence and wildfire upon Gasconade County and all jurisdictions through local, state, and federal agencies	Identical action items that have been removed due to SEMA reviewer stating that they do not meet SMART criteria. These action items were added at the request of SEMA/FEMA during a previous update. The MPC also determined these were not high priorities.
2.1.2 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.	Duplicate of 1.1.2. MPC chose to remove from plan.
2.1.3 Find resources to maintain and upgrade levee in Gasconade.	MPC determined that as the levee was on private property, it could not be addressed by any jurisdiction and should be removed.
2.1.5 Provide information on the benefits of establishing minimum building codes to those jurisdictions that currently lack minimum building code requirements.	Upon review, due to not meeting the SMART criteria and falling to a low priority – this action item was deleted.
5.1.1 Provide information to all communities on the benefits and costs of developing storm water management plans.	The MPC determined that this action item did not meet the SMART criteria and chose to remove the action item from the plan.
5.1.3 Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties	The MPC determined that this action item did not meet the SMART criteria and chose to remove the action item from the plan.
5.1.5 Provide information to communities on the benefits of zoning repetitive loss properties in the floodplain as open space.	The MPC determined that this action item did not meet the SMART criteria and chose to remove the action item from the plan.
5.1.6 Disseminate information on the importance of and funding sources for constructing storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms.	Duplicate of 1.2.1 – which was deleted.
6.1.4 Provide information to local governments on the benefits of budgeting for implementing hazard mitigation projects.	The MPC determined that this action item did not meet the SMART criteria and chose to remove the action item from the plan.
6.1.6 Implement public awareness program on the benefits of hazard mitigation projects, both public and private.	This was combined with 6.1.5

Source: Previously approved County Hazard Mitigation Plan; MPC committee; data collection questionnaires

4.3 New Action Items Added to the Updated Plan

Action Number	Item	New Action Item
1.1.9		Construct certified tornado saferooms in every school that does not have one as funding becomes available.
1.1.10		Review requirements to ensure continued compliance in NFIP.

Source: MPC committee

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 C: A spreadsheet with the action items and final scores is illustrated in Figure 4.1.

Jurisdictional Floodplain Management Programs

Gasconade County and the cities of Bland, Gasconade, Hermann, Morrison and Owensville are members of the NFIP and regulate development in the floodplain by reviewing permit applications for all development including new and existing structures. Rosebud is not a member of the NFIP. 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 hall and the county's flood maps can be obtained from the floodplain manager. Furthermore floodplain maps can be found online through FEMA's website <https://msc.fema.gov/portal>. The city of Rosebud does not currently participate in the NFIP nor monitor activities within the floodplain.

Table 4.3. Jurisdictional Floodplain Ordinance Adoption Date

Community Name	Ordinance Adoption Date
Gasconade County	09/04/87
Bland	08/24/84
Gasconade	12/18/84
Hermann	03/05/76
Morrison	09/18/86
Owensville	06/03/78
Rosebud	Not participating in the NFIP

Source: FEMA's Community Status Book Report¹; NSFHA (SEMA)

¹ 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
1.1.1	Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.3	Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems.	3	2	2	3	3	2	2	17	IC, PD, LF, EMCC	8	-3	5	22	H
1.1.5	Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.	3	3	3	3	3	3	2	20	IC, PD, LF, EMCC	8	-3	5	25	H
1.1.7	Regularly review and update school emergency plans.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
1.1.8	Regularly review school facilities and re-evaluate designated safe areas to insure that these areas are the safest locations to shelter students and staff.	3	2	2	3	3	3	3	19	IC, LF, EMCC	6	-1	5	24	H
1.1.9	Construct certified tornado safe rooms in every school that does not have one as funding becomes available.	3	3	3	3	3	2	3	20	LF, EMCC	4	-1	3	23	H
1.1.10	Review requirements to ensure continued compliance in NFIP.	3	3	3	2	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
2.1.4	Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.	3	2	2	2	3	3	3	18	IC, PD, LF, EMCC	8	-1	7	25	H
2.1.6	Review 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.	2	2	2	2	3	3	3	17	IC, PD, LF, EMCC	8	-1	7	24	H
3.1.1	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.	3	2	2	3	3	3	3	19	IC, PD, LF, EMCC	8	-2	6	25	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
3.1.2	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
4.1.1	Disseminate information about hazard mitigation projects to the public through press releases and social media.	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
5.1.4	Purchase properties in the flood plain as funds become available and convert that land into public space/recreation area.	2	2	2	2	3	3	3	17	IC, PD, LF, EMCC	8	-3	5	22	H
6.1.3	Work with state/local/federal agencies to include mitigation in all economic and community development projects.	3	2	2	2	3	3	3	18	IC, PD, LF, EMCC	8	-2	6	24	H
6.1.5	Promote the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.	3	2	2	3	3	3	3	19	IC, PD, LF, EMCC	8	-1	7	26	H

Gasconade County

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	County EMD and Health Department
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Information is distributed through local offices, at local events and through the media by the county EMD, SEMA, health department and emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. Owensville has a program to partner with KRCG TV to promote weather radios and survival kits but had to postpone due to COVID. The County EMD does education through FB, website and newspapers, but this action item would benefit from additional efforts to share information.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	County EMD, Gasconade County Commission
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The County is in the process of re-establishing its phone alert system.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County Commission, Road and Bridge Departments
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, road and bridge funds, MoDOT allocations, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan, road and bridge plans
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The County routinely works toward upgrading county roads and bridges when replacements are made. Culverts are routinely sized up to improve drainage. As funding allows, low water crossings are replaced with bridges. There is a BRO project in process to make the low water crossing at Valentine Ford safer. The County has also paved Friend Road leading to Adam Puchta Winery to improve flooding issues at that location.

Action 1.1.10: Review requirements for continued compliance in NFIP.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Development in floodplain.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.10
Name of Action or Project:	Continued Compliance in NFIP.
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$250 - \$1,500
Benefits:	Reduce development in SFHA, protect floodplain.
Plan for Implementation	
Responsible Organization/Department:	County Floodplain Manager, County EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinances, Hazard Mitigation Plan
Progress Report	
Action Status	New
Report of Progress	New – not started.

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.4: Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and floodplain development.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Education for residents, realtors and contractors on the dangers of and requirements associated with floodplain development.
Action or Project Description:	Distribute floodplain brochures and press releases on the dangers of floodplain development and the requirements as outlined in the county floodplain ordinance.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$3,500
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:	County Commission, County Floodplain Manager
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – brochures should be developed and distributed by 2025. Press releases should be distributed to local media annually.
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some floodplain awareness is occurring in Gasconade County but this action item would benefit from a focused, coordinated effort to increase awareness and educate not just residents but also realtors and contractors.

Action 2.1.6: Review floodplain ordinance and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials tanks and mobile homes during flooding, severe weather, or tornado events
Hazard(s) Addressed:	Floods, Severe Storms, Tornados
Action or Project	
Action/Project Number:	2.1.6
Name of Action or Project:	Review of floodplain ordinance.
Action or Project Description:	Review floodplain ordinance and, if applicable, add language for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$500 - \$1,200
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:	County Commission, Floodplain Manager
Action/Project Priority:	24 – High Priority
Timeline for Completion:	5 years
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The County has not addressed this action item to date.

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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$5,000 - \$25,000
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:	County EMD, Gasconade County Commission
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	County EMD, Floodplain Manager, County Health Department, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Outreach and education activities are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The county health department maintains brochures and information at the courthouse. The county and jurisdiction would benefit from a more focused approach to distributing information on NFIP and floodplain development requirements.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	County Commission, County EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some information is being distributed on hazard mitigation projects. Public hearings are held on any projects being funded with state or federal funds. Press releases are sent to local papers and minutes of commission meetings are also posted in local papers. However, this action item would benefit from a more focused effort to point out and explain the mitigation benefits of various projects, i.e. increasing the size of culverts; replacing low water crossings with bridges; etc.

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.

Action 5.1.4: Purchase properties in the floodplain as funds become available to convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Government purchase of properties in the floodplain.
Action or Project Description:	Purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	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 benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County Commission, Floodplain Manager
Action/Project Priority:	22– High Priority
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	To date there have been no floodplain buyouts in unincorporated Gasconade County.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 -\$9,500
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:	County Commission, County engineer, County EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), County Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the public on the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Gasconade County
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Develop and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	County Commission
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The county will install culverts if the individual pays for the culvert to ensure that installation is done correctly, and the culvert is sized correctly. This program could benefit from more organized guidelines and focused efforts if additional funding could be secured.

Bland

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	Mayor and Board of Aldermen, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city benefits from county and SEMA efforts of providing information through local offices, at local events and through the media and by emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. This action item would benefit from a more organized and sustained approach by the city to share information.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	Mayor, Board of Aldermen and City EMD
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city has one warning siren which is controlled by the fire department and would benefit from a more focused effort on providing early warning to citizens.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor, Board of Aldermen, Public Works Department
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan, road and bridge plans
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The City tries to upgrade city roads and culverts when repairs and/or replacements are made as funding allows.

Action 1.1.10: Review requirements for continued compliance in NFIP.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Development in floodplain.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.10
Name of Action or Project:	Continued Compliance in NFIP.
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$250 - \$1,500
Benefits:	Reduce development in SFHA, protect floodplain.
Plan for Implementation	
Responsible Organization/Department:	City Floodplain Manager, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinances, Hazard Mitigation Plan
Progress Report	
Action Status	New
Report of Progress	New – not started.

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.4: Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and floodplain development.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Education for residents, realtors and contractors on the dangers of and requirements associated with floodplain development.
Action or Project Description:	Provide information by distributing floodplain brochures and press releases on the dangers of floodplain development and the requirements as outlined in the county floodplain ordinance.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$3,500
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:	City Floodplain Manager, Mayor and Board of Aldermen
Action/Project Priority:	25 –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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Not Started /Continue in Plan Update
Report of Progress	This action item would benefit from a focused, coordinated effort to increase awareness and educate not just residents but also realtors and contractors.

Action 2.1.6: Review floodplain ordinance and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials tanks and mobile homes during flooding, severe weather or tornado events
Hazard(s) Addressed:	Floods, Severe Storms, Tornados
Action or Project	
Action/Project Number:	2.1.6
Name of Action or Project:	Review of floodplain ordinance.
Action or Project Description:	Review floodplain ordinance and if applicable add language for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$500 - \$1,200
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:	City Floodplain Manager, Mayor and Board of Aldermen
Action/Project Priority:	24 – High Priority
Timeline for Completion:	5 years
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The City has not addressed this action item to date.

Goal 3: Provide 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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$5,000 - \$25,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	City EMD, City Floodplain Manager, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Outreach and education activities are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The county health department maintains brochures and information at the courthouse. The city would benefit from a more focused approach to distributing information on NFIP and floodplain development requirements.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some information is being distributed on hazard mitigation projects. Public hearings are held on any projects being funded with state or federal funds. Press releases are sent to local papers and minutes of board meetings are also available to the public. However, this action item would benefit from a more focused effort to point out and explain the mitigation benefits of various projects.

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.

Action 5.1.4: Purchase properties in the floodplain as funds become available to convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Government purchase of properties in the floodplain.
Action or Project Description:	Purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	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 benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	City Floodplain Manager, Mayor and Board of Aldermen
Action/Project Priority:	22– High Priority
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	To date there have been no floodplain buyouts in Bland.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 - \$9,500
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:	Mayor and Board of Aldermen, City Engineer, City EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), County Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the public on the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Bland
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Develop and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	This program could benefit from more organized guidelines and focused efforts if additional funding could be secured.

Gasconade

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The city likely benefits from efforts made by the county to distribute information through local offices, at local events and through the media by the county EMD, SEMA, health department and emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. This action item would benefit from additional efforts by the city to share information.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The city does not have an outdoor siren or other means of early warning for residents and currently does not have funding to address this action item.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The city does not currently have the funding necessary to address this action item.

Action 1.1.10: Review requirements for continued compliance in NFIP.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Development in floodplain.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.10
Name of Action or Project:	Continued Compliance in NFIP.
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$250 - \$1,500
Benefits:	Reduce development in SFHA, protect floodplain.
Plan for Implementation	
Responsible Organization/Department:	City Floodplain Manager, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinances, Hazard Mitigation Plan
Progress Report	
Action Status	New
Report of Progress	New – not started

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.4: Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and floodplain development.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Education for residents, realtors and contractors on the dangers of and requirements associated with floodplain development.
Action or Project Description:	Provide information by distributing floodplain brochures and press releases on the dangers of floodplain development and the requirements as outlined in the county floodplain ordinance.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$3,500
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:	City Floodplain Manager, Mayor and Board of Aldermen
Action/Project Priority:	25 –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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some floodplain awareness is occurring in Gasconade but this action item would benefit from a focused, coordinated effort to increase awareness and educate not just residents but also realtors and contractors.

Action 2.1.6: Review floodplain ordinance and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials tanks and mobile homes during flooding, severe weather or tornado events
Hazard(s) Addressed:	Floods, Severe Storms, Tornados
Action or Project	
Action/Project Number:	2.1.6
Name of Action or Project:	Review of floodplain ordinance.
Action or Project Description:	Review floodplain ordinance and if applicable add language for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$500 - \$1,200
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:	Mayor and Board of Aldermen, City Floodplain Manager
Action/Project Priority:	24 – High Priority
Timeline for Completion:	5 years
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The city has not addressed this action item to date.

Goal 3: Provide 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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$5,000 - \$25,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	City EMD, City Floodplain Manager, County Health Department, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Outreach and education activities are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The city would benefit from a more focused approach to distributing information on NFIP and floodplain development requirements.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	Mayor and Board of Aldermen, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some information is being distributed on hazard mitigation projects. However, this action item would benefit from a more focused effort to point out and explain the mitigation benefits of various projects.

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.

Action 5.1.4: Purchase properties in the floodplain as funds become available to convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Government purchase of properties in the floodplain.
Action or Project Description:	Purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	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 benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, City Floodplain Manager
Action/Project Priority:	22– High Priority
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	To date there have been no floodplain buyouts in the community of Gasconade.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 -\$9,500
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:	Mayor and Board of Aldermen, City EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), County Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the public on the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Gasconade
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Develop and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The city does not currently have any cost-share programs in place.

Hermann

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Information is distributed through local offices, at local events and through the media by the city EMD, SEMA, and emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. This action item would benefit from additional efforts to share information.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city has five outdoor sirens – three of which have been recently updated. Hermann also has a phone app – Code Red – which provides early warning via phone, text and email.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, road and bridge funds, MoDOT allocations, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan, road and bridge plans
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city routinely works toward upgrading roads and is responsible for one bridge within the community. Culverts are routinely sized up to improve drainage.

Action 1.1.10: Review requirements for continued compliance in NFIP.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Development in floodplain.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.10
Name of Action or Project:	Continued Compliance in NFIP.
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$250 - \$1,500
Benefits:	Reduce development in SFHA, protect floodplain.
Plan for Implementation	
Responsible Organization/Department:	City Floodplain Manager, City EMD
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinances, Hazard Mitigation Plan
Progress Report	
Action Status	New
Report of Progress	New – not started

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.4: Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and floodplain development.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Education for residents, realtors and contractors on the dangers of and requirements associated with floodplain development.
Action or Project Description:	Provide information by distributing floodplain brochures and press releases on the dangers of floodplain development and the requirements as outlined in the county floodplain ordinance.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$3,500
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:	City Floodplain Manager, Mayor and Board of Aldermen
Action/Project Priority:	25 –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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hermann provides information on floodplain at city hall and is currently working to put city floodplain maps on the city website. This action item would benefit from a focused, coordinated effort to increase awareness and educate not just residents but also realtors and contractors.

Action 2.1.6: Review floodplain ordinance and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials tanks and mobile homes during flooding, severe weather or tornado events
Hazard(s) Addressed:	Floods, Severe Storms, Tornadoes
Action or Project	
Action/Project Number:	2.1.6
Name of Action or Project:	Review of floodplain ordinance.
Action or Project Description:	Review floodplain ordinance and if applicable add language for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$500 - \$1,200
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:	City Floodplain Manager, Mayor and Board of Aldermen
Action/Project Priority:	24 – High Priority
Timeline for Completion:	Completed
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Completed
Report of Progress	The city's floodplain ordinance does address hazardous materials tanks and mobile homes.

Goal 3: Provide 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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$5,000 - \$25,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	City EMD, City Floodplain Manager, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Outreach and education activities are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The county health department maintains brochures and information at the courthouse. The city would likely benefit from a more focused approach to distributing information on NFIP and floodplain development requirements as well as natural hazards.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	Mayor and Board of Aldermen, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	On-going. Public hearings are held on any projects being funded with state or federal funds. Press releases are sent to local papers and minutes of board meetings are available to the public. Information is posted on FaceBook, local paper and city website. Most recently Hermann developed and marked a flood route to improve traffic problems during flooding. The project was widely publicized. This action item could benefit from a more focused effort to point out and explain the mitigation benefits of various projects.

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.

Action 5.1.4: Purchase properties in the floodplain as funds become available to convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Government purchase of properties in the floodplain.
Action or Project Description:	Purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	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 benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, City Floodplain Manager
Action/Project Priority:	22– High Priority
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Most recently, the City of Hermann has done a buyout project to purchase the medical clinic that was located in the floodplain and a repetitive loss property.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 -\$9,500
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:	Mayor and Board of Aldermen, City engineer, City EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), City Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the general public on the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Hermann
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Development and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The City of Hermann has worked with developers to cost-share projects that deal with stormwater run-off.

Morrison

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city of Morrison benefits from Information distributed at local events and through the media by the county EMD, SEMA, health department and emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. The County EMD does education through FB, website and newspapers, but this action item would benefit from additional efforts to share information and a more focused approach by the city.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city has one siren but would likely benefit from additional warning systems.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, road and bridge funds, MoDOT allocations, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan,
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city upgrades culverts and roads as funding allows.

Action 1.1.10: Review requirements for continued compliance in NFIP.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Development in floodplain.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.10
Name of Action or Project:	Continued Compliance in NFIP.
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$250 - \$1,500
Benefits:	Reduce development in SFHA, protect floodplain.
Plan for Implementation	
Responsible Organization/Department:	City Floodplain Manager, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinances
Progress Report	
Action Status	New
Report of Progress	New – not started

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.4: Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and floodplain development.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Education for residents, realtors and contractors on the dangers of and requirements associated with floodplain development.
Action or Project Description:	Provide information by distributing floodplain brochures and press releases on the dangers of floodplain development and the requirements as outlined in the county floodplain ordinance.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$3,500
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:	Mayor, Board of Aldermen and Floodplain Manager
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – brochures should be developed and distributed by 2025. Press releases should be distributed to local media annually.
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some floodplain awareness is occurring in Morrison but this action item would benefit from a focused, coordinated effort to increase awareness and educate not just residents but also realtors and contractors.

Action 2.1.6: Review floodplain ordinance and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials tanks and mobile homes during flooding, severe weather or tornado events
Hazard(s) Addressed:	Floods, Severe Storms, Tornados
Action or Project	
Action/Project Number:	2.1.6
Name of Action or Project:	Review of floodplain ordinance.
Action or Project Description:	Review floodplain ordinance and if applicable add language for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$500 - \$1,200
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:	Mayor and Board of Aldermen, Floodplain Manager
Action/Project Priority:	24 – High Priority
Timeline for Completion:	5 years
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The City has not addressed this action item to date.

Goal 3: Provide 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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	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.
Estimated Cost:	\$5,000 - \$25,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning

	activities, this action item will continue to expand.
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Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	City EMD, Floodplain Manager, County Health Department, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Outreach and education activities are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The county health department maintains and distributes brochures and information. The city would benefit from a more focused approach to distributing information on NFIP and floodplain development requirements.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	Mayor and Board of Aldermen, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some information is being distributed on hazard mitigation projects. Public hearings are held on any projects being funded with state or federal funds. Press releases are sent to local papers and minutes of board meetings are available to the public. However, this action item would benefit from a more focused effort to point out and explain the mitigation benefits of various projects, i.e. increasing the size of culverts; etc.

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.

