2021 Jasper-Newton Bi-County Natural Hazard Mitigation Plan

Prepared by: *Harry S Truman Coordinating Council, Carrie Campbell*

407 S Pennsylvania Ave, Joplin Mo 64801

Jasper County and Newton County Hazard Mitigation Planning Committee

Jurisdictional Representatives

Name	Title	Department	Jurisdiction
John Bartosh	Presiding Commissioner	County	Jasper County
Jim Hounschell	Administrator	School	Joplin School System
Jef Kabarce	Administrator	School	Jasper County
Don Melton	Webb City Police	Police	Jasper County
Keith Stammer	Joplin/Jasper County Emergency Mgt	City and School	Joplin
Ron Klein	Administrator	City	Jasper
Charla Geller	Newton County Emergency Mgt	County	Newton
Monte Shoemaker	Administrator	School	Ozark Christian College
Madison Kienzle	Administrator	School	University of Arkansas
Denis Desmond	Village of Leawood	City	Leawood
Rachel Holcomb	Assistant City Manager	County	Neosho
David Myers	Deputy Fire Chief	County	Carthage
Roger Williams	Fire Chief	City	Carthage
Morgan Housh	Administrative Asst	City	Carthage
Lois Seng	City Clerk	City	Stark City
Kevin Johnson	Fire Chief	City	Fairview
Brenda Gardner	City Clerk, Alba	City	Alba
Ben Leavens	Administrator	City	Saginaw
Brenda Schmitt	Mayor	City	Diamond
Ruth Wilson	City Clerk	City	Asbury
Steve Lawver	City Manager	City	Carl Junction
Teri Neil	City Clerk	City	Fidelity
Mary Mcnary	City Clerk	City	Jasper
Dan Hole	Mayor	City	Neck City
Jim Jackson	County Commissioner	County	Newton County
Jed Schlegel	Emergency Manager	County	Newton County
Phil lewis	Superintendent	School	Sarcoxie
Don Triplett	Mayor	City	Sarcoxie
Delmar Haase	Fire Chief	City	Carl Junction
Patty Heagel	Asst Dir of Planning	City	Joplin
Sue Hirshey	City Clerk	City	Airport Drive
Cyndy Hutchings	City Clerk	City	Seneca
Clyde Stephems	City Chairman	City	Wentworth
Russ Cruzan	Superintendent of School	School	Avila
Will Cline	City Administrator	City	Carterville
Kim Demoss	City Clerk	City	Webb City
Carl Francis	City Manager	City	Webb City
Demita Doss	Mayor	City	Waco
Melody Cundiff	City Clerk	City	Duquesne
Tammy Talent	Mayor	City	Oronogo
Justin Pryor	City Administrator	City	Duenweg
Ronald Born	Secretary	City	Dennis Acres
Sam Lehman	Maintenance Director	School	Jasper
Brandon Eggleston	Superintendent	School	Seneca R-7
Rusty McDermott	Director of Operations	School	East Newton
Don Melton	Chief of Police/Emergency Management Director	City	Webb City
Mary Mather	Secretary to Superintendent	School	Carl Junction R1

Andrew Roughton	Fire Chief	City	Carl Junction
Vicky Mieseler	Chief Administrative Officer, Ozark Center/Freeman	Hospital	Joplin
Matt Moran	Executive Director, Housing Authority	City	Joplin
Kerry Sachetta	Asst Superintendent	School	Joplin R8
Steve Hubbard	Superintendent	School	Diamond R6
Richie Fretwell	Asst Superintendent	School	Neosho R5
TJ Angel	Dir of Operations	School	Crowder College
Gregg Wolf	Asst superintendent	School	Carthage R9
Georgiana Mcgriff	Director	School	Joplin Area Catholic School
Ryan West	Dir of Safety and Security	School	Neosho R5
Bryan Goodwin	Asst Plant Director	School	Missouri Southern State College
Keith Stammer	Director Jasper County EMA	County	Jasper
Anthony Rosseth	Superintendent	School	Webb City
Misty Hailey	Superintendent	School	Westview C6

Stakeholder Representatives

Name	Title	Department	Jurisdiction
Bob Barth	Director of Advertising	City	Joplin
Larry Bearden	Manager Jasper Products	Public	Joplin
Dirk Edwards	Manager, Jasper Products	Public	Joplin
Ted Donaldson	Compass Quest	Public	Joplin
Kelly Chenoweth	Business and Community Dev Manager, Liberty Utilities	Public	Jasper County
Gary Clinton	EHS Manager, Bemis	Public	Joplin
Clint Walton	Project Manager, R.E. Smith Construction	Public	Joplin
Patty Overman	Executive Director, Region M	Public	Joplin
Gayl Navarro	Owner, Ozark Nursery	Public	Joplin
Debbie Hutson	Realtor, Keller Williams	Public	Joplin
Kurt Higgins	Senior VP, Allgier Martin and associates	Public	Joplin
Craig Jones	Owner, Craig Jones and Company	Public	Joplin
Laner Clevenger	Owner, Lance Clevenger Financial	Public	Joplin
Scott Clayton	Executive Director, Habitat for Humanity	Public	Joplin

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EXECUTIVE SUMMARY

The purpose of the Jasper/Newton hazard mitigation plan is designed as a tool for County citizens and stakeholders alike in controlling the hazardous effects of natural disaster to the loss of life and property damage. Jasper/Newton County and participating jurisdictions and school districts developed this multi-jurisdictional local hazard mitigation plan update to reduce future losses from hazard events to the County and its communities and school districts. This iteration of the plan is an update of a plan that was approved on April 8th , 2016. The plan and the update were prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 to result in eligibility for the Federal Emergency Management Agency (FEMA) Hazard Mitigation Assistance Grant Programs.