Action 5.1.4: Purchase properties in the floodplain as funds become available to convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Government purchase of properties in the floodplain.
Action or Project Description:	Purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	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 benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor, Board of Aldermen, Floodplain Manager
Action/Project Priority:	22– High Priority
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	To date there have been no floodplain buyouts in Morrison

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 -\$9,500
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:	Mayor and Board of Aldermen, City engineer, City EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), County Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the public about the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Morrison
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Development and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	No progress due to lack of resources.

Owensville

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city benefits from Information distributed at local events and through the media by the city EMD, SEMA, county health department and emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. The City EMD does education through FB, website and newspapers. The city planned to partner with KRCG TV to promote weather radios and survival kits but COVID-19 postponed this project. This action item would benefit from additional efforts to share information.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city recently updated its outdoor sirens and currently has three that are controlled by the 9-1-1 Dispatch.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, road and bridge funds, MoDOT allocations, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan,
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city upgrades culverts and roads as funding allows. The city is not responsible for any bridges within its jurisdiction. The city has plans to reduce flooding issues near the fairground arena at the fairgrounds by increasing the culvert size.

Action 1.1.10: Review requirements for continued compliance in NFIP.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Development in floodplain.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.10
Name of Action or Project:	Continued Compliance in NFIP.
Action or Project Description:	Enforce floodplain management ordinances, regulate new construction in SFHA, work with residents to identify flood prone areas, assist residents with map amendment process.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$250 - \$1,500
Benefits:	Reduce development in SFHA, protect floodplain.
Plan for Implementation	
Responsible Organization/Department:	City Floodplain Manager, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	General Revenue
Local Planning Mechanisms to be Used in Implementation, if any:	Floodplain Ordinances, Hazard Mitigation Plan
Progress Report	
Action Status	New
Report of Progress	New – not started

Goal 2: Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.

Action 2.1.4: Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with flooding and floodplain development.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	2.1.4
Name of Action or Project:	Education for residents, realtors and contractors on the dangers of and requirements associated with floodplain development.
Action or Project Description:	Provide information by distributing floodplain brochures and press releases on the dangers of floodplain development and the requirements as outlined in the county floodplain ordinance.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$3,500
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:	Mayor, Board of Aldermen and Floodplain Manager
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – brochures should be developed and distributed by 2025. Press releases should be distributed to local media annually.
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some floodplain awareness is occurring in Owensville but this action item would benefit from a focused, coordinated effort to increase awareness and educate not just residents but also realtors and contractors.

Action 2.1.6: Review floodplain ordinance and if not included, add language for securing hazardous materials tanks and mobile homes in floodplain areas to reduce hazards during storms and flooding.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with unsecured hazardous materials tanks and mobile homes during flooding, severe weather or tornado events
Hazard(s) Addressed:	Floods, Severe Storms, Tornadoes
Action or Project	
Action/Project Number:	2.1.6
Name of Action or Project:	Review of floodplain ordinance.
Action or Project Description:	Review floodplain ordinance and if applicable add language for securing hazardous materials tanks and mobile homes to reduce hazards during storms and flooding.
Applicable Goal Statement:	Reduce the potential impact of natural disasters on new and existing properties and infrastructure and the local economy.
Estimated Cost:	\$500 - \$1,200
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:	Mayor and Board of Aldermen, Floodplain Manager
Action/Project Priority:	24 – High Priority
Timeline for Completion:	5 years
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:	Hazard mitigation plan, floodplain ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	The City has not addressed this action item to date.

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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$5,000 - \$25,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	City EMD, Floodplain Manager, County Health Department, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Outreach and education activities are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The county health department maintains and distributes brochures and information. The city would benefit from a more focused approach to distributing information on NFIP and floodplain development requirements.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	Mayor and Board of Aldermen, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some information is being distributed on hazard mitigation projects. Public hearings are held on any projects being funded with state or federal funds. Press releases are sent to local papers and minutes of board meetings are available to the public. All activities are posted on the city's website and FaceBook page. However, this action item could benefit from a more focused effort to point out and explain the mitigation benefits of various projects, i.e. increasing the size of culverts; etc.

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.

Action 5.1.4: Purchase properties in the floodplain as funds become available to convert that land into public space/recreation area.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with floodplain properties.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	5.1.4
Name of Action or Project:	Government purchase of properties in the floodplain.
Action or Project Description:	Purchase properties in the floodplain as funds become available and convert that land into public space/recreation area.
Applicable Goal Statement:	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 benefits of special interests.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss of function/displacement and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor, Board of Aldermen, Floodplain Manager
Action/Project Priority:	22– High Priority
Timeline for Completion:	N/A
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	To date there have been no floodplain buyouts in Owensville.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 -\$9,500
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:	Mayor and Board of Aldermen, City engineer, City EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), County Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the public about the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Owensville
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Develop and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	No progress due to lack of resources.

Rosebud

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.

Action 1.1.1: Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Ongoing need to improve public education and awareness of hazards, personal emergency preparedness and the benefits of hazard mitigation.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.1
Name of Action or Project:	Personal Preparedness Education/Awareness Program
Action or Project Description:	Local emergency responders and EMDs will provide Ready-In-3 and other personal preparedness education programs through distribution of brochures, press releases and presentations at special events and through county health department and local government offices.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$500 - \$3,500
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going with full implementation completed in one to five years.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city benefits from Information distributed at local events and through the media by the county EMD, SEMA, health department and emergency response agencies. Children’s Division does personal preparedness by checking smoke and carbon monoxide detectors, doing fire drills and posting emergency numbers in homes. The County EMD does education through FB, website and newspapers, but this action item would benefit from additional efforts to share information and a more focused approach by the city.

Action 1.1.3: Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems and increase use by individuals of existing warning systems.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with insufficient early warning systems and improved communications systems.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.3
Name of Action or Project:	Improving early warning and communications systems.
Action or Project Description:	Finding funding to improve warning and communications systems county-wide and increase use of existing warning systems.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown due to variables – \$2,500 - ?
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	22 –High Priority
Timeline for Completion:	One to 10 years
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	LEOP, Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city has one siren controlled by 9-1-1 Dispatch but would likely benefit from additional warning systems.

Action 1.1.5: Examine road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Risks and vulnerabilities associated with low water crossings, stormwater run-off, undersized culverts, etc.
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	1.1.5
Name of Action or Project:	Mitigation through road and bridge improvements.
Action or Project Description:	Review all road and bridge improvements with consideration given to mitigating flooding. Mitigation actions could include sizing up culverts when replacing them; upgrading from low water crossings to a bridge; raising road beds that frequently flood, etc.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$5,500 - \$10,500
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, property damage, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	25 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, road and bridge funds, MoDOT allocations, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, LEOP, transportation plan,
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city upgrades culverts and roads as funding allows.

Goal 3: Provide 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.

Action 3.1.1: Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with not regularly reviewing and updating the mitigation plan and incorporating mitigation activities into emergency operations plans and procedures.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	3.1.1
Name of Action or Project:	Review hazard mitigation plan, merge with other community planning and coordinate and integrate activities with emergency plans and procedures.
Action or Project Description:	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction.
Applicable Goal Statement:	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.
Estimated Cost:	\$5,000 - \$25,000
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:	City EMD, Mayor and Board of Aldermen
Action/Project Priority:	25 –High Priority
Timeline for Completion:	On-going – should be reviewed after any major disasters and on an annual basis to determine if action items are being addressed on schedule. Hazard mitigation actions should be incorporated into applicable plans/ordinances as those documents are reviewed and updated.
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community and Economic Development Strategy. Mitigation actions are part of the county LEOP. As more local officials become familiar with mitigation and understand how it fits within other planning activities, this action item will continue to expand.

Action 3.1.2: Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with the public's lack of knowledge in regards to natural disasters, preparedness, and NFIP.
Hazard(s) Addressed:	All hazards.
Action or Project	
Action/Project Number:	3.1.2
Name of Action or Project:	Outreach & Education on natural disasters, preparedness and NFIP
Action or Project Description:	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events.
Applicable Goal Statement:	Provide 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.
Estimated Cost:	\$500 - \$1,500
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:	City EMD, Floodplain Manager, County Health Department, local emergency response agencies
Action/Project Priority:	28 – High Priority
Timeline for Completion:	1 – 5 years - ongoing
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:	Hazard Mitigation Plan, LEOP, floodplain ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The city is not a member of the NFIP. Outreach and education activities on natural hazards are an on-going activity. Local emergency response agencies frequently distribute materials at local events. The county health department maintains and distributes brochures and information. The city would benefit from a more focused approach to distributing information on natural hazards to the public.

Goal 4: Strengthen communication and coordinate participation between public agencies, citizens, non-profit organizations, business, and industry to create a widespread interest in mitigation.

Action 4.1.1: Disseminate information about hazard mitigation projects to the public through press releases and social media.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Lack of knowledge concerning local hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	4.1.1
Name of Action or Project:	Dissemination of hazard mitigation project information by elected officials
Action or Project Description:	Elected officials to disseminate information about hazard mitigation projects to the public to raise awareness and understanding of how hazard mitigation projects can reduce risks, save lives and protect property.
Applicable Goal Statement:	Strengthen communication and coordinate participation between agencies, stakeholders, jurisdictions, and the public to create widespread interest in mitigation.
Estimated Cost:	\$500 - \$1,000
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:	Mayor and Board of Aldermen, City EMD
Action/Project Priority:	27 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Floodplain Ordinance
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Some information is being distributed on hazard mitigation projects. Public hearings are held on any projects being funded with state or federal funds. Press releases are sent to local papers and minutes of board meetings are available to the public. However, this action item would benefit from a more focused effort to point out and explain the mitigation benefits of various projects, i.e. increasing the size of culverts; etc.

Goal 6: Secure resources for investment in hazard mitigation.

Action 6.1.3: Work with state/local/federal agencies to include mitigation in all economic and community development projects.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Lack of synergy/communication/coordination of mitigation in community development projects and integration of mitigation actions into economic and community development projects.
Hazard(s) Addressed:	Flood
Action or Project	
Action/Project Number:	6.1.3
Name of Action or Project:	Coordination with state/local/federal agencies to integrate mitigation into economic and community development projects
Action or Project Description:	Work with state/local/federal agencies to include mitigation in all economic and community development projects.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	\$3,500 -\$9,500
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:	Mayor and Board of Aldermen, City engineer, City EMD, local planners and grant writers
Action/Project Priority:	24 – High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan, Economic Development Strategy (CEDS), County Budget
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	Hazard mitigation goals and actions have been incorporated into the regional Community Economic Development Strategy (CEDS). As mitigation awareness grows, additional efforts will be made to incorporate mitigation activities into economic and community development projects.

Action 6.1.5: Educate the public about the benefits of local governments implementing hazard mitigation projects as well as cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.

Action Worksheet	
Name of Jurisdiction:	Rosebud
Risk / Vulnerability	
Problem being Mitigated:	Lack of cost-share programs with private property owners for hazard mitigation projects.
Hazard(s) Addressed:	All hazards
Action or Project	
Action/Project Number:	6.1.5
Name of Action or Project:	Develop local mitigation cost-share programs.
Action or Project Description:	Develop and implement cost-share programs with private property owners for hazard mitigation projects that benefit the community as a whole.
Applicable Goal Statement:	Secure resources for investment in hazard mitigation.
Estimated Cost:	Unknown – dependent upon projects and interest
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	Mayor and Board of Aldermen, Public Works
Action/Project Priority:	26 –High Priority
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard Mitigation Plan
Progress Report	
Action Status	Not Started/Continue in Plan Update
Report of Progress	No progress due to lack of resources.

Gasconade R-I

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Action 1.1.7: Regularly review and update school emergency plans.

Action Worksheet	
Name of Jurisdiction:	Gasconade R-I
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of review and updating of school emergency plans annually and after a major incident.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.7
Name of Action or Project:	School emergency plan annual review and update.
Action or Project Description:	Review and update the school emergency plan on at least an annual basis and following any major events.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$1,000 - \$5,000
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:	School Superintendent and Board of Education
Action/Project Priority:	28 - H
Timeline for Completion:	All three school districts indicate that they do this activity but felt it was a critical action item and wanted to keep it in the plan.
Potential Fund Sources:	School general revenue funds, grants and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	School Crisis Management plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	All three school districts indicated that they regularly review and update their school emergency plans. However, they felt this action item was critically important and want to leave it in the plan as being in progress.

Action 1.1.8: Regularly review school facilities and re-evaluate designated safe areas to ensure that these areas are the safest locations to shelter students and staff.

Action Worksheet	
Name of Jurisdiction:	Gasconade R-I
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with school facilities that do not have certified safe rooms and use alternative facilities to shelter students and staff in the event of high winds/tornados.
Hazard(s) Addressed:	Tornados, Severe Weather
Action or Project	
Action/Project Number:	1.1.8
Name of Action or Project:	Review and evaluation of designated school safe rooms.
Action or Project Description:	School district personnel, with help if necessary, should review and re-evaluate those areas of school facilities designated as safe rooms during tornado warnings. These areas should be re-evaluated periodically to determine if they are still the safest locations for students and staff to shelter during a tornado or severe weather event.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$1,500 - \$5,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent, Board of Education
Action/Project Priority:	24 – H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, LEOP, school crisis management plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The district had a consultant evaluate safe areas of the school within the last five years.

Action 1.1.9: Construct certified tornado safe rooms in every school that does not have one as funding becomes available.

Action Worksheet	
Name of Jurisdiction:	Gasconade R-I
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with nonexistent /unavailable storm shelters in schools.
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	1.3.5
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Construct certified tornado safe rooms in every school that does not have one as funding becomes available.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent, Board of Education
Action/Project Priority:	23 - H
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:	LEOP, hazard mitigation plan, school budget, school crisis management plan and capital improvements plan
Progress Report	
Action Status	New – added in 2021 update.
Report of Progress	New – Not started

Gasconade R-II

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Action 1.1.7: Regularly review and update school emergency plans.

Action Worksheet	
Name of Jurisdiction:	Gasconade R-II
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of review and updating of school emergency plans annually and after a major incident.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.7
Name of Action or Project:	School emergency plan annual review and update.
Action or Project Description:	Review and update the school emergency plan on at least an annual basis and following any major events.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$1,000 - \$5,000
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:	School Superintendent and Board of Education
Action/Project Priority:	28 - H
Timeline for Completion:	All three school districts indicate that they do this activity but felt it was a critical action item and wanted to keep it in the plan.
Potential Fund Sources:	School general revenue funds, grants and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	School Crisis Management plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	R-II stated they do an annual review of their plan. However, they felt this action item was critically important and want to leave it in the plan as being in progress.

Action 1.1.8: Regularly review school facilities and re-evaluate designated safe areas to ensure that these areas are the safest locations to shelter students and staff.

Action Worksheet	
Name of Jurisdiction:	Gasconade R-II
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with school facilities that do not have certified safe rooms and use alternative facilities to shelter students and staff in the event of high winds/tornados.
Hazard(s) Addressed:	Tornados, Severe Weather
Action or Project	
Action/Project Number:	1.1.8
Name of Action or Project:	Review and evaluation of designated school safe rooms.
Action or Project Description:	School district personnel, with help if necessary, should review and re-evaluate those areas of school facilities designated as safe rooms during tornado warnings. These areas should be re-evaluated periodically to determine if they are still the safest locations for students and staff to shelter during a tornado or severe weather event.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$1,500 - \$5,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent, Board of Education
Action/Project Priority:	24 – H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, LEOP, school crisis management plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The district does this on an annual basis and has relocated two safe areas in the past five years.

Action 1.1.9: Construct certified tornado safe rooms in every school that does not have one as funding becomes available.

Action Worksheet	
Name of Jurisdiction:	Gasconade R-II
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with nonexistent /unavailable storm shelters in schools.
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	1.3.5
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Construct certified tornado safe rooms in every school that does not have one as funding becomes available.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent, Board of Education
Action/Project Priority:	23 - H
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:	LEOP, hazard mitigation plan, school budget, school crisis management plan and capital improvements plan
Progress Report	
Action Status	New – added in 2021 update.
Report of Progress	

Maries R-II

Goal 1: Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning and hazard mitigation activities.

Action 1.1.7: Regularly review and update school emergency plans.

Action Worksheet	
Name of Jurisdiction:	Maries R-II
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with lack of review and updating of school emergency plans annually and after a major incident.
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	1.1.7
Name of Action or Project:	School emergency plan annual review and update.
Action or Project Description:	Review and update the school emergency plan on at least an annual basis and following any major events.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$1,000 - \$5,000
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:	School Superintendent and Board of Education
Action/Project Priority:	28 - H
Timeline for Completion:	All three school districts indicate that they do this activity but felt it was a critical action item and wanted to keep it in the plan.
Potential Fund Sources:	School general revenue funds, grants and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	School Crisis Management plan, LEOP
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	All three school districts indicated that they regularly review and update their school emergency plans. However, they felt this action item was critically important and want to leave it in the plan as being in progress.

Action 1.1.8: Regularly review school facilities and re-evaluate designated safe areas to ensure that these areas are the safest locations to shelter students and staff.

Action Worksheet	
Name of Jurisdiction:	Maries R-II
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with school facilities that do not have certified safe rooms and use alternative facilities to shelter students and staff in the event of high winds/tornados.
Hazard(s) Addressed:	Tornados, Severe Weather
Action or Project	
Action/Project Number:	1.1.8
Name of Action or Project:	Review and evaluation of designated school safe rooms.
Action or Project Description:	School district personnel, with help if necessary, should review and re-evaluate those areas of school facilities designated as safe rooms during tornado warnings. These areas should be re-evaluated periodically to determine if they are still the safest locations for students and staff to shelter during a tornado or severe weather event.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	\$1,500 - \$5,000
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts, and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent, Board of Education
Action/Project Priority:	24 – H
Timeline for Completion:	On-going
Potential Fund Sources:	Grants, local general revenue funds, and private donations of cash, goods, or services.
Local Planning Mechanisms to be Used in Implementation, if any:	Hazard mitigation plan, LEOP, school crisis management plan
Progress Report	
Action Status	In Progress/Continue in Plan Update
Report of Progress	The district has designated safe areas of the school but would likely benefit from an annual review of those areas.

Action 1.1.9: Construct certified tornado safe rooms in every school that does not have one as funding becomes available.

Action Worksheet	
Name of Jurisdiction:	Maries R-II
Risk / Vulnerability	
Problem being Mitigated:	Risks/vulnerabilities associated with nonexistent /unavailable storm shelters in schools.
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	1.3.5
Name of Action or Project:	Reducing Vulnerability of People
Action or Project Description:	Construct certified tornado safe rooms in every school that does not have one as funding becomes available.
Applicable Goal Statement:	Reduce risks and vulnerabilities of people in hazard-prone areas through current technology, better planning, and hazard mitigation activities.
Estimated Cost:	Unknown
Benefits:	Losses avoided by implementing this action include injuries and/or casualties, loss-of-function/displacement impacts and emergency management costs/community costs.
Plan for Implementation	
Responsible Organization/Department:	School Superintendent, Board of Education
Action/Project Priority:	23 - H
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:	LEOP, hazard mitigation plan, school budget, school crisis management plan and capital improvements plan
Progress Report	
Action Status	New – added in 2021 update.
Report of Progress	New – not started

5 PLAN MAINTENANCE PROCESS

5 PLAN MAINTENANCE PROCESS	5.1
<i>5.1 Monitoring, Evaluating, and Updating the Plan.....</i>	<i>5.1</i>
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
<i>5.2 Incorporation into Existing Planning Mechanisms</i>	<i>5.3</i>
<i>5.3 Continued Public Involvement</i>	<i>5.7</i>

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

5.1.1 Responsibility for Plan Maintenance

Periodic revisions and updates of the Plan are required by Missouri SEMA to ensure that the goals and objectives for Gasconade 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 Gasconade 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 Gasconade 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 Gasconade County Hazard Mitigation Planning Committee and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. 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 Gasconade 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;
- Gasconade 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 Gasconade 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

Jurisdiction	Planning Mechanisms	Integration Process for Previous Plan	Integration Process for Current Plan
Unincorporated Gasconade 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 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.
Bland	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, Aldermen 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.

Jurisdiction	Planning Mechanisms	Integration Process for Previous Plan	Integration Process for Current Plan
Gasconade	<p>Emergency Operations Plan (part of county) County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy (construction budget) Public Works Construction Budget</p>	<p>Hazard Mitigation action 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.</p>	<p>Mayor, Aldermen 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.</p>
Hermann	<p>Emergency Operations Plan (part of county) County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Public Works Construction Budget</p>	<p>Hazard Mitigation action 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.</p>	<p>Mayor, Aldermen 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.</p>
Morrison	<p>Emergency Operations Plan (part of county) County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Public Works Construction Budget</p>	<p>Hazard Mitigation action 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.</p>	<p>Mayor, Aldermen 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</p>

Jurisdiction	Planning Mechanisms	Integration Process for Previous Plan	Integration Process for Current Plan
			items.
Owensville	Emergency Operations Plan (part of county) City Emergency Operations Plan County Mitigation Plan Regional Transportation Plan Comprehensive Economic Development Strategy Public Works Construction Budget City Comprehensive Plan	Hazard Mitigation action 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.	Mayor, Aldermen 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.
Rosebud	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. City EMD was encouraged to incorporate hazard mitigation into LEOP where applicable.	Mayor, Aldermen 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.
Gasconade R-I	Master Plan Capital Improvement Plan School Emergency Plan District Budget	School board and superintendent reviewed school emergency plan to see where hazard mitigation actions could be incorporated.	School board and superintendent will review School Emergency Plan to update applicable areas with revised action items list. Superintendent will work toward including the certified tornado safe room(s) into the district budget.
Gasconade R-II	Master Plan Capital Improvement Plan School Emergency Plan	School board and superintendent reviewed school emergency plan to see where hazard	School board and superintendent will review School Emergency Plan to update applicable areas

Jurisdiction	Planning Mechanisms	Integration Process for Previous Plan	Integration Process for Current Plan
	District Budget	mitigation actions could be incorporated.	with revised action items list. Superintendent will work toward including the certified tornado safe room(s) into the district budget.
Maries R-II	Master Plan Capital Improvement Plan School Emergency Plan District Budget	School board and superintendent reviewed school emergency plan to see where hazard mitigation actions could be incorporated.	School board and superintendent will review School Emergency Plan 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 2018

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

A: References	6.2
B: Planning Process	6.6
C: Public Survey	6.41
D: Adoption Resolutions.....	6.61
E: Critical/Essential Facilities	6.72
F: MDC Wildfire Data Search	6.76

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B: Planning Process

HMPC Mailing list

Larry Miskel, Commissioner
Gasconade Co. Courthouse
119 E. First St.
Hermann, MO 65041

Lesa Lietzow, County Clerk
Gasconade Co. Courthouse
119 E. First St.
Hermann, MO 65041

Wayne Kottwitz
Gasconade Co. Road Dept.
2685 Highway 19
Owensville, MO 65066

Carrie Krupp, Clerk
City of Bland
P.O. Box 40
Bland, MO 65014

Fire Chief Douglas Nocht
City of Bland
P. O. Box 157
Bland, MO 65014

Kim Steiner, Clerk
City of Gasconade
493 Oak St.
Gasconade, MO 65036

Patricia Heaney, Clerk
City of Hermann
1902 Jefferson St.
Hermann, MO 65041

Fire Chief Kevin Speckhals
City of Hermann
214 East 2nd Street
Hermann, MO 65041

Doris Rost, Clerk
City of Morrison
405 HWY 100
Morrison, MO 65061

John Kamler, Mayor
City of Owensville
107 W. Sears
Owensville, MO 65066

Jerry Lairmore, Assoc. Comm.
Gasconade Co. Courthouse
119 E. First St.
Hermann, MO 65041

Scott Eiler, Sheriff
Gasconade Co.
119 E. 1st St. #22
Hermann, MO 65041

Patrick Boatman, City Marshall
City of Bland
P.O. Box 40
Bland, MO 65014

Chief of Police Riley Lewis
480 Oak Street
P.O. Box 132
Gasconade, MO 65036

Public Works
City of Gasconade
493 Oak St.
Gasconade, MO 65036

Mark Wallace, City Admin.
City of Hermann
1902 Jefferson St.
Hermann, MO 65041

Wayne Bruckerhoff, Public Works
City of Hermann
1902 Jefferson St.
Hermann, MO 65041

Rick Cramer, Fire Chief
Morrison Volunteer Fire Dept.
524 HWY 100
Morrison, MO 65061

Bobbi Limberg, Clerk
City of Owensville
107 W. Sears
Owensville, MO 65066

James Holland, Assoc. Comm.
Gasconade Co. Courthouse
119 E. First St.
Hermann, MO 65041

Dan Dyer, EMD
Gasconade Co.
119 E. 1st St.
Hermann, MO 65041

Lee Medlock, Mayor
City of Bland
P.O. Box 40
Bland, MO 65014

Jason Lewis, Public Works
City of Bland
P.O. Box 40
Bland, MO 65014

Debbie Green, Mayor
City of Gasconade
493 Oak St.
Gasconade, MO 65036

Bruce Cox, Mayor
City of Hermann
1902 Jefferson St.
Hermann, MO 65041

Marlon Walker, Chief of Police
City of Hermann
1902 Jefferson St.
Hermann, MO 65041

Melissa Strobe, Mayor
City of Morrison
405 HWY 100
Morrison, MO 65061

Delmar Mitchen, City & Water
City of Morrison
632 HWY 100
Morrison, MO 65061

Nathan Schauf, City Amin.
City of Owensville
107 W. Sears
Owensville, MO 65066

Robert Rickerd, Marshall
City of Owensville
109 North Second St.
Owensville, MO 65066

Scott Stranghoener, Fire Chief
City of Owensville
107 West Sears Ave.
Owensville, MO 65066

Jeff Arnold, EMD
City of Owensville
107 W. Sears
Owensville, MO 65066

Jeff Kuhne, Public Works
City of Owensville
107 W. Sears
Owensville, MO 65066

Shannon Grus, Mayor
City of Rosebud
P.O. Box 199
Rosebud, MO 63091

Ann Parker, Clerk
City of Rosebud
P.O. Box 197
Rosebud, MO 63091

Mason Griffith, Chief of Police
City of Rosebud
P.O. Box 197
Rosebud, MO 63091

Dennis Eilers, Public Works
City of Rosebud
P.O. Box 197
Rosebud, MO 63091

Dr. Scott Smith, Supt.
Gasconade Co. R-I
170 Blue Pride Drive
Hermann, MO 65041

Dr. Chuck Garner
Gasconade R-II
402 E. Lincoln
Owensville, MO 65066

Gasconade Manor Nursing
Home
1910 Nursing Home Rd.
Owensville, MO 65066

Greg Lara
Gasconade Co. Health Dept.
300 Schiller St.
Hermann, MO 65041

Victorian Place of Owensville
301 N 7th St.
Owensville, MO 65066

Gasconade Terrace Assisted
1930 Nursing Home Rd.
Owensville, MO 65066

Frene Valley Health Center
1800 Wein St.
Hermann, MO 65041

Victorian Place of Hermann
2120 Village Ln.
Hermann, MO 65041

Hermann Senior Housing
Manager
421 W. 18th St.
Hermann, MO 65041

Three Rivers Electric Co-Op
1324 E Main St.
Linn, MO 65051

Crawford Electric Co-Op Inc
10301 N. Service Rd. W.
Bourbon, MO 65441

American Red Cross
10195 Coorporate Square
Creve Coeur, MO 63132

USDA, Natural Resources
Conservation Service
316 MO-19
Owensville, MO 65066

Enbridge Energy
1162 Highway Cc
Bland, MO 65014

Capital Region Medical Clinic
3536 Kuhne Rd.
Owensville, MO 65066

Medical Clinic of Owensville
708 MO-28
Owensville, MO 65066

Hermann Area District Hospital
509 W 18th St.
Hermann, MO 65041

Preston Kramer
MoDOT
17855 Hwy 8
St. James, MO 65559

American Red Cross
3230 Emerald Lane
Jefferson City, MO 65109

Sherry Smith
Gasconade Co. Div. of Aging
1008 Highway 28 W.
Owensville, MO 65066

Missouri Dept. of Conservation
Central Regional Office
3500 East Gans Road
Columbia, MO 65201

Missouri State Highway Patrol
Troop F
P.O. Box 568
Jefferson City, MO 65102

Marlon Walker, EMD
City of Hermann
1902 Jefferson St.
Hermann, MO 65041

Fidelity Communications
64 North Clark St.
Sullivan, MO 63080

Ameren UE
P.O. Box 1558
Jefferson City, MO 65102

Intercounty Electric Co-op
1310 S Bishop Ave.
Rolla, MO 65401

USACE
Emergency Management
601 E. 12th Street
Kansas City, MO 64106

Tom Waters, Chairman
MLDDA
36257 Hwy Z
Orrick, MO 64077

StoneBridge Senior Living
1016 Hwy. 28
Owensville, MO 65066

MEMORANDUM

TO: Gasconade County Hazard Mitigation Planning Committee
FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director
DATE: October 15, 2020
SUBJECT: Hazard mitigation planning meeting October 29, 2020

The Meramec Regional Planning Commission (MRPC) has been contracted by Gasconade County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Gasconade County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Gasconade County. We need your help to successfully complete this project.

The county must submit the first draft of an updated hazard mitigation plan to SEMA and FEMA by September 30, 2021 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.

A meeting of the Gasconade County hazard mitigation planning committee is scheduled for Thursday, October 29 at 10:00 a.m. via Zoom and conference call. Instructions for joining the call are on the agenda.

The focus of this meeting will be to explain the planning process and reasons for updating the plan; overview of what is required of the participating jurisdictions; public involvement in the planning process; and review of existing goals and action items to determine if any changes need to be made. An agenda is attached, as well as a list of action items currently in the plan. 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

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 Gasconade 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 Gasconade County. If you have any questions, contact me at (573) 265-2993, extension 104 or via e-mail: tsnodgrass@merameregion.org. I look forward to seeing you at the meeting.

TS

Gasconade County Multi-Jurisdictional Hazard Mitigation Plan Update Planning Meeting

Thursday, October 29, 2020 ~ 10:00 a.m.

Meeting via Zoom and Conference Call:

Join Zoom Meeting:

<https://us02web.zoom.us/j/89878769140?pwd=NORxSTRLaEptY0ZseUI2czZ2VmZPQT09>

Meeting ID: 898 7876 9140 Passcode: 077989

One tap mobile: +19292056099,,89878769140#,,,,,0#,,077989# US (New York)

+13017158592,,89878769140#,,,,,0#,,077989# US (Germantown)

Dial by your location: +1 312 626 6799 US (Chicago)

Find your local number: <https://us02web.zoom.us/u/kbQppkypxy>

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: **October 27, 2020 at 2:30 p.m.**

Notice is hereby given that the **Gasconade County Hazard Mitigation Planning Committee** will meet at 10:00 a.m. on **Thursday, October 29, 2020** via Zoom and conference call. Instructions for joining the meeting:

Zoom:

<https://us02web.zoom.us/j/89878769140?pwd=N0RxSTRLaEptY0ZseUI2czZ2VmZPQT09>

Call in: 1-(312) 626-6799 ~ Meeting ID: 898 7876 9140~ Passcode: 077989

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
- Set Next Meeting Date(s)
- 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

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.

Gasconade County Hazard Mitigation Plan Review Meeting
October 29, 2020 ~ 10:00 a.m.

Name	Representing	Email Address	Phone #	Address
Mark Wallace		hermannadmin@centurytel.net		
Dan McKinney	Hermann Hospital	dan@hadh.org		
Kent Krotzmeier MSHP Krotzmeier	MSHP			
Kathryn Hawes	MRPC	khawes@meramecregion.org		
Jeff Arnold	Ambulance EMD / Coroner	cityofowensvillema@gmail.com		
Katie Scheer	Medical Clinic Owensville			
Chuck Garner	R-II School Gasco	cgarner@dutchmen.us		
Larry Miskel	Presiding Commissioner	LNL94@centurytel.net		

MEMORANDUM

TO: Gasconade County Hazard Mitigation Planning Committee
FROM: Tammy Snodgrass, MRPC Environmental Programs Manager/Assistant Director
DATE: January 26, 2021
SUBJECT: Hazard mitigation planning meeting 1 p.m. February 9, 2021

The Meramec Regional Planning Commission (MRPC) has been contracted by Gasconade County and the State Emergency Management Agency (SEMA) to review and update the multi-jurisdictional hazard mitigation plan for Gasconade County, its cities and school districts. The project is being funded by state and federal dollars with matching funds from Gasconade County. We need your help to successfully complete this project.

The county must submit the first draft of an updated hazard mitigation plan to SEMA and FEMA by September 30, 2021 in order to continue to be eligible for 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.

A meeting of the Gasconade County hazard mitigation planning committee is scheduled for Tuesday, February 9 at 1:00 p.m. via Zoom and conference call. Instructions for joining the call are on the enclosed agenda. The focus of this meeting will be to review and update the action items listed in the plan. **As these action items are the substance and core of the plan – and what the jurisdictions are committing to work toward completing – it is critical that the county, cities and school districts participate in this meeting.**

It is also critical that you provide an email address so that I will be able to contact you directly and as quickly as possible with information on the plan as well as meetings and meeting postponement information. Please send an email to tsnodgrass@meramecregion.org so that I can put you on the email list for the committee.

An agenda is attached. The list of action items was mailed out in December with the agenda of the January meeting that was postponed. I did a review and mark up the action items with *suggestions* for changes. **The most important thing is for each jurisdiction to review the current list and consider - which ones are completed or progress has been made on; which ones may no longer be high or medium priority; and which ones you believe are repetitive or can be combined.**

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. Please come prepared to report on these activities.

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 Gasconade 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.

Also enclosed is an in-kind match form. Please complete this form with any time you or any other staff members spend reviewing the action items or gathering information. The county is required to provide 25 percent match for the federal grant funding this plan update. Any time spent by someone - other than an elected official - can be put towards that match requirement. Please use the hourly rate and mileage rate indicated on the form.

Thank you for your assistance in addressing hazard mitigation for Gasconade County. If you have any questions, contact me at (573) 265-2993, extension 104 or via e-mail: tsnodgrass@merameregion.org. I look forward to seeing you at the meeting.

TS

Enclosures

Gasconade County

Multi-Jurisdictional Hazard Mitigation Plan Update

Planning Meeting via Zoom

Tuesday, February 9, 2021 ~ 1:00 p.m.

AGENDA

- I. Welcome/Introductions – Tammy Snodgrass, Assistant Director, Meramec Regional Planning Commission
- II. Brief Review
- III. Public Survey Update
- IV. Participation Requirements/Status of Questionnaires
- V. Discuss Mitigation Action Updates – *(Which have been accomplished or had progress made; which are no longer high priority; which can be combined or eliminated)*
- VI. Next Steps
- VII. Set Next Meeting Date(s)

Join Zoom Meeting

<https://us02web.zoom.us/j/84983796833?pwd=WW42S0UwdlVMNIRIVW5MZnhvaXBpQT09>

Meeting ID: 849 8379 6833

Passcode: 044941

One tap mobile

+13126266799,,84983796833#,,,,*044941# US (Chicago)

+19292056099,,84983796833#,,,,*044941# US (New York)

Dial by your location

+1 312 626 6799 US (Chicago)

Find your local number: <https://us02web.zoom.us/u/kdPJHIXaKM>

NOTICE OF PUBLIC MEETING

Date and time of posting: **January 26, 2021 at 1:30 p.m.**

Notice is hereby given that the **Gasconade County Hazard Mitigation Planning Committee** will meet at **1:00 p.m.** on **Tuesday, February 9, 2021** via Zoom and conference call. Instructions for joining the meeting:

Zoom:

<https://us02web.zoom.us/j/84983796833?pwd=WW42S0UwdIVMNIRIVW5MZnhvaXBpQT09>

Call in: 1-(312) 626-6799 ~ Meeting ID: 849 8379 6833 ~ Passcode: 044941

The tentative agenda of this meeting includes:

- Welcome and Introductions
- Brief Review
- Public Survey Update
- Participation Requirements
- Review and Discussion of Action Items
- Plan Maintenance
- Next Steps
- Set Next Meeting Date(s)
- 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

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.

02/09/2021

Dear Gasconade County Hazard Mitigation Planning Committee Members:

As I stated in the cover letter, I have reviewed the list of action items that were shared out at the October 29, 2020 meeting and I have some *suggested* revisions – mainly to get the discussion going. These are just suggestions and the jurisdictions may have very different ideas for editing these action items. Please note how I marked up the document below. I really want folks to look this over closely and make the final decision on what stays, what needs to be revised and if there are any new action items that need to be added. At the same time, I want you to look at the items and let me know if some that I've left in the plan have been accomplished or if progress has been made on them.

In addition, SEMA and FEMA have stated that all action items need to be **SMART** – **S**pecific, **M**easurable, **A**chievable, **R**elevant, **T**ime-bound. In other words, the action item should not have soft language like “encourage”, “promote”, “work to”. I will endeavor to wordsmith each action item as necessary, to meet this requirement. I have included questions in *red italic* to help move the process along as we review these together.

I have gone through the existing list and highlighted the ones I think can be removed in **gray**. These may be good activities, but (in my opinion) they do not rise to the level of being included in the plan; would not be an activity that hazard mitigation grant funds would be requested for; or are an on-going activity that is already imbedded in local policy and procedure.

Action items that are repetitive or can be combined are marked in **aqua**, with notes on what I did in *red italic*.

The action items that I believe the county has achieved, that can be taken off the list, I have highlighted in **green**. But it is up to the committee to decide if these have been completed and should be removed.

Revisions to action items are marked in **blue**. If I have deleted language, it is in brackets and highlighted in **grey**.

These will be discussed and final decisions made at the January 26 meeting. The handout also includes an explanation of the STAPLEE method of scoring each action item and determining if it is a high, medium or low priority.

Thank you for your assistance and time. I've attached an in-kind match form for you to use as well.

System Used to Prioritize Action Items - STAPLEE

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

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 C: A spreadsheet with the action items and final scores is illustrated in Figure 4.4.

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 2 = Maybe YES							1 = Prob NO 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
1.1.1	Implement an education program on personal emergency preparedness that teaches residents how to prepare emergency survival kits with water, blankets, flashlights, etc. and how to shut off their home utilities during emergencies. Ready-in-3 brochures/videos and information will be made readily available to the public through the health department and local government offices. <i>Any progress here? Has this been established and could be marked COMPLETED? Some of this is covered in HS classes at the schools. R-I and R-II. Children's division does personal preparedness by checking smoke detectors and carbon monox detectors, fire drills, posting emergency numbers on the fridge. Hospital does weekly status reports on COVID, vaccination plans. Owensville was supposed to partner up in April with KRCG TV to promote weather radios, survival kits, will do after COVID. Clyde – does education through his office through FB, website and newspapers.</i>	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.2	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. <i>Public entities should already have emergency plans in place and "promoting" emergency plans to businesses may not meet the SMART criteria. Has this been partially completed? Is it still a high or medium priority? School plans are good. Look at them regularly. County plan is good. Owensville plan is good. Hermann plan is good. Hospital is required through law and regulation to maintain emergency plan. Public entities are good – business emergency planning – low priority – remove from plan.</i>	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
1.1.3	Actively seek funding to assist cities in obtaining early warning systems and improved communication systems and updating existing warning systems. <i>Any progress? New sirens? Phone/text systems? Owensville updated sirens – now have 3. Controlled by 9-1-1. Peaceful Valley purchased old Owensville sirens and installed them there (2). Hermann has 5 sirens – three are updated – controlled by Police dispatch. Hermann also has a phone app – Code Red – text, email, phone calls.</i>	3	2	2	3	3	2	2	17	IC, PD, LF, EMCC	8	-3	5	22	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 2 = Maybe YES			1 = Prob NO 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
	<i>County is in the process of re-establishing phone alert system. R-I and R-II have used their phone app system to announce emergency mass communication for emergency situations. City of Rosebud has one siren updated 2 years ago. Show progress</i>														
1.1.4	Monitor developments in data availability concerning the impact of levee failure, dam failure, tornados, sinkholes, land subsidence, and wildfire upon Gasconade County and all jurisdictions through local, state, and federal agencies <i>This was included at the request of SEMA and FEMA – they no longer require it – remove? REMOVE</i>	3	2	2	3	3	2	3	18	IC, PD, LF, EMCC	8	-2	6	24	H
1.1.5	Examine [potential] road and bridge upgrades that would improve drainage, reduce flooding and the risk to residents and property. <i>Progress here? Need a list of significant projects completed or policies put into place. No bridges in Owensville. Hermann has one they are responsible for. Hermann school has two bridges they are responsible for them. County – this is a constant. MODOT inspects all of them annually. 72 bridges including low water crossings. BRO project in process to make a low water crossing safer (VALENTINE Ford). Friend Creek (Adam Puchta Winery) paving that road to improve flooding issues. When replacing culverts – size up when necessary to improve drainage.</i>	3	3	3	3	3	3	2	20	IC, PD, LF, EMCC	8	-3	5	25	H
1.1.6	[Educate] Ensure school staff are trained on natural hazards and [make sure all staff are] familiar with school emergency plans including evacuation and safety procedures. <i>Progress? Is this already established in school policy and procedures? Can we mark it COMPLETE? Yes – happening with relevant school staff – Owensville and Hermann.</i>	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
1.1.7	Regularly review and update school emergency plans. <i>Is this COMPLETE? Established in school policy? Done on an annual basis – but district prefers that it be left in the plan. Done after drills and annually.</i>	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 2 = Maybe YES							1 = Prob NO 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
Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES 2 = Maybe YES							1 = Prob NO 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
1.1.8	Regularly review school facilities and re-evaluate designated safe areas to ensure that these areas are the safest locations to shelter students and staff. <i>Any progress here? R-II -Do on an annual basis (have relocated two spots in the last few years). R-I had a consultant come in and evaluate the school for the best areas to shelter in.</i>	3	2	2	3	3	3	3	19	IC, LF, EMCC	6	-1	5	24	H
1.2.1	Disseminate information on the importance of and funding sources for constructing storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms. <i>Progress? Who is responsible? EMD (Owensville) agrees that people know that they need them – not sure the action item is needed? REMOVE.</i>	3	3	2	3	3	2	3	19	IC, EMCC	4	-2	2	21	H
2.1.1	Provide information on self-inspection programs to critical facilities to assess earthquake and tornado resistance. <i>Is this doable? Is it still a high priority? REMOVE</i>	3	2	2	3	3	3	2	18	IC, PD, LF, EMCC	8	-2	6	24	H
2.1.2	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. <i>Remove – duplicate of 1.1.2</i>	3	3	3	3	3	2	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
2.1.3	Find resources to maintain and upgrade levee in Gasconade. <i>Is this doable? Some are on private property, responsibility of local districts. REMOVE.</i>	3	2	2	3	3	3	1	17	IC, PD, LF, EMCC	8	-3	5	22	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
2.1.4	Educate residents, realtors and contractors about the dangers of floodplain development and the benefits of the National Flood Insurance Program by providing brochures and information. <i>Hermann provides info at city hall and working to put floodplain maps on city website.</i>	3	2	2	2	3	3	3	18	IC, PD, LF, EMCC	8	-1	7	25	H
2.1.5	Provide information on the benefits of establishing minimum building codes to those jurisdiction that currently lack minimum building code requirements. <i>Is this doable? Who will take responsibility? No codes in the county. Difficult to push small communities to adopt codes. Owensville and Hermann Bland has building codes in place. REMOVE.</i>	2	2	2	1	3	3	3	16	IC, PD, LF, EMCC	8	-2	6	22	H
2.1.6	[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. <i>Hermann has in place. Check FP ordinances for this.</i>	2	2	2	2	3	3	3	17	IC, PD, LF, EMCC	8	-1	7	24	H
2.1.7	Monitor developments in data availability concerning the impact of levee failure, dam failure, tornados, sinkholes, land subsidence and wildfire upon Gasconade County and all jurisdictions through local, state, and federal agencies. <i>This was included at the request of SEMA and FEMA – they no longer require it – remove?</i>	3	2	2	3	3	2	3	18	IC, PD, LF, EMCC	8	-2	6	24	H
3.1.1	Re-evaluate the hazard mitigation plan, merge with other community planning activities and documents and incorporate hazard mitigation into the long-range planning and development activities of the county and each jurisdiction. <i>Has this been done? Progress made? Completed? County has a nuke plant plan and are evaluated annually and do an exercise annually. Hermann – emergency flood route project.</i>	3	2	2	3	3	3	3	19	IC, PD, LF, EMCC	8	-2	6	25	H
Figure 4.4 Prioritization of Hazard Mitigation Actions		3 = Def YES		1 = Prob NO											
		2 = Maybe YES		0 = Def NO.											

Figure 4.4 Prioritization of Mitigation Actions		3 = Def YES		2 = Maybe YES		1 = Prob NO		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
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
3.1.2	Distribute SEMA brochures on natural disasters and NFIP at public facilities and events. <i>Is this established in policy and procedure? Can we mark it COMPLETE? Hermann – NFIP materials at city hall. Back to school fairs sometimes hand out personal preparedness info to parents. During fire prevention week fire departments distribute materials.</i>	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
3.1.3	Educate parents on school safety protocols. <i>Is this established in policy and procedure? Can we mark it COMPLETE? Don't share info on active shooters but do share info on natural hazards – tornados, fire – how we are going to communicate, where we will communicate. COMPLETED.</i>	3	3	3	3	3	3	3	21	IC, PD, LF, EMCC	8	-1	7	28	H
4.1.1	[Encourage elected officials to] Disseminate information about hazard mitigation projects to the public. <i>How? Need specifics – or do we need to remove? Is this significant enough to keep? County has public hearings on any project with federal funds, do press releases through local papers (minutes in the papers). Hermann – every move we make is on FB. Would be on website, FB, in local paper – (flood route). Owensville – same thing – everything is publicized.</i>	3	3	2	3	3	3	3	20	IC, PD, LF, EMCC	8	-1	7	27	H
5.1.1	Provide information to all communities on the benefits and costs of developing storm water management plans. <i>Need specifics? Who will be responsible for this action item? How will info be shared? REMOVE</i>	3	2	2	2	3	3	3	18	IC, PD, LF, EMCC	8	-2	6	24	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
5.1.2	Coordinate and integrate hazard mitigation activities where appropriate with emergency operations plans and procedures. <i>Has this been completed? COMPLETED.</i>	3	2	2	3	3	3	3	19	IC, PD, LF, EMCC	8	-2	6	25	H
5.1.3	Encourage cities to require contractor storm water management plans in all new development – both residential and commercial properties. <i>Needs specific language – who will be responsible? Hermann does this already – but not sure how to get other cities to do it. Same with Owensville. Until we get mandates – probably won't happen. REMOVE.</i>	2	3	2	2	3	3	3	18	PD, EMCC	4	-2	2	20	H
5.1.4	[Encourage local government to] Purchase properties in the flood plain as funds become available and convert that land into public space/recreation area. <i>In process with the old clinic in Hermann. None in Owensville.</i>	2	2	2	2	3	3	3	17	IC, PD, LF, EMCC	8	-3	5	22	H
5.1.5	Provide information to communities on the benefits of zoning repetitive loss properties in the floodplain as open space. <i>Needs more specific language. Who will be responsible? Is this doable? REMOVE</i>	1	2	2	2	3	3	3	16	IC, PD, LF, EMCC	8	-1	7	23	H
5.1.6	<i>Disseminate information on the importance of and funding sources for constructing storm shelters, especially tornado safe rooms near schools and large employment centers that currently do not have access to safe rooms. Duplicate of 1.2.1 – REMOVE.</i>	3	3	2	3	3	2	3	19	IC, EMCC	4	-2	4	21	H
6.1.1	Work with SEMA Region I coordinator and State Hazard Mitigation Officer to learn about new mitigation funding opportunities <i>Has this been done? Is it a high priority? REMOVE – MRPC sends out grant alerts</i>	3	3	3	3	3	3	3	21	IC, LF, EMCC	8	-1	7	28	H
6.1.2	Structure grant proposals for road/bridge upgrades so that hazard mitigation concerns are also met. <i>Any progress? Set in policy for the County. Same for cities. COMPLETE – remove.</i>	3	2	2	2	3	3	3	18	IC, LF, EMCC	8	-2	6	24	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
6.1.3	Work with state/local/federal agencies to include mitigation in all economic & community development projects. <i>Any progress? Clinic in Hermann is green space – talk of making it a dog park.</i>	3	2	2	2	3	3	3	18	IC, LF, EMCC	8	-2	6	24	H
6.1.4	Provide information to local governments on the benefits of budgeting for and implementing hazard mitigation projects. <i>Who is responsible? How will this be done? REMOVE.</i>	3	2	2	3	3	3	3	19	IC, LF, EMCC	8	-1	7	26	H
6.1.5	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 <i>Who is responsible? How will this be done? Culverts – County will install and the resident pays for the culvert. If a culvert is installed for drainage purposes, no cost to the landowner. Me work on the wording on this and share out again.</i>	3	2	2	3	3	3	3	19	IC, LF, EMCC	8	-1	7	26	H
6.1.6	Implement public awareness program on the benefits of hazard mitigation projects, both public and private. <i>Combine with 6.1.5.</i>	3	2	2	3	3	3	3	19	IC, LF, EMCC	8	-1	7	28	H
6.1.7	Prioritize mitigation projects, based on cost-effectiveness and starting with those sites facing the greatest threat to life, health and property. <i>This is currently being done every five years with hazmit plan review and update. Mark Completed? Completed.</i>	3	2	2	3	3	3	3	19	IC, LF, EMCC	8	-1	7	28	H

Gasconade County Hazard Mitigation Plan Review Meeting
February 9, 2021 ~ 1:00 p.m.

Name	Representing	Email Address	Phone #	Address
Tammy Snodgrass	MRPC			
Kathryn Hawes	MRPC			
Larry Miskel	Gasconade County			
Jeff Arnold	Owensville EMD Fire Chief			
Clyde Zelch	EMD Gasco Co.			
Chuck Garner	R-II Schools			
Dan McKinney	Hermann Area Distr. Hospital			
Gott Smith	R-I School			
Jessica Henton	Gasco Children's Div.			

Name	Representing	Email Address	Phone #	Address
Randy Blaske	City Admin Owensville			
Mark Wallace	Hermann			
Karen Norton	R-I Schools			

Dear Gasconade County Hazard Mitigation Planning Committee:

The committee will meet on Tuesday, August 31, 2021 at 1:00 via Zoom. You will receive an Outlook invite separately from this email, but here is the meeting information:

Join Zoom Meeting

<https://us02web.zoom.us/j/84573752802?pwd=QXFyYkEpyVlhOWUJGSmJyUUFlancwdz09>

Meeting ID: 845 7375 2802 ~ Passcode: 615685

One tap mobile: +13126266799,,84573752802#,,,,*615685# US (Chicago)

Meeting ID: 845 7375 2802 ~ Passcode: 615685

Find your local number: <https://us02web.zoom.us/u/kbLatBSuuw>

Please make every effort to participate in this meeting. It will be the final planning meeting before the public comment period. **The first draft must be submitted to SEMA by September 30, 2021.** As I stated in an earlier email for the county, cities and school districts - **please make sure to include the review, approval and adoption of the hazard mitigation plan update in your September meetings. I must have all the adoption resolutions signed and returned to me before the plan is submitted to SEMA for review (September 28th at the latest).** I will email personalized adoption resolutions to each jurisdiction once the first draft is completed and ready for review at the end of August.

I will be sending out completed chapters for your review this week. **Please track your time and complete in-kind match for any time you spend on reviewing the plan or getting the adoption resolutions completed. The county still needs a significant amount of in-kind match documented.** If you have spent any time in meetings, collecting information, completing the questionnaire, reviewing the document, etc., please complete an in-kind match form. If you are not sure if you have submitted one already, please contact me and I can check my records to see if I have received anything from you. Please remember that elected officials' time is not eligible to count toward in-kind match. Please use the hourly volunteer rate on the form.

Thank you again for assisting in the update of the Gasconade County Hazard Mitigation Plan. I appreciate your time and commitment to the completion of this project. If you have any questions, or wish to provide feedback on the plan document, please let me know.

Best Regards,

Tamara F. Snodgrass

Assistant Director/Environmental Programs Manager

Meramec Regional Planning Commission

4 Industrial Drive

St. James, MO 65559

Phone: (573) 265-2993, extension 104

FAX: (573) 265-3550

tsnodgrass@meramecregion.org

Gasconade County
Multi-Jurisdictional Hazard Mitigation Plan Update
Planning Meeting via Zoom

Tuesday, August 31, 2021 ~ 1:00 p.m.

AGENDA

- I. Welcome/Introductions – Tammy Snodgrass, Assistant Director, Meramec Regional Planning Commission

- II. Brief Review

- III. Public Survey Results

- IV. Participation Requirements

- V. Review and Discussion of Draft Plan Chapters

- VI. Plan Maintenance

- VII. Adoption Process

- VIII. Public Comment Period

- IX. Next Steps

- X. Adjourn

Join Zoom Meeting:

<https://us02web.zoom.us/j/84573752802?pwd=QXFybEpyVlhOWUJGSmJyUUFlancwdz09>

Meeting ID: 845 7375 2802 ~ Passcode: 615685

One tap mobile : +13126266799,,84573752802#,,,,*615685# US (Chicago)

Find your local number: <https://us02web.zoom.us/u/kbLatBSuuw>

NOTICE OF PUBLIC MEETING

Date and time of posting: **August 30, 2021 at 9:30 a.m.**

Notice is hereby given that the **Gasconade County Hazard Mitigation Planning Committee** will meet at **1:00 p.m.** on **Tuesday, August 31, 2021** via Zoom and conference call. Instructions for joining the meeting:

Zoom: <https://us02web.zoom.us/j/84573752802?pwd=QXFyYkEpyVlhOWUJGSmJyUUFlancwdz09>

Call in: 1-(312) 626-6799 ~ Meeting ID: 845 7375 2802 ~ Passcode: 615685

The tentative agenda of this meeting includes:

- Welcome and Introductions
- Brief Review
- Public Survey Update
- Participation Requirements
- Review and Discussion of Draft Plan Chapters
- Plan Maintenance
- Adoption Process
- Public Comment Period
- 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

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.

Gasconade County Hazard Mitigation Plan Review Meeting
August 31, 2021 ~ 1:00 p.m.

Name	Representing	Email Address	Phone #	Address
Jeff Arnold?	Owensville			
Tricia Heavey	Hermann			
Larry Miskel	Gasco. Co.			
Leslie Lause	Gasco R-I			
Dan McKinney	Herman hospital			
Dr. Jerri Kay Hardy	Gasco. R-II			
Clyde Zelch	County EMD			
Geoff Neill	Gasco R-I			
Jessica Williams	Stonebridge of Hermann			

Name	Representing	Email Address	Phone #	Address
Tammy Snodgrass	MRPC			

Mailing list for surrounding jurisdictions:

Tim Webster, Supt.
St. James R-I
122 East Scioto Street
St. James, MO 65559
Dr. Randy Caffey
Newburg R-II
P.O. Box C
Newburg, MO 65550
Mayor Terry Austin
City of Edgar Springs
P. O. Box 13
Edgar Springs, MO 65462
Mayor Rick Krawiecki
City of St. James
100 S. Jefferson St.
St. James, MO 65559
Mayor T.C. James
City of Vienna
P.O. Box 196
Vienna, MO 65582
Presiding Comm Leo Sanders
Crawford County
P.O. Box AS
Steelville, MO 65565
Mayor Terry Beckham
City of Steelville
P.O. Box M
Steelville, MO 65565
Chairman
Village of West Sullivan

Jon Earnhart, Supt.
Crawford Co R-II
1 Wildcat Pride Dr
Cuba, MO 65453
Presiding Commissioner Darryl Griffin
Osage County
205 East Main St.
Linn, MO 65051
Chairperson Darryl Haller
City of Freeburg
PO BOX 121
Freeburg, MO 65035
Mayor Tammy Massman
City of Westphalia
PO BOX 36
Westphalia, MO 65085

Craig Hounsom, Supt.
Rolla 31
500A Forum Dr.
Rolla, MO 65401
Pres. Commissioner Randy Verkamp
Phelps County Commission
200 N. Main St.
Rolla, MO 65401
Mayor James Poucher
City of Newburg
P.O. Drawer K
Newburg, MO 65550
Presiding Com. Ray Schwartz
Maries County Courthouse
P.O. Box 205
Vienna, MO 65582
Mark Parker, Supt.
Maries County R-I
P.O. Box 218
Vienna, MO 65582
Mayor David Lafferty
City of Bourbon
P.O. Box 164
Bourbon, MO 65441
Chairman Jared West
Village of Leasburg
P.O. Box 39
Leasburg, MO 65535
Mayor Dennis Watz
City of Sullivan
210 West Washington
Sullivan, MO 63080
Mike Whittaker, Supt.
Steelville R-III
P.O. Box 339
Steelville, MO 65565
Chairperson Chris Brundick
City of Argyle
PO BOX 22
Argyle, MO 65001
Mayor Dwight Massey
City of Linn
1200 E Main St, PO Box 498
Linn, MO 65051
Superintendent Lyle Best
Osage Co. R-I
614 S. Poplar St.
Chamois, MO 65024

John Fluhrer, Supt.
Phelps County R-III
17790 State Route M
Edgar Springs, MO 65462
Mayor Billy Marton
City of Doolittle
380 Eisenhower
Doolittle, MO 65401
Mayor Louis J. Magdits, IV
City of Rolla
P.O. Box 979
Rolla, MO 65402
Mayor Steve Vogt
City of Belle
P.O. Drawer 813
Belle, MO 65013
Dr. Lenice Basham, Supt.
Maries County R-II
P.O. Box 819
Belle, MO 65013
Mayor, Cody Leathers
City of Cuba
P.O. Box K
Cuba, MO 65453
Chairman
Village of St. Cloud

Dr. Kyle Gibbs, Supt.
Crawford Co R-1
1444 Old Hwy 66
Bourbon, MO 65441
Dr. Jana Thornsberry, Supt.
Sullivan School District
138 Taylor St.
Sullivan, MO 63080
Mayor Elise Brochu
Chamois City Hall
200 S. Main St.
Chamois, MO 65024
Mayor Harold Libbert
City of Meta
101 S. Locust St., PO BOX 65
Meta, MO 65058
Superintendent Dena Smith
Osage Co. R-II
1212 E Main St.
Linn, MO 65051

Superintendent Chuck Woody
Osage Co. R-III
143 E. Main
Westphalia, MO 65085
Mayor Robert Sellenriek
City of Jonesburg
P.O. Box 256
Jonesburg, MO 63351
Mayor Bonnie Nordwald
City of New Florence
PO Box 70
New Florence, MO 63363
Superintendent Tracy Bottoms
Montgomery County R-II
418 N Highway 19
Montgomery City, MO 63361-5217
Chairperson Jeff Thomsen
Village of Innsbrook
1835 Hwy F
Innsbrook, MO 63390
Mayor Chris Watson
City of Truesdale
109 Pinckney St.
Truesdale, MO 63380
Dr. Gregg Klinginsmith, Supt.
Warren County R-III
385 West Veterans Memorial Drive,
Warrenton, MO 63383
City of Berger
404 Rosalie Ave,
Berger, MO 63014

Mayor Steve Myers
City of Pacific
300 Hoven Drive
Pacific, MO 63069
Mayor Rod J. Tappe
City of Union
10 E. Locust Street,
Union, MO 63084
Dr. Lori VanLeer, Supt.
Washington School District
220 Locust St.
Washington, MO 63090
Jeannie Jenkins, Supt.
Spring Bluff R-XV
9374 Hwy 185
Sullivan, MO 63080

Mayor Jeanie Martin
City of Bellflower
100 S. Main St.
Bellflower, MO 63333
Chairperson Joey Los
Village of McKittrick
406 Sterline
McKittrick, MO 65041
Chairperson Steve Wehrle
Village of Rhineland
PO Box 428
Rhineland, MO 65069
Dr. Erin Oligschlaeger, Supt.
Wellsville-Middletown R-I
900 Burlington Road
Wellsville, MO 63384-1114
Mayor David Lange
City of Marthasville
402 E. Main
Marthasville, MO 63357
Mayor Eric Schleuter
City of Warrenton
200 West Booneslick
Warrenton, MO 63383
Dr. Chris Berger, Supt.
Wright City R-II of Warren County
90 Bell Rd.,
Wright City, MO 63390
Mayor Hillary Ward
City of Gerald
106 East Fitzgerald Ave.
Gerald, MO 63037
Mayor Ron Blum
City of St Clair
#1 Paul Parks Drive
St. Clair, MO 63077
Mayor Sandy Lucy
City of Washington
405 Jefferson St,
Washington, MO 63090
Superintendent Steve Weinhold
Union R-XI School District
PO Box 440
Union, MO 63084
Dr. Kyle Kruse, Supt.
St. Clair R-XIII
905 Bardot Street,
St. Clair, MO 63077

Mayor Tom Stine
City of High Hill
P.O. Box 42
High Hill, MO 63350
Mayor Mike Spirz
City of Montgomery City
723 N. Sturgeon
Montgomery City, MO 63361
Mayor Howard Steele
City of Wellsville
200 W. Hudson
Wellsville, MO 63384
Joe Gildehaus, Pres. Comm.
Warren County
101 Mockingbird Lane, Suite 302
Warrenton, MO 63383
Chairperson Chris Pottebaum
Village of Pendleton
28837 Pendleton Church Rd.
Warrenton, MO 63383
Mayor Dan Rowden
City of Wright City
PO Box 436
Wright City, MO 63390
Tim Brinker, Pres. Comm.
Franklin County
400 East Locust Street
Union, Missouri 63084
Dick Bodi, Mayor
City of New Madrid
P.O. Box 96
New Madrid, MO 63869
Mayor Dennis Watz
City of Sullivan
210 W. Washington
Sullivan, MO 63080
Superintendent Josh Hoener
New Haven School District
100 Park Dr,
New Haven, MO 63068
Superintendent Kathy Vandegriffe
Strain-Japan R-XVI
4640 Highway H,
Sullivan, MO 63080
Jenny Ulrich, Supt.
Lonedell R-XIV
7466 Hwy FF
Lonedell, MO 63060

Dr. John Mulford, Supt.
Meramec Valley R-III
126 N Payne St.
Pacific, MO 63069-1260

Meramec Regional Planning Commission

#4 Industrial Drive

St. James, MO 65559



9/7/21

Attention Members of the Gasconade County Hazard Mitigation Planning Committee and neighboring jurisdictions:

The first draft of the Gasconade 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 mailed to the Gasconade County Courthouse for public viewing as well. Please take some time to review the planning document, especially sections that have specifics regarding your jurisdiction. We have submitted a draft to SEMA for review, but they are allowing us some time for public input. Please notify us no later than **September 24, 2021**

For immediate release
Sept. 23, 2021

For more information, contact
Tammy Snodgrass at (573) 265-2993

Public comment being accepted on Gasconade County Hazard Mitigation Plan until Oct. 15

GASCONADE COUNTY—Public comment is being accepted until Oct. 15, 2021, on the Gasconade County Hazard Mitigation Plan. The plan update is available for review on Meramec Regional Planning Commission’s website, <http://www.meramecregion.org/publications/>. The 2021 plan update is located under the Hazard Mitigation Plans by County. A hard copy of the plan is also available at the Gasconade 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 Gasconade County, the cities of Bland, Gasconade, Hermann, Morrison, Owensville and Rosebud, as well as Gasconade County R-1 School District, Gasconade County R-2 School District, Hermann Area District Hospital, Missouri Department of Social Services – Gasconade County, and Stonebridge of Hermann.

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.

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 or on Facebook at www.facebook.com/meramecregion/.

C: Public Survey

Public Survey: Gasconade 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 Gasconade County, the incorporated cities, and the public school districts is currently developing an update to the comprehensive Gasconade 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 Gasconade 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 Gasconade County | <input type="checkbox"/> City of Owensville |
| <input type="checkbox"/> City of Bland | <input type="checkbox"/> City of Rosebud |
| <input type="checkbox"/> City of Gasconade | <input type="checkbox"/> Maries County R-II School District |
| <input type="checkbox"/> City of Hermann | <input type="checkbox"/> Gasconade County R-I School District |
| <input type="checkbox"/> City of Morrison | <input type="checkbox"/> Gasconade County R-II School District |

2. The hazards addressed in the Multi-jurisdictional Hazard Mitigation Plan Update are listed below. Please indicate your opinion on the likelihood for each hazard to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

1 = Unlikely, 2 = Occasional, 3 = Likely, 4 = Highly Likely

<input type="checkbox"/> Flooding (Flash and River)	<input type="checkbox"/> Earthquake	<input type="checkbox"/> Severe Thunderstorms
<input type="checkbox"/> Tornadoes	<input type="checkbox"/> Land Subsidence / Sinkholes	<input type="checkbox"/> Severe Winter Weather
<input type="checkbox"/> Dam Failure	<input type="checkbox"/> Drought	<input type="checkbox"/> Levee Failure
<input type="checkbox"/> Wildfire	<input type="checkbox"/> Extreme Temperatures	

3. Please indicate your opinion on the potential magnitude of each hazard’s impact on YOUR JURISDICTION (identified above). **Please rate EACH hazard 1 through 4 as follows:**

1 = Negligible, 2 = Limited, 3 = Critical, 4 = Catastrophic

<input type="checkbox"/> Flooding (Flash and River)	<input type="checkbox"/> Earthquake	<input type="checkbox"/> Severe Thunderstorms
<input type="checkbox"/> Tornadoes	<input type="checkbox"/> Land Subsidence / Sinkholes	<input type="checkbox"/> Severe Winter Weather
<input type="checkbox"/> Dam Failure	<input type="checkbox"/> Drought	<input type="checkbox"/> Levee Failure
<input type="checkbox"/> Wildfire	<input type="checkbox"/> Extreme Temperatures	

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 Gasconade County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by hazard events.

Please return your completed survey no later than February 1, 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

On-line surveys will be automatically sent.

Gasconade County Public Survey Results

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 Gasconade County, the incorporated cities, and the public school districts is currently developing an update to the comprehensive Gasconade 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 Gasconade 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 Gasconade County - 1 | <input type="checkbox"/> City of Owensville - 3 |
| <input type="checkbox"/> City of Bland - 0 | <input type="checkbox"/> City of Rosebud - 0 |
| <input type="checkbox"/> City of Gasconade - 0 | <input type="checkbox"/> Maries County R-II School District - 0 |
| <input type="checkbox"/> City of Hermann - 3 | <input type="checkbox"/> Gasconade County R-I School District - 1 |
| <input type="checkbox"/> City of Morrison - 0 | <input type="checkbox"/> Gasconade County R-II School District - 3 |

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

 3 Flooding (Flash and River)

 1.7 Earthquake

 3.6 Severe Thunderstorms

- 2.5 Tornadoes
- 1.6 Land Subsidence/Sinkholes
- 3.1 Severe Winter Weather
- 1.6 Dam Failure
- 2.6 Drought
- 2.5 Levee Failure
- 1.8 Wildfire
- 2.8 Extreme Temperatures

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

- 3.1 Flooding (Flash and River)
- 2.7 Earthquake
- 3.2 Severe Thunderstorms
- 2.9 Tornadoes
- 2.0 Land Subsidence/Sinkholes
- 2.8 Severe Winter Weather
- 1.9 Dam Failure
- 2.8 Drought
- 2.3 Levee Failure
- 2.1 Wildfire
- 2.9 Extreme Temperatures

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:

- | | |
|--|--|
| <ul style="list-style-type: none"> <input type="checkbox"/> Flood-prone Property Acquisition & Structure Demolition /Relocation – 45.5% <input type="checkbox"/> Flood-Prone Structure Elevation – 36.4% <input type="checkbox"/> Dry Floodproofing of Historical Residential Structures and/or Non-residential Structures – 63.6% <input type="checkbox"/> Minor Localized Flood Reduction Projects (storm water management or localized flood control projects) – 81.8% <input type="checkbox"/> Structural Retrofitting of Existing Buildings to Add a Tornado Safe Room – 72.7% <input type="checkbox"/> Storm Sirens – 90.9% <input type="checkbox"/> Early Warning Systems such as phone/text alerts – 81.8% | <ul style="list-style-type: none"> <input type="checkbox"/> Retrofitting of Existing Buildings, and Facilities from Wind Damage. – 54.5% <input type="checkbox"/> New Tornado Safe Room Construction – 54.5% <input type="checkbox"/> Electrical Utilities Infrastructure Retrofit – 81.8% <input type="checkbox"/> Soil Erosion Stabilization – 36.4% <input type="checkbox"/> Wildfire Mitigation – 54.5% <input type="checkbox"/> Other (please specify) – 0% |
|--|--|

5. Please comment on any other issues that the Gasconade County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by hazard events.

"Must consider that Gasconade County is in the natural meteorological path of the Ameren nuclear plant should that plant experience a catastrophic failure."

"I think the school transportation department should be notified on all weather related events, road closing, emergency vehicles in the area during routes so buses can be rerouted if possible and a emergency frequency set up so bus drivers can talk straight to 911 office Incase of emergency"

"My interest is as an advocate for people with disabilities. For example: How do we alert those people to hazards; do we have an evacuation plan for people with limitations; etc."

"This pandemic and the lack of thought put into the risk to our kids!"

Please return your completed survey no later than February 1, 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

On-line surveys will be automatically sent.

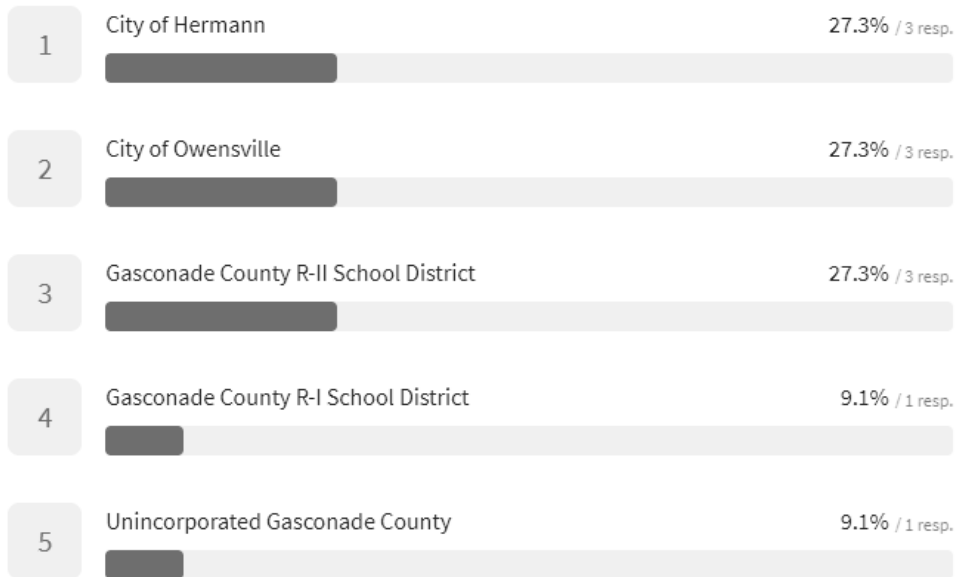
Public Survey: Gasconade County Multi-jurisdictional Hazard Mitigation Plan

11 responses


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.

 Hide question

11 out of 11 answered



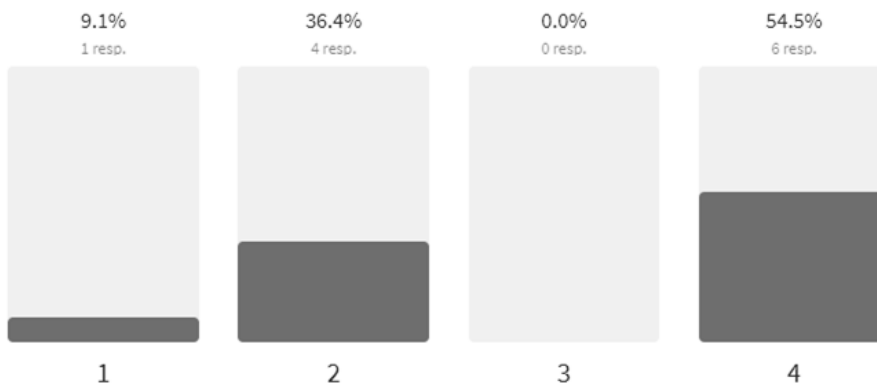
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Flooding (Flash and River)

11 out of 11 answered

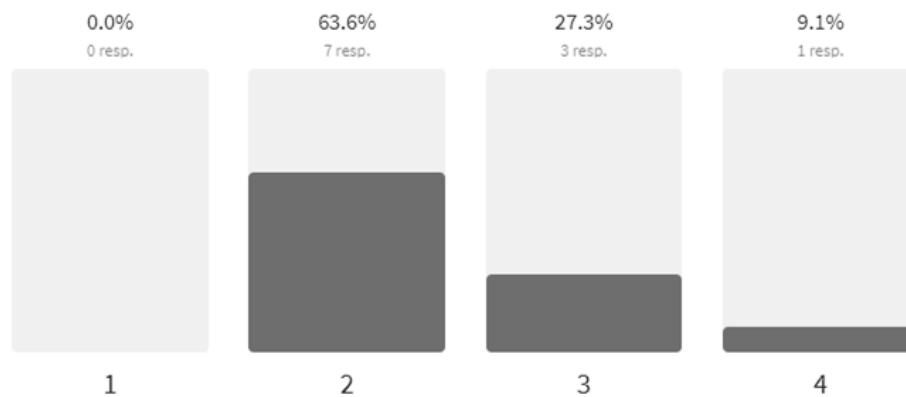
3.0 Average rating




Tornadoes

11 out of 11 answered

2.5 Average rating



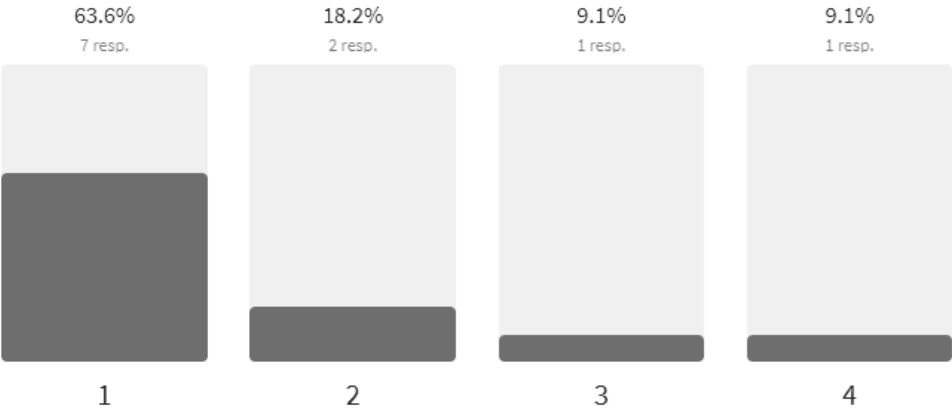
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Dam Failure

11 out of 11 answered

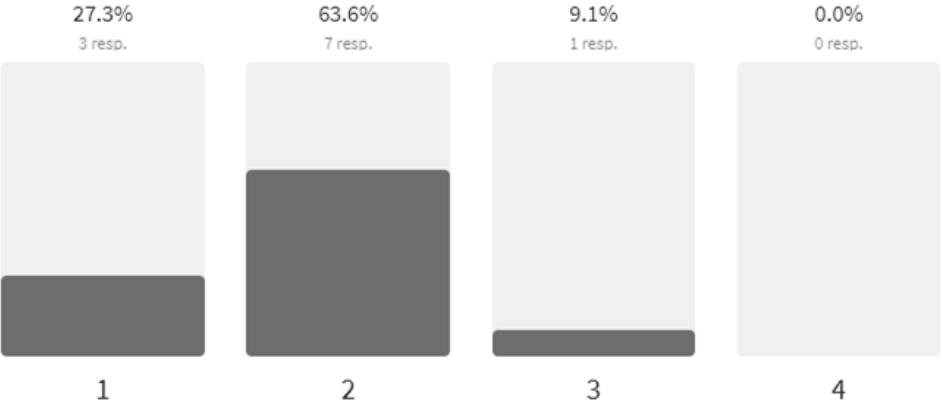
1.6 Average rating




Wildfire

11 out of 11 answered

1.8 Average rating



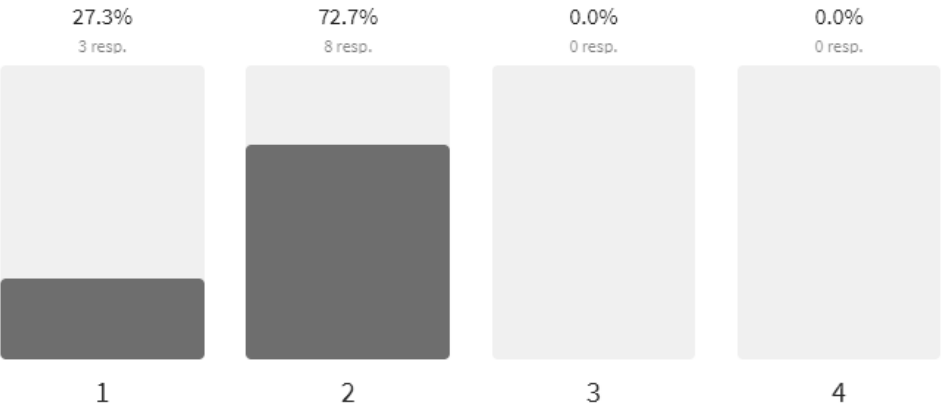
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Earthquake

11 out of 11 answered

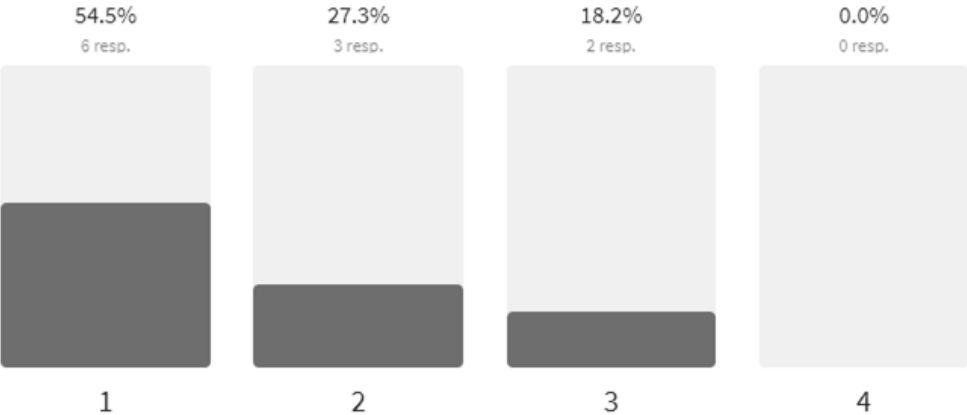
1.7 Average rating




Land Subsidence/Sinkholes

11 out of 11 answered

1.6 Average rating



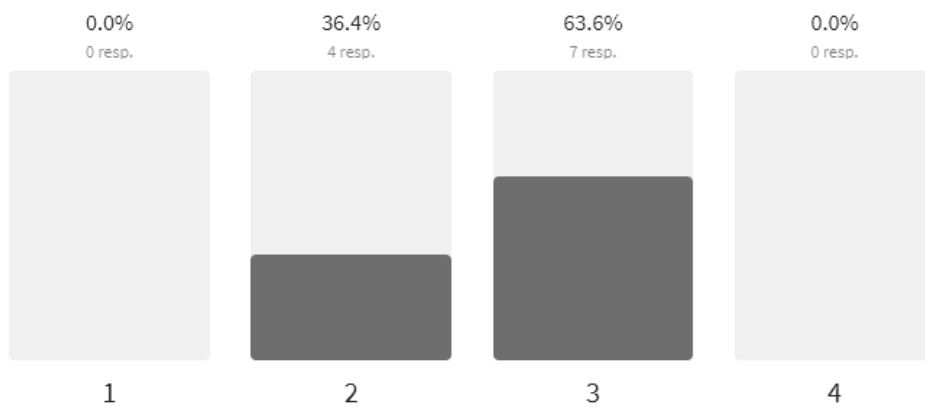
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Drought

11 out of 11 answered

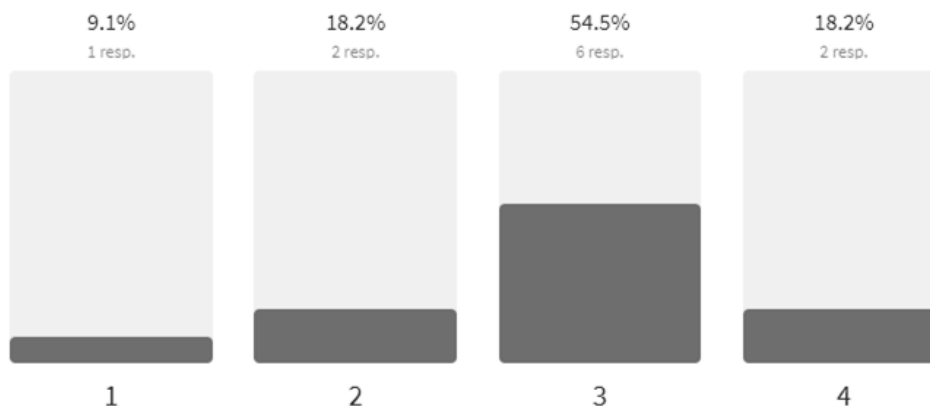
2.6 Average rating




Extreme Temperatures

11 out of 11 answered

2.8 Average rating



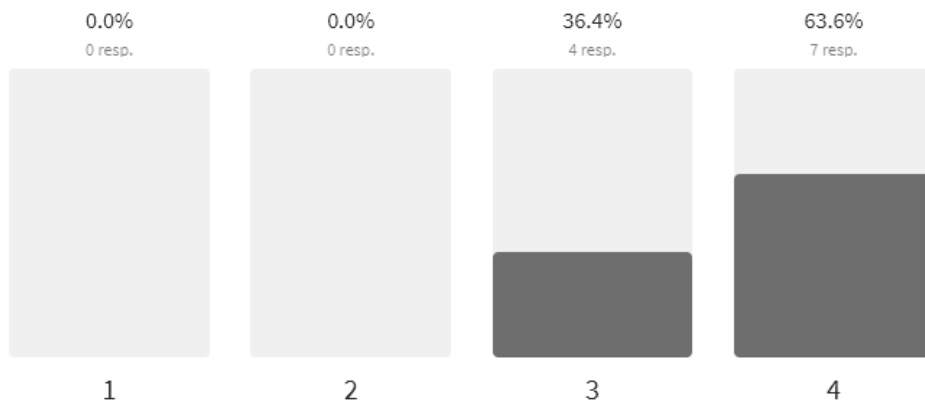
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Severe Thunderstorms

11 out of 11 answered

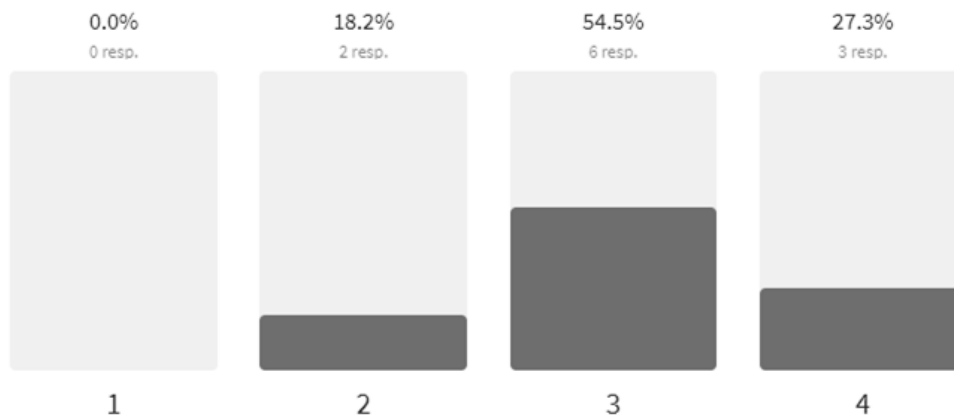
3.6 Average rating



Severe Winter Weather

11 out of 11 answered

3.1 Average rating



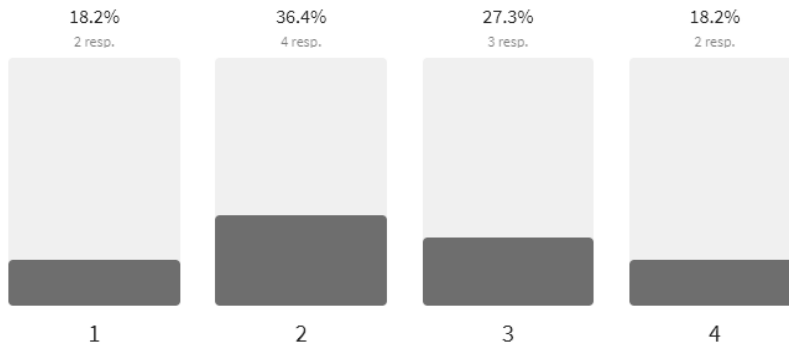
Please indicate your opinion on the likelihood for each hazard addressed in the Multi-jurisdictional Hazard Mitigation Plan Update to impact YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

[Hide question](#)

Levee Failure

11 out of 11 answered

2.5 Average rating



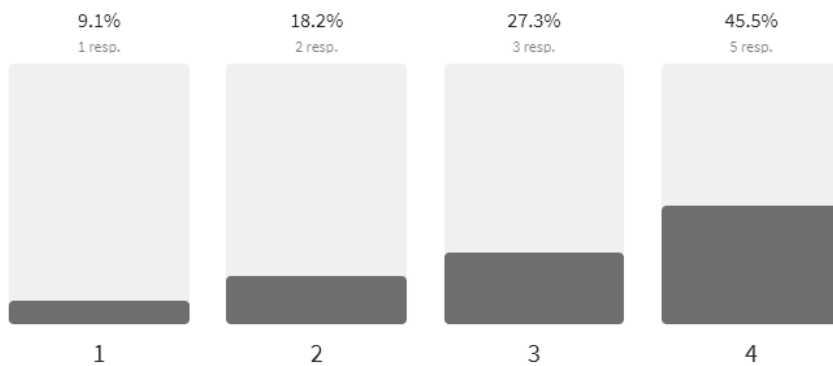
Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

[Hide question](#)


Flooding (Flash and River)

11 out of 11 answered

3.1 Average rating



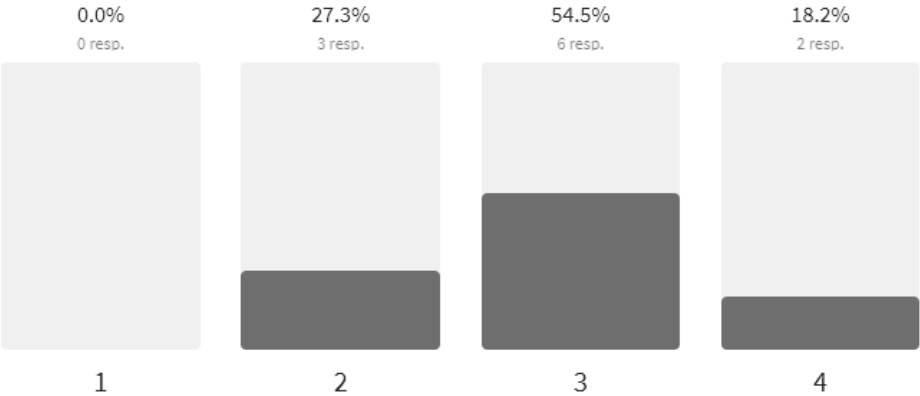
Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Tornadoes

11 out of 11 answered

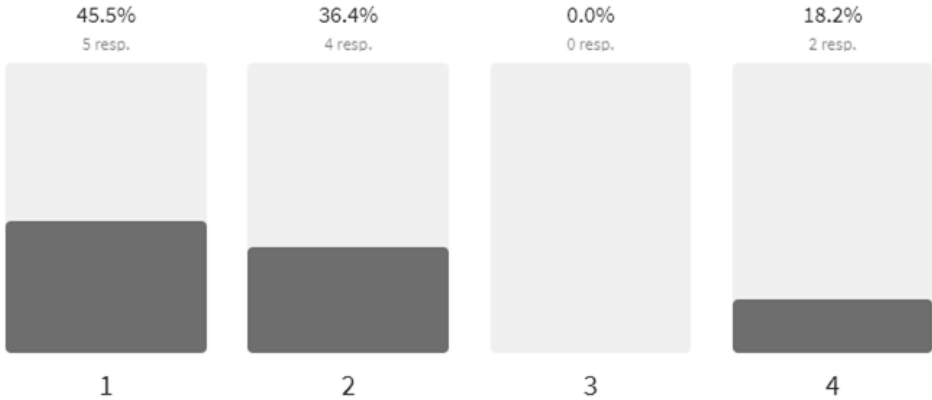
2.9 Average rating




Dam Failure

11 out of 11 answered

1.9 Average rating



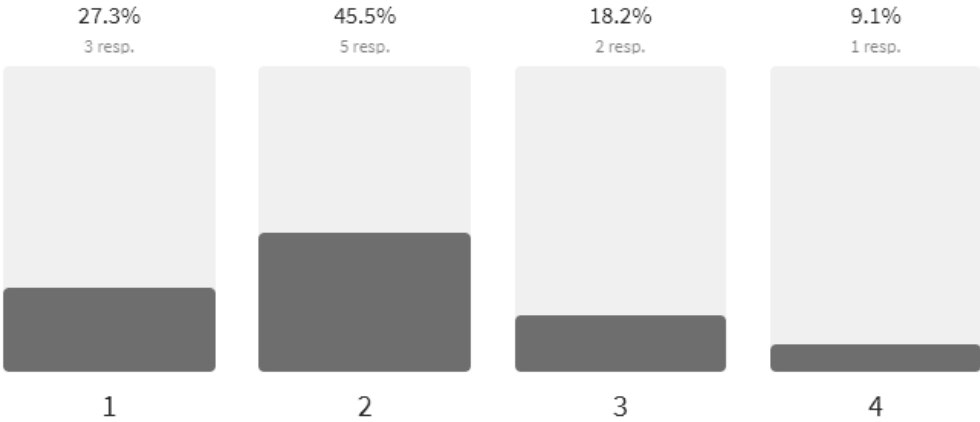
Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Wildfire

11 out of 11 answered

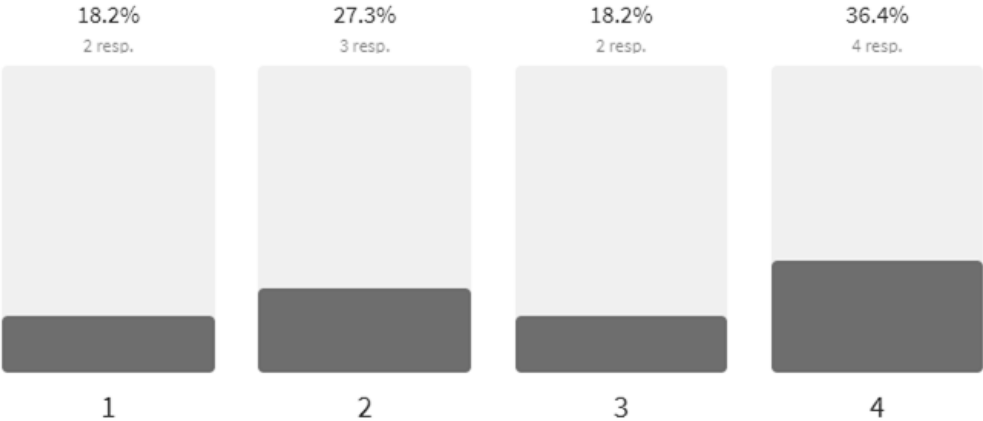
2.1 Average rating




Earthquake

11 out of 11 answered

2.7 Average rating



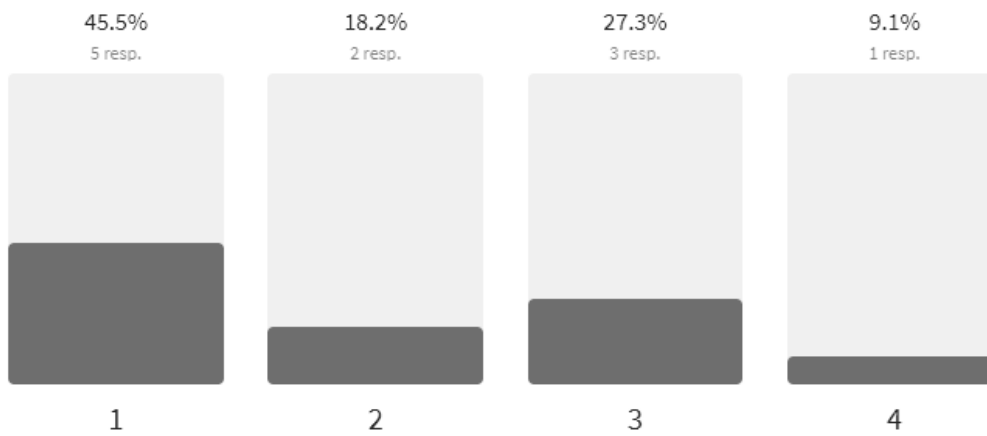
Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Land Subsidence/Sinkholes

11 out of 11 answered

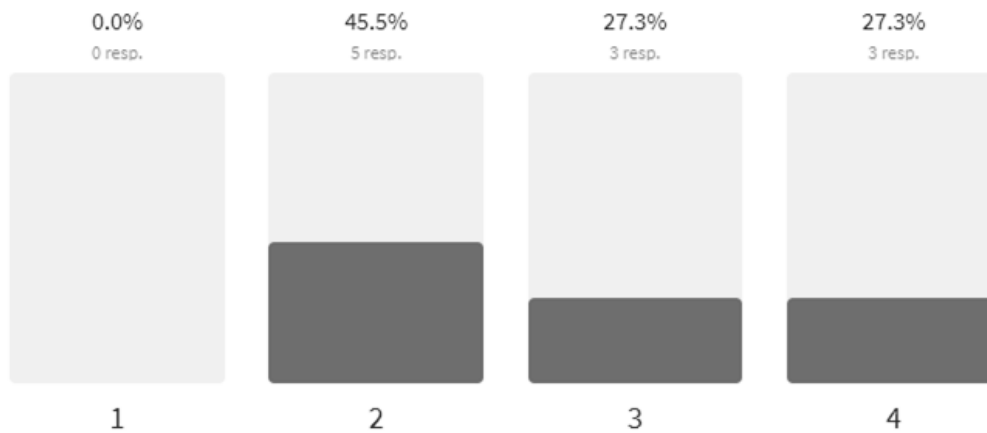
2.0 Average rating




Drought

11 out of 11 answered

2.8 Average rating



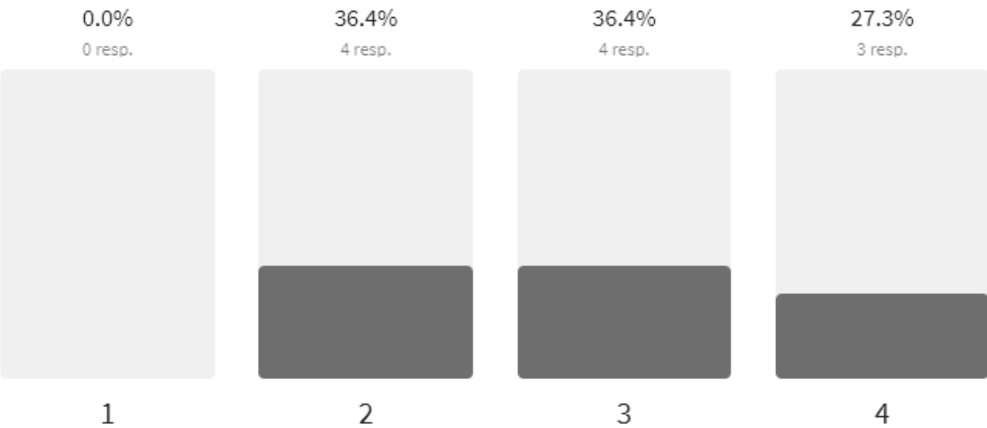
Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Extreme Temperatures

11 out of 11 answered

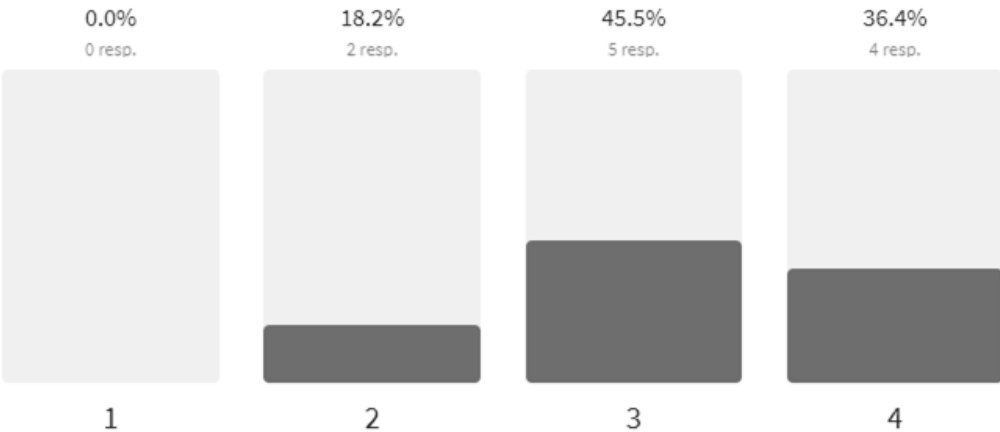
2.9 Average rating




Severe Thunderstorms

11 out of 11 answered

3.2 Average rating



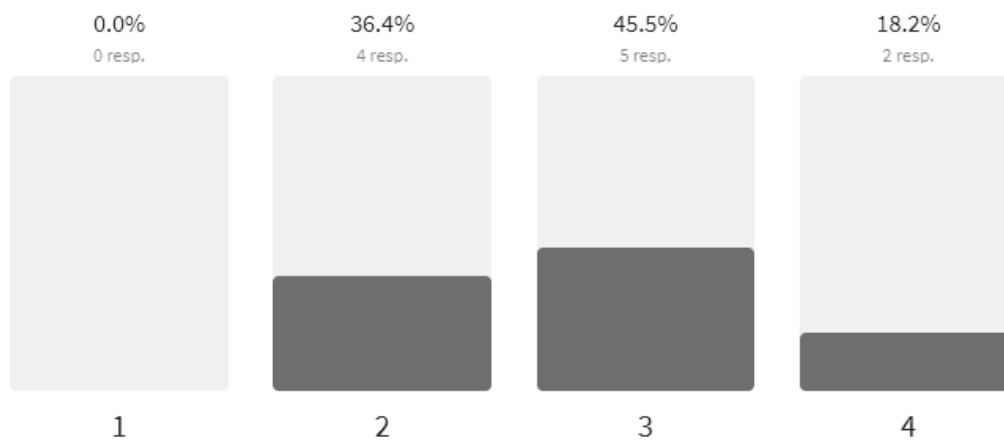
Please indicate your opinion on the potential magnitude of each hazard's impact on YOUR JURISDICTION (identified above). Please rate EACH hazard 1 through 4 as follows:

 Hide question

Severe Winter Weather

11 out of 11 answered

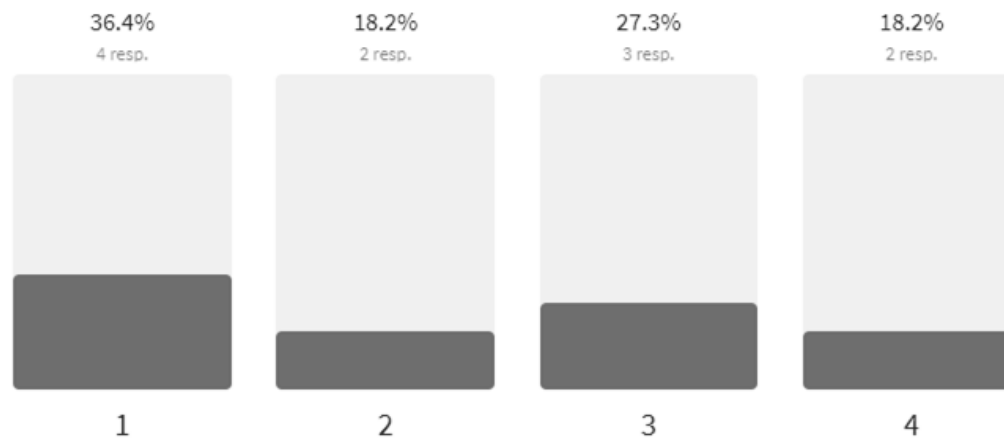
2.8 Average rating




Levee Failure

11 out of 11 answered

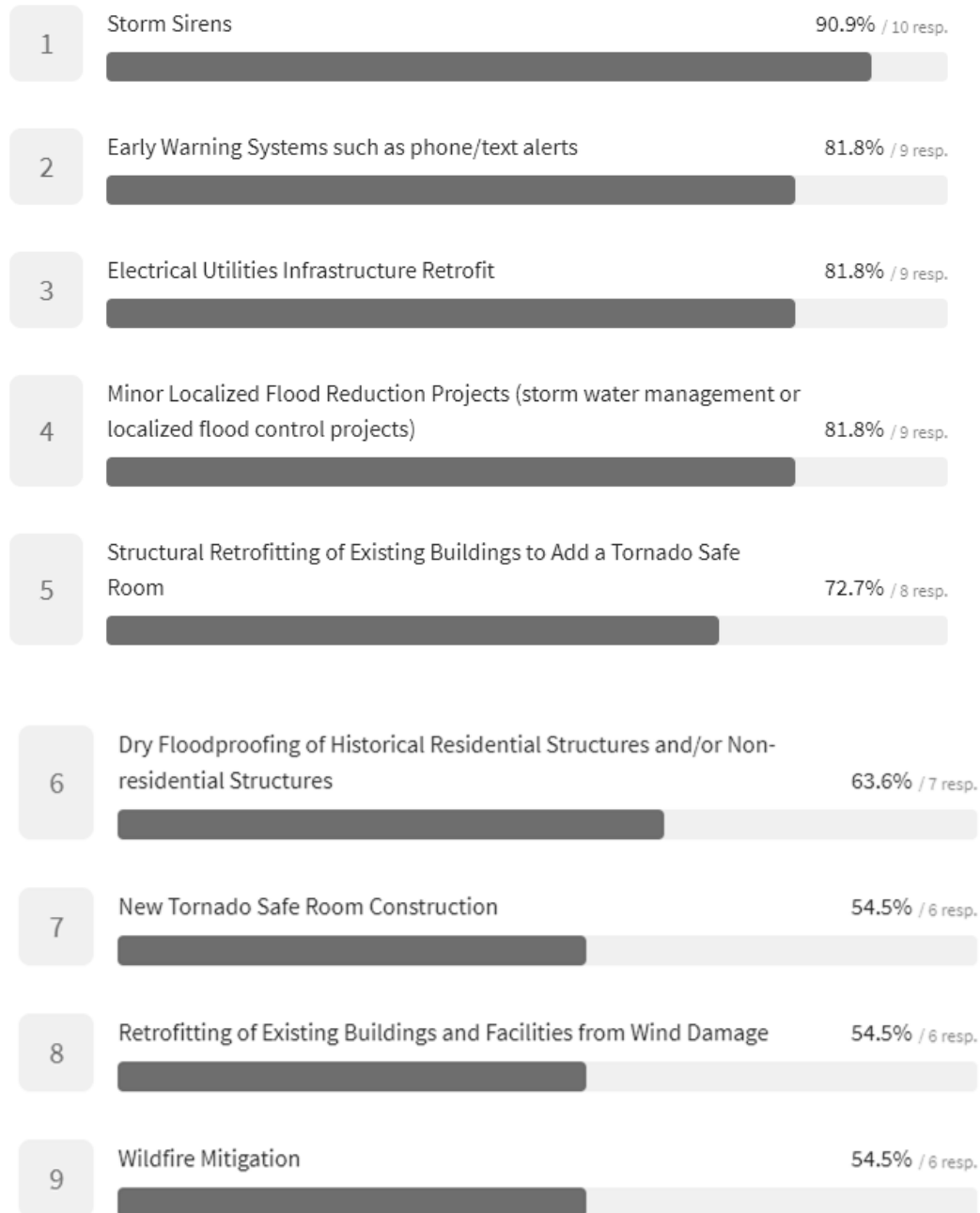
2.3 Average rating

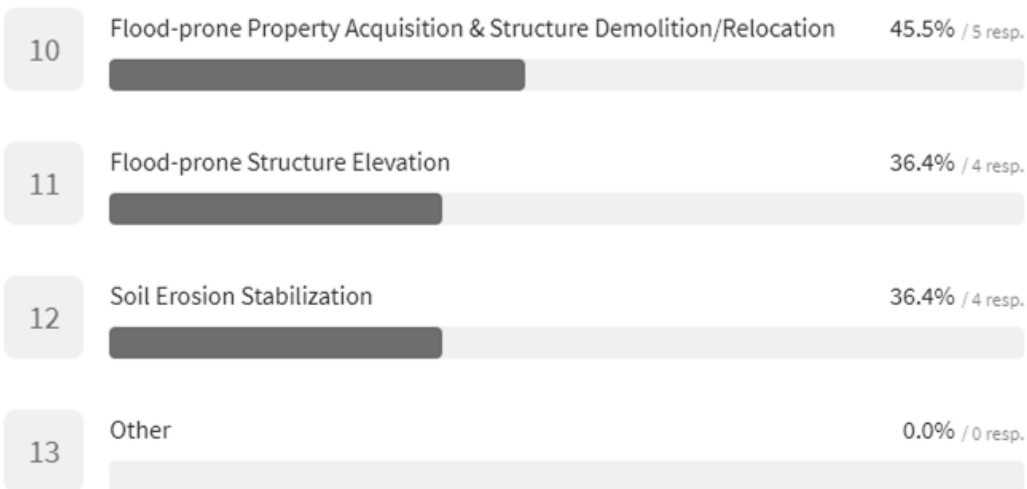


FEMA Hazard Mitigation Assistance Grants are administered by the State Emergency Management Agency. Listed below are some types of projects considered.


 Hide question

11 out of 11 answered





Please comment on any other issues that the Gasconade County Hazard Mitigation Planning Committee should consider in developing a strategy to reduce future losses caused by hazard events.

 Hide question

"Must consider that Gasconade County is in the natural meteorological path of the Ameren nuclear plant should that plant experience a catastrophic failure."

"I think the school transportation department should be notified on all weather related events, road closing, emergency vehicles in the area during routes so buses can be rerouted if possible and a emergency frequency set up so bus drivers can talk straight to 911 office Incase of emergency"

"My interest is as an advocate for people with disabilities. For example: How do we alert those people to hazards; do we have an evacuation plan for people with limitations; etc."

"This pandemic and the lack of thought put into the risk to our kids!"

D: Adoption Resolutions

RESOLUTION NO. 475

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

WHEREAS, Gasconade 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, Gasconade County Commission fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

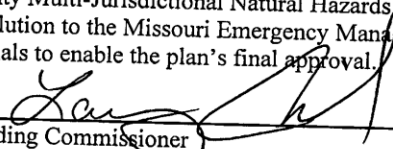
WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, Gasconade County Commission desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of Gasconade 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 Gasconade County Commission adopts the Gasconade 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

9/23/2021
Date



Associate Commissioner

9-23-2021
Date



Associate Commissioner

9/23/21
Date

RESOLUTION NO. 2021-9-13

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Bland 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 Bland fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Bland desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Bland 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 Bland adopts the Gasconade 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.

Arthur L. Medlock
Certifying Official

9/14/2021
Date

Diane Decker
Witness

9/14/2021
Date

RESOLUTION NO. 3-21

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Gasconade 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 Gasconade fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Gasconade desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Gasconade 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 Gasconade adopts the Gasconade 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.

Debbie Green
Certifying Official

September 17, 2021
Date

Kim Steiner
Witness

Sept. 17, 2021
Date

RESOLUTION NO. 1310

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Hermann 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 Hermann fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan ("Mitigation Plan") and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Hermann desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Hermann demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Mitigation Plan; and

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

WHEREAS, the Board of Aldermen has determined that the Mitigation Plan serves a legitimate public purpose and is in the best interests of the citizens of the City of Hermann, Missouri.

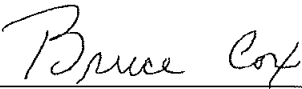
NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF ALDERMEN OF THE CITY OF HERMANN, MISSOURI, that the Mitigation Plan is accepted.

This Resolution shall be in full force and effect immediately.

Voting: Ayes 3; Nays 0; Absent 1

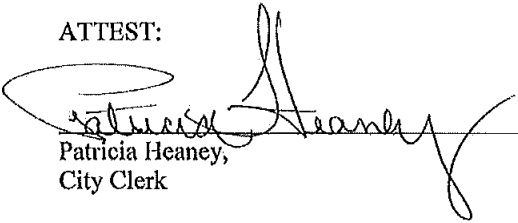
PASSED by the Board of Aldermen of the City of Hermann, Missouri, this 13 day of September, 2021.

(SEAL)



BRUCE COX, Mayor

ATTEST:



Patricia Heaney,
City Clerk

CERTIFICATE

I, the undersigned Clerk of the City of Hermann, Missouri, hereby certifies that the above and foregoing is a true and correct copy of the Resolution _____, as the same appears of record in my office and as it was passed and approved by the Board of Aldermen. This Resolution has not been altered, amended or replaced as of this _____ day of _____, 2021.

(SEAL)

Patricia Heaney, City Clerk

RESOLUTION NO. _____

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Morrison 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 Morrison fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Morrison desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Morrison 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 Morrison adopts the Gasconade 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

9-25-21

Date



Witness

9-25-21

Date

RESOLUTION NO 2021-6

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Owensville 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 Owensville fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Owensville desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Owensville 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 Owensville adopts the Gasconade 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.

Approved this 19th Day of August, 2021


John Kamler, Mayor

Attest:

Peggy Farrell, Deputy City Clerk

RESOLUTION NO. 9-2021

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, the City of Rosebud 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 Rosebud fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

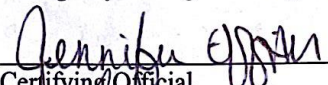
WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, the City of Rosebud desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of the City of Rosebud 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;

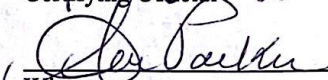
NOW, THEREFORE BE IT RESOLVED, that the City of Rosebud adopts the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.



Certifying Official

9-14-21

Date



Witness

9-14-21

Date

RESOLUTION NO. _____

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, Gasconade County R-I School District recognizes the threat that natural hazards pose to people and property within our community; and

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

WHEREAS, the U.S. Congress passed the Disaster Mitigation Act of 2000 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, Gasconade County R-I School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

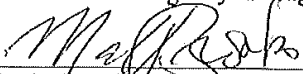
WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, Gasconade County R-I School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of Gasconade County R-I 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;

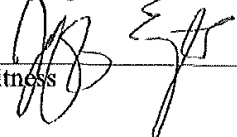
NOW, THEREFORE BE IT RESOLVED, that Gasconade County R-I School District adopts the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency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



Certifying Official

9/9/21

Date



Witness

9/9/21

Date

RESOLUTION NO. _____

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, Gasconade County R-II 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, Gasconade County R-II School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

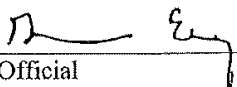
WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, Gasconade County R-II School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of Gasconade County R-II 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 Gasconade County R-II School District adopts the Gasconade 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

9-20-2021

Date



Witness

9-20-2021

Date

RESOLUTION NO. _____

**A RESOLUTION TO ADOPT THE GASCONADE COUNTY
MULTI-JURISDICTION NATURAL HAZARDS MITIGATION PLAN**

WHEREAS, Maries County R-II 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, Maries County R-II School District fully participated in the FEMA prescribed mitigation planning process to prepare this Mitigation Plan; and

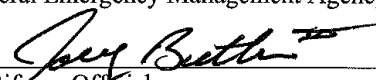
WHEREAS, the Missouri State Emergency Management Agency and Federal Emergency Management Agency officials have reviewed the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan and approved it contingent upon this official adoption of the participating governing body; and

WHEREAS, Maries County R-II School District desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the Gasconade County Multi-Jurisdiction Natural Hazards Mitigation Plan; and

WHEREAS, adoption by the governing body of Maries County R-II 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;

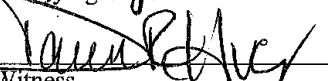
NOW, THEREFORE BE IT RESOLVED, that Maries County R-II School District adopts the Gasconade County Multi-Jurisdictional Natural Hazards Mitigation Plan as an official plan and will submit this Adoption Resolution to the Missouri Emergency Management Agency and the Federal Emergency Management Agency officials to enable the plan's final approval.



Certifying Official

8/31/21

Date



Witness

8/31/21

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 Gasconade County Critical Facilities by Type and Jurisdiction

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
Emergency Facilities						
	Gasconade County	Gasconade Co. E-911	216 W. Rosebud Ave.	Rosebud	MO	63091
	Gasconade County	Emergency Management Director	3546 Hwy T	Rosebud	MO	63091
Fire Department Facilities						
MO000260	Morrison	Morrison Volunteer Fire Dept. #1	524 Hwy 100	Morrison	MO	65061
MO000261	Owensville	Owensville Fire Dept. #1	819 Franklin Ave.	Owensville	MO	65066
MO000754	Bland	Bland Fire Protection Dist. #1	104 W Colorado Ave	Bland	MO	65014
	Hermann	Hermann Volunteer FD #1	214 E. 2 nd St.	Hermann	MO	65041
	Hermann	Hermann Volunteer FD #2	103 Hwy. 100	Hermann	MO	65041
	Hermann	Hermann Volunteer FD #3	2063 Hwy 19	Hermann	MO	65041
	Mt. Sterling	Owensville Fire Dept. #2	2710 Hwy. A	Mt. Sterling	MO	65062
	Owensville	Owensville Fire Dept. #3	600 Springfield Rd.	Owensville	MO	65066
Law Enforcement Facilities						

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
MO000095	Owensville	Owensville City Police Dept.	109 N 2 nd St.	Owensville	MO	65066
MO000150	Gasconade County	Gasconade Co. Sheriff	119 E 1 st St. #22	Hermann	MO	65041
MO000189	Hermann	Hermann Police Dept.	1902 Jefferson	Hermann	MO	65041
MO000453	Gasconade	Gasconade City Police Dept.	480 Oak St.	Morrison	MO	65061
	Rosebud	Rosebud Police Dept.	307 N. Cedar	Rosebud	MO	63091
Medical Facilities						
MO000001	Hermann	Hermann Area Dist. Hospital	509 West 18 th St.	Hermann	MO	65041
	Hermann	Hermann Medical Arts Clinic	509 West 18 th St.	Hermann	MO	65041
	Hermann	Frene Valley Health Center	403 Market St.	Hermann	MO	65041
	Hermann	Southwest Medical Associates	1714 Wein Street	Hermann	MO	65041
	Owensville	Mercy Family Clinic	440 MO Hometown Plaza Drive	Owensville	MO	65066
	Owensville	Medical Clinic of Owensville (Capital Region Medical Center)	3536 Kuhne Road	Owensville	MO	65066
	Gasconade County	Gasconade Co. Health Dept. – Main Office	300 Schiller St.	Hermann	MO	65041
	Gasconade County	Gasconade Co. Health Dept. – Satellite Office	305 N. First St.	Owensville	MO	65041
HazusID	Jurisdiction	Building Name	Address	City	State	Zip

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
School Facilities						
MO000491	Hermann	Hermann Elem.	328 W Seventh St.	Hermann	MO	65041
MO002562	Hermann	Hermann Middle	164 Blue Pride Dr.	Hermann	MO	65041
MO000492	Hermann	Hermann High	176 Bearcat Crossing	Hermann	MO	65041
MO001007	Owensville	Owensville K-5 Elementary	2000 Dutchmen Dr.	Owensville	MO	65066
HazusID	Jurisdiction	Building Name	Address	City	State	Zip
MO001010	Owensville	Owensville Middle	3340 Highway 19	Owensville	MO	65066
MO001009	Owensville	Owensville High	3336 Highway 19	Owensville	MO	65066
MO001676	Hermann	St. George School	133 W 4 th St.	Hermann	MO	65041
MO001677	Rosebud	Immanuel Lutheran School	300 1 st St. N	Rosebud	MO	63091
MO002776	Bland	Maries Co. R2 Middle School	300 S Main	Bland	MO	65014
Childcare Facilities						
	Hermann	Bruckerhoff, Shiela	156 State Hwy. 19	Hermann	MO	65041
	Hermann	Little Tykes Childcare and Preschool	1100 Wein St.	Hermann	MO	65041
	Hermann	Steinbeck, Cheryl	1311 Hwy. E	Hermann	MO	65041
	Hermann	Vanausdoll, Deborah Sue	1513 Washington St.	Hermann	MO	65041
	Hermann	Little Bearcats Daycare Center, LLC	334 W. 9 th St.	Hermann	MO	65041

HazusID	Jurisdiction	Building Name	Address	City	State	Zip
	Owensville	Creative Kiddoz LLC	212 N. Walnut St.	Owensville	MO	65066
	Owensville	McClurg, Violet	206 E. Jefferson Ave.	Owensville	MO	65066
	Owensville	Rademacher, Christina A	419 E. Madison Ave.	Owensville	MO	65066
	Owensville	Kiddie Korner, Inc	207 E. Marvin Ave.	Owensville	MO	65066
	Owensville	Missouri Ozarks Community Action, Inc (Head Start)	1011 Commercial Dr.	Owensville	MO	65066
	Owensville	Tiny Tots of Owensville LLC	3384 Old Hwy. 19	Owensville	MO	65066
Nursing Homes						
	Hermann	Stonebridge Hermann	1800 Wein St.	Hermann	MO	65041
	Hermann	Victorian Place of Hermann, Residential Care by Americare	2120 Village Lane	Hermann	MO	65041
	Owensville	Frene Valley of Owensville – A Stonebridge Community	1016 W. Highway 28	Owensville	MO	65066
	Owensville	Gasconade Manor Nursing Home	1910 Nursing Home Rd.	Owensville	MO	65066
	Owensville	Gasconade Terrace Retirement Center	1930 Nursing Home Rd.	Owensville	MO	65066
	Owensville	Victorian Place of Owensville, Residential Care Americare	301 N. 7 th St.	Owensville	MO	65066

Source: Hazard Mitigation Plan Data Collection Questionnaire (2020-2021); Missouri Department of Health and Senior Services website-health.mo.gov

F: MDC Wildfire Data Search

View	Discovered Date	County	Station	Cause	Acres Burned
2002-03733-001174	07/27/2002	Gasconade	Hermann Vol Fire Department	Unknown	
2002-03733-001176	07/27/2002	Gasconade	Hermann Vol Fire Department	Unknown	
2002-03731-000112	11/08/2002	Gasconade	Bland Fire Protection District	Arson	0.5
2002-03731-000126	11/08/2002	Gasconade	Bland Fire Protection District	Arson	1
2002-03731-000110	11/08/2002	Gasconade	Bland Fire Protection District	Unknown	1
2002-03731-000132	12/15/2002	Gasconade	Bland Fire Protection District	Debris	2
2003-03733-001186	01/01/2003	Gasconade	Hermann Vol Fire Department	Unknown	
2003-03623-001147	01/08/2003	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	2.5
2003-03731-000134	01/31/2003	Gasconade	Bland Fire Protection District	Debris	1
2003-03731-000138	01/31/2003	Gasconade	Bland Fire Protection District	Debris	1
2003-03731-000147	03/17/2003	Gasconade	Bland Fire Protection District	Debris	1
2003-03731-000149	03/22/2003	Gasconade	Bland Fire Protection District	Debris	1
2003-03733-001188	03/22/2003	Gasconade	Hermann Vol Fire Department	Miscellaneous	
2003-03623-001160	03/23/2003	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	1
2003-03733-001189	03/29/2003	Gasconade	Hermann Vol Fire Department	Unknown	
2003-03733-001190	04/01/2003	Gasconade	Hermann Vol Fire Department	Debris	1
2003-03733-001193	04/01/2003	Gasconade	Hermann Vol Fire Department	Debris	
2003-03733-001196	04/02/2003	Gasconade	Hermann Vol Fire Department	Debris	
2003-03733-001236	04/12/2003	Gasconade	Hermann Vol Fire Department	Miscellaneous	
2003-03733-001244	05/23/2003	Gasconade	Hermann Vol Fire Department	Debris	
2003-03732-003082	07/25/2003	Gasconade	GASCONADE VFD	Equipment	4
2003-03732-003083	08/15/2003	Gasconade	GASCONADE VFD	Debris	
2003-03732-003084	08/19/2003	Gasconade	GASCONADE VFD	Unknown	

2003-03732-003085	08/26/2003	Gasconade	GASCONADE VFD	Debris	4
2003-03824-003234	10/22/2003	Gasconade	Albany Community Fire Protection District	Unknown	15
2003-03733-003941	12/04/2003	Gasconade	Hermann Vol Fire Department	Unknown	1.5
2004-03733-003793	02/16/2004	Gasconade	Hermann Vol Fire Department	Miscellaneous	35
2004-03733-003794	02/19/2004	Gasconade	Hermann Vol Fire Department	Debris	2
2004-03733-003795	02/28/2004	Gasconade	Hermann Vol Fire Department	Miscellaneous	3
2004-03733-004161	03/15/2004	Gasconade	Hermann Vol Fire Department	Debris	
2004-03733-004160	03/17/2004	Gasconade	Hermann Vol Fire Department	Debris	
2004-03733-004159	03/19/2004	Gasconade	Hermann Vol Fire Department	Unknown	
2004-03733-004158	03/21/2004	Gasconade	Hermann Vol Fire Department	Debris	
2004-03733-004157	03/23/2004	Gasconade	Hermann Vol Fire Department	Debris	
2004-03733-004631	04/04/2004	Gasconade	Hermann Vol Fire Department	Debris	50
2004-03733-004632	04/05/2004	Gasconade	Hermann Vol Fire Department	Debris	90
2004-03733-004633	04/06/2004	Gasconade	Hermann Vol Fire Department	Debris	100
2004-00008-005870	04/16/2004	Gasconade	MDC REPORTING REGION - ST. LOUIS	Unknown	30
2004-03733-006155	09/23/2004	Gasconade	Hermann Vol Fire Department	Miscellaneous	1
2004-03733-006154	11/03/2004	Gasconade	Hermann Vol Fire Department	Unknown	1
2005-03733-008064	03/06/2005	Gasconade	Hermann Vol Fire Department	Debris	10
2005-03733-008071	03/12/2005	Gasconade	Hermann Vol Fire Department	Debris	5
2005-03733-008079	03/19/2005	Gasconade	Hermann Vol Fire Department	Debris	6
2005-03733-008857	05/06/2005	Gasconade	Hermann Vol Fire Department	Unknown	1
2005-03733-008856	05/16/2005	Gasconade	Hermann Vol Fire Department	Unknown	2
2005-03620-009768	07/30/2005	Gasconade	Beaufort-Leslie Fire Protection District	Unknown	2
2006-03733-024097	01/08/2006	Gasconade	Hermann Vol Fire Department	Miscellaneous	6
2006-03733-024098	01/19/2006	Gasconade	Hermann Vol Fire Department	Unknown	1
2006-03733-024101	02/15/2006	Gasconade	Hermann Vol Fire Department	Debris	1
2006-03733-024092	03/02/2006	Gasconade	Hermann Vol Fire Department	Unknown	1
2006-03733-024091	03/02/2006	Gasconade	Hermann Vol Fire Department	Unknown	12
2006-03733-024093	03/12/2006	Gasconade	Hermann Vol Fire Department	Miscellaneous	1

2006-03733-024094	03/12/2006	Gasconade	Hermann Vol Fire Department	Miscellaneous	1
2006-06313-025456	03/16/2006	Gasconade	Vichy Volunteer Fire Protection Assoc	Unknown	10
2006-03733-024095	03/26/2006	Gasconade	Hermann Vol Fire Department	Unknown	2
2006-03733-024085	04/01/2006	Gasconade	Hermann Vol Fire Department	Miscellaneous	3
2006-03733-024088	04/13/2006	Gasconade	Hermann Vol Fire Department	Miscellaneous	4
2006-03733-024089	04/14/2006	Gasconade	Hermann Vol Fire Department	Unknown	2
2006-03733-024090	04/21/2006	Gasconade	Hermann Vol Fire Department	Miscellaneous	1
2007-03733-028867	02/11/2007	Gasconade	Hermann Vol Fire Department	Not Reported	1
2007-03733-028868	02/11/2007	Gasconade	Hermann Vol Fire Department	Not Reported	1
2007-03733-028869	02/11/2007	Gasconade	Hermann Vol Fire Department	Not Reported	1
2007-03733-028870	02/11/2007	Gasconade	Hermann Vol Fire Department	Not Reported	1
2007-03733-028871	02/11/2007	Gasconade	Hermann Vol Fire Department	Not Reported	1
2007-03733-028872	02/11/2007	Gasconade	Hermann Vol Fire Department	Not Reported	1
2007-03733-029072	03/09/2007	Gasconade	Hermann Vol Fire Department	Miscellaneous	1
2007-03733-029073	03/12/2007	Gasconade	Hermann Vol Fire Department	Miscellaneous	1
2007-03733-030138	06/26/2007	Gasconade	Hermann Vol Fire Department	Unknown	1
2007-03825-033348	07/02/2007	Gasconade	King City Fire Protection District	Equipment	5
2007-03733-031033	08/11/2007	Gasconade	Hermann Vol Fire Department	Unknown	1
2007-03733-031346	09/18/2007	Gasconade	Hermann Vol Fire Department	Unknown	1
2008-03733-033161	01/21/2008	Gasconade	Hermann Vol Fire Department	Unknown	3
2008-03733-034140	03/01/2008	Gasconade	Hermann Vol Fire Department	Unknown	2
2008-02811-034185	03/12/2008	Gasconade	Cuba Fire Department	Not Reported	32
2008-03733-034404	04/07/2008	Gasconade	Hermann Vol Fire Department	Unknown	15
2008-03733-034405	04/07/2008	Gasconade	Hermann Vol Fire Department	Unknown	15
2008-03733-034406	04/08/2008	Gasconade	Hermann Vol Fire Department	Miscellaneous	2
2008-03733-036094	11/23/2008	Gasconade	Hermann Vol Fire Department	Unknown	1
2009-03734-039953	01/19/2009	Gasconade	Owensville Volunteer Fire Department	Debris	1
2009-03733-037015	01/20/2009	Gasconade	Hermann Vol Fire Department	Not Reported	15
2009-03734-039954	01/21/2009	Gasconade	Owensville Volunteer Fire Department	Debris	2

2009-03734-039955	01/22/2009	Gasconade	Owensville Volunteer Fire Department	Debris	1
2009-03733-037016	01/22/2009	Gasconade	Hermann Vol Fire Department	Not Reported	1
2009-03733-037017	01/22/2009	Gasconade	Hermann Vol Fire Department	Not Reported	1
2009-03733-037053	01/24/2009	Gasconade	Hermann Vol Fire Department	Miscellaneous	3.5
2009-03734-039957	01/26/2009	Gasconade	Owensville Volunteer Fire Department	Debris	1
2009-03733-039144	02/19/2009	Gasconade	Hermann Vol Fire Department	Debris	1
2009-03733-039145	02/22/2009	Gasconade	Hermann Vol Fire Department	Debris	1.5
2009-03734-039958	02/22/2009	Gasconade	Owensville Volunteer Fire Department	Debris	10
2009-03734-039959	02/24/2009	Gasconade	Owensville Volunteer Fire Department	Equipment	1
2009-03734-039960	02/25/2009	Gasconade	Owensville Volunteer Fire Department	Debris	1
2009-03734-039962	02/25/2009	Gasconade	Owensville Volunteer Fire Department	Debris	5
2009-03734-039961	02/25/2009	Gasconade	Owensville Volunteer Fire Department	Debris	20
2009-03734-039965	03/04/2009	Gasconade	Owensville Volunteer Fire Department	Debris	1
2009-03734-039967	03/05/2009	Gasconade	Owensville Volunteer Fire Department	Debris	5
2009-03734-039968	03/07/2009	Gasconade	Owensville Volunteer Fire Department	Debris	350
2009-03734-039969	03/17/2009	Gasconade	Owensville Volunteer Fire Department	Debris	1
2009-03624-042804	04/22/2009	Gasconade	New Haven Berger Fire Protection District	Debris	10
2009-03733-042384	10/31/2009	Gasconade	Hermann Vol Fire Department	Unknown	2
2009-03733-043569	12/01/2009	Gasconade	Hermann Vol Fire Department	Unknown	1
2010-03733-044536	02/24/2010	Gasconade	Hermann Vol Fire Department	Unknown	1
2010-03733-046025	04/11/2010	Gasconade	Hermann Vol Fire Department	Unknown	1
2010-03733-046481	05/09/2010	Gasconade	Hermann Vol Fire Department	Unknown	1
2010-03733-051182	11/12/2010	Gasconade	Hermann Vol Fire Department	Unknown	1
2010-03733-051183	11/21/2010	Gasconade	Hermann Vol Fire Department	Miscellaneous	10
2010-03733-051184	11/28/2010	Gasconade	Hermann Vol Fire Department	Miscellaneous	1
2014-03623-094449	01/25/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Miscellaneous	1
2014-03623-095805	02/28/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Miscellaneous	1.5
2014-03623-095806	03/01/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	8
2014-03623-095808	03/09/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	2

2014-03623-095809	03/10/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	0.5
2014-03620-095390	03/11/2014	Gasconade	Beaufort-Leslie Fire Protection District	Debris	20
2014-06313-111584	03/12/2014	Gasconade	Vichy Volunteer Fire Protection Assoc	Miscellaneous	60
2014-02811-106555	03/15/2014	Gasconade	Cuba Fire Department	Debris	50
2014-03620-096049	03/21/2014	Gasconade	Beaufort-Leslie Fire Protection District	Unknown	20
2014-03623-096700	03/21/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Unknown	50
2014-03623-096691	03/23/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Unknown	0.5
2014-03623-096696	03/26/2014	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	12
2015-06303-129686	01/19/2015	Gasconade	Belle Volunteer Fire Department	Unknown	1.5
2015-06303-129687	01/29/2015	Gasconade	Belle Volunteer Fire Department	Unknown	0.02
2015-06303-129680	03/11/2015	Gasconade	Belle Volunteer Fire Department	Unknown	1
2015-03623-120837	03/22/2015	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Miscellaneous	2
2015-06303-129682	03/30/2015	Gasconade	Belle Volunteer Fire Department	Unknown	0.5
2015-03620-121808	04/01/2015	Gasconade	Beaufort-Leslie Fire Protection District	Debris	12
2015-06303-130444	10/02/2015	Gasconade	Belle Volunteer Fire Department	Unknown	0.25
2015-03623-129317	10/13/2015	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Unknown	5
2016-06303-132692	11/14/2015	Gasconade	Belle Volunteer Fire Department	Unknown	40
2016-06303-140861	01/03/2016	Gasconade	Belle Volunteer Fire Department	Unknown	0.5
2016-06303-140862	02/02/2016	Gasconade	Belle Volunteer Fire Department	Debris	2
2017-03733-146151	02/06/2016	Gasconade	Hermann Vol Fire Department	Debris	5
2016-03620-134196	02/06/2016	Gasconade	Beaufort-Leslie Fire Protection District		4
2016-06303-140863	02/07/2016	Gasconade	Belle Volunteer Fire Department	Unknown	3
2017-03733-146153	02/26/2016	Gasconade	Hermann Vol Fire Department	Debris	2
2016-06303-140865	02/27/2016	Gasconade	Belle Volunteer Fire Department	Unknown	15
2016-03623-136094	02/28/2016	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	2
2016-06303-140866	02/29/2016	Gasconade	Belle Volunteer Fire Department	Unknown	1
2017-03733-146154	03/06/2016	Gasconade	Hermann Vol Fire Department	Debris	4
2017-03733-146155	03/06/2016	Gasconade	Hermann Vol Fire Department	Unknown	0.5
2017-03733-146156	03/13/2016	Gasconade	Hermann Vol Fire Department	Unknown	1

2016-06303-140869	03/22/2016	Gasconade	Belle Volunteer Fire Department	Unknown	0.1
2016-06303-140872	04/03/2016	Gasconade	Belle Volunteer Fire Department	Unknown	1
2017-03733-146157	10/17/2016	Gasconade	Hermann Vol Fire Department	Unknown	0.25
2016-06303-141962	11/20/2016	Gasconade	Belle Volunteer Fire Department	Unknown	2
2016-06303-141964	11/21/2016	Gasconade	Belle Volunteer Fire Department	Debris	1.2
2017-03734-149462	01/21/2017	Gasconade	Owensville Volunteer Fire Department	Debris	1
2017-03734-150032	01/21/2017	Gasconade	Owensville Volunteer Fire Department	Debris	2
2017-03734-150033	01/25/2017	Gasconade	Owensville Volunteer Fire Department	Unknown	1
2017-03734-150034	01/30/2017	Gasconade	Owensville Volunteer Fire Department	Arson	1
2017-03734-150035	01/30/2017	Gasconade	Owensville Volunteer Fire Department	Arson	1
2017-03734-150036	01/31/2017	Gasconade	Owensville Volunteer Fire Department	Debris	2
2017-03733-146159	02/04/2017	Gasconade	Hermann Vol Fire Department	Unknown	4
2017-03623-145203	02/05/2017	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Debris	0.5
2017-03734-150140	02/05/2017	Gasconade	Owensville Volunteer Fire Department	Smoking	1
2017-03733-146160	02/05/2017	Gasconade	Hermann Vol Fire Department	Unknown	0.25
2017-03734-150138	02/05/2017	Gasconade	Owensville Volunteer Fire Department	Unknown	1
2017-03623-145204	02/10/2017	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Miscellaneous	0.5
2017-03734-150141	02/11/2017	Gasconade	Owensville Volunteer Fire Department	Equipment	1
2017-03734-150143	02/12/2017	Gasconade	Owensville Volunteer Fire Department	Miscellaneous	1
2017-03733-146161	02/12/2017	Gasconade	Hermann Vol Fire Department	Unknown	4
2017-03734-150144	02/15/2017	Gasconade	Owensville Volunteer Fire Department	Debris	4
2017-06313-158115	02/15/2017	Gasconade	Vichy Volunteer Fire Protection Assoc	Miscellaneous	7
2017-03734-150152	02/16/2017	Gasconade	Owensville Volunteer Fire Department	Debris	5
2017-03734-150151	02/16/2017	Gasconade	Owensville Volunteer Fire Department	Debris	15
2017-03733-146164	02/16/2017	Gasconade	Hermann Vol Fire Department	Unknown	7
2017-03733-146165	02/16/2017	Gasconade	Hermann Vol Fire Department	Unknown	12
2017-03734-150153	02/17/2017	Gasconade	Owensville Volunteer Fire Department	Debris	6
2017-03623-145856	02/17/2017	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Unknown	1
2017-03733-146167	02/17/2017	Gasconade	Hermann Vol Fire Department	Unknown	1

2017-03734-150154	02/17/2017	Gasconade	Owensville Volunteer Fire Department	Unknown	1
2017-03733-146166	02/17/2017	Gasconade	Hermann Vol Fire Department	Unknown	15
2017-03734-150155	02/18/2017	Gasconade	Owensville Volunteer Fire Department	Unknown	7
2017-03733-146168	02/18/2017	Gasconade	Hermann Vol Fire Department	Unknown	10
2017-03734-150511	02/19/2017	Gasconade	Owensville Volunteer Fire Department	Debris	1
2017-03734-150512	02/19/2017	Gasconade	Owensville Volunteer Fire Department	Debris	4
2017-03623-145857	02/20/2017	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Miscellaneous	0.1
2017-03734-150513	03/03/2017	Gasconade	Owensville Volunteer Fire Department	Debris	3
2017-03733-146870	03/04/2017	Gasconade	Hermann Vol Fire Department	Children	5
2017-03734-150514	03/04/2017	Gasconade	Owensville Volunteer Fire Department	Debris	1
2017-03734-150515	03/08/2017	Gasconade	Owensville Volunteer Fire Department	Unknown	1
2017-03734-150516	03/15/2017	Gasconade	Owensville Volunteer Fire Department	Debris	10
2017-03734-150531	03/18/2017	Gasconade	Owensville Volunteer Fire Department	Debris	5
2017-03734-148171	03/20/2017	Gasconade	Owensville Volunteer Fire Department	Debris	4
2017-03734-150533	03/20/2017	Gasconade	Owensville Volunteer Fire Department	Unknown	5
2017-03623-160031	10/02/2017	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Equipment	3
2017-03623-160032	10/14/2017	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Unknown	1.5
2017-06313-164925	11/24/2017	Gasconade	Vichy Volunteer Fire Protection Assoc	Miscellaneous	17
2017-06313-164923	11/26/2017	Gasconade	Vichy Volunteer Fire Protection Assoc	Miscellaneous	1
2017-06313-164922	11/27/2017	Gasconade	Vichy Volunteer Fire Protection Assoc	Miscellaneous	15
2018-03733-177033	02/26/2018	Gasconade	Hermann Vol Fire Department	Unknown	0.53
2018-03733-177032	03/02/2018	Gasconade	Hermann Vol Fire Department	Unknown	4.06
2018-03733-177031	03/03/2018	Gasconade	Hermann Vol Fire Department	Unknown	11.48
2018-03733-177029	03/04/2018	Gasconade	Hermann Vol Fire Department	Not Reported	685.83
2018-03733-177028	03/04/2018	Gasconade	Hermann Vol Fire Department	Unknown	0.22
2018-03733-177030	03/04/2018	Gasconade	Hermann Vol Fire Department	Unknown	6.7
2019-07607-178671	03/15/2018	Gasconade	Linn Fire Protection District	Unknown	0.58
2018-03733-177027	03/16/2018	Gasconade	Hermann Vol Fire Department	Unknown	1.32
2018-03733-177026	04/12/2018	Gasconade	Hermann Vol Fire Department	Debris	11.76

2018-03733-177025	04/12/2018	Gasconade	Hermann Vol Fire Department	Unknown	0.76
2018-03733-177024	04/20/2018	Gasconade	Hermann Vol Fire Department	Unknown	0.57
2018-03733-177160	06/07/2018	Gasconade	Hermann Vol Fire Department	Unknown	27.57
2019-03623-178377	03/21/2019	Gasconade	Gerald-Rosebud Fire Prot. Dist.	Miscellaneous	0.88
2019-03734-179427	07/21/2019	Gasconade	Owensville Volunteer Fire Department	Debris	
2019-03731-179531	11/27/2019	Gasconade	Bland Fire Protection District	Campfire	0.91
2019-03731-179532	11/27/2019	Gasconade	Bland Fire Protection District	Unknown	8.65
2019-03731-179577	12/11/2019	Gasconade	Bland Fire Protection District	Debris	0.06