The Jasper and Newton County Hazard Mitigation Plan is a multi-jurisdictional plan that covers the following jurisdictions that participated in the planning process:

- Unincorporated Jasper County
- Village of Airport Drive
- City of Alba
- City of Asbury
- City of Carl Junction
- City of Carterville
- City of Carthage
- City of Diamond
- City of Duenweg
- City of Duquesne
- Village of Fidelity
- City of Granby
- City of Jasper
- City of Joplin
- City of Leawood
- City of Neck City
- City of Oronogo
- City of Sarcoxie
- City of Waco
- City of Webb City
- Unincorporated Newton County
- City of Neosho
- City of Seneca
- City of Stark City
- City of Wentworth
- Avilla R-XIII
- Joplin R-VIII
- Westview C-VI

Both Jasper and Newton counties and the entities listed above developed a Multi-Jurisdictional Hazard Mitigation Plan that was approved by FEMA on April 8, 2016 (hereafter referred to as the *2021 Hazard Mitigation Plan*). This current planning effort serves to update that previously approved plan.

The plan update process followed a methodology in accordance with FEMA guidance, which began with the formation of a Mitigation Planning Committee (MPC) comprised of representatives from Jasper County and Newton County and participating jurisdictions. The MPC updated the risk assessment that identified and profiled hazards that pose a risk to both Jasper County and Newton County and analyzed jurisdictional vulnerability to these hazards. The MPC also examined the capabilities in place to mitigate the hazard damages, with emphasis on changes that have occurred since the previously approved plan was adopted. The MPC determined that the planning area is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Riverine and flash flooding, winter

storms, severe thunderstorms/hail/lightning/high winds, and tornadoes are among the hazards that historically have had a significant impact.

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

1. Minimize new development in hazard-prone areas.
2. Minimize losses to existing and future structures within hazard areas.
3. Strengthen protection of critical facilities and infrastructure from natural hazards to create a safer, more sustainable community.
4. Build and enhance local mitigation capabilities to ensure individual safety, reduce damage to public buildings and ensure continuity of emergency services
5. Increase public awareness of risk from natural hazards.
6. Improve the coordination and communication with Federal, State, Regional, and Local emergency management personnel and other potential partners.

To advance the identified goals, the MPC developed recommended mitigation actions, as summarized in the table on the following pages. The MPC developed an implementation plan for each action, which identifies priority level, background information, ideas for implementation, responsible agency, timeline, cost estimate, potential funding sources, and more. These additional details are provided in Chapter 4.

Table I. Mitigation Action Matrix

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Airport Drive1.1	Development of Comprehensive Plan	Airport Drive	Med	1	Tornados, Severe Storms		✓	
Stark1.1	Develop emergency management plan	Stark City	High	1	Various	✓		✓
Went1.1	Develop emergency management plan	Wentworth	High	1	Various	✓		✓
CJ1.1	Building code and enforcement	Carl Junction	Med	1	Tornado	✓		✓
Alba1.1	Find funding for backup generators	Alba	High	1	Various	✓		✓
Asbury1.1	Purchase a tornado shelter	Asbury	High	1	Tornado	✓		
Carterville1.1	Purchase and install backup generator to ensure continuity of service for residents	Carterville	High	1	Various storms	✓		
Carthage1.1	Purchase and install backup generator to ensure continuity of service for residents	Carthage	High	1	Various storms	✓		
Duenweg1.1	Purchase and install backup generator to ensure continuity of service for residents	Duenweg	High	1	Various storms	✓		
Duquesne1.1	Make site specific drainage improvements at problematic sites	Duquesne	High	1	Flooding		✓	✓
Fidelity1.1	Purchase and install backup generator to ensure continuity of service for residents	Fidelity	High	1	Various storms	✓	✓	✓
JasperCo1.1	Apply for funding replace low water bridges in rural areas	Jasper Co.	High	1	Flooding	✓		✓
Neck1.1	Apply for funding for community tornado shelter	Neck City	High	1	Tornado	✓		
Oronogo1.1	Purchase backup generator for PD and FD	Oronogo	High	1	Various	✓		
Sarcoxie1.1	Purchase backup generator for PD, FD, water towers, sewer systems and city Hall, nursing home	Sarcoxie	High	1	Various	✓		
Diamond1.1	Purchase a tornado shelter	Diamond	High	1	Tornado	✓		
Granby1.1	Purchase additional sirens	Granby	High	1	Tornado/severe storms	✓		
Leawood1.1	Purchase additional siren for Southern Hills	Leawood	High	1	Tornado/severe storms	✓		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Neosho1.1	Flood Plain Buyouts, retention ponds, Drainage	Neosho	High	1	Flooding	✓		✓
NewtonCo1.1	Flood Plain Buyouts, retention ponds, Drainage	Newton Co.	High	1	Flooding	✓		✓
Seneca1.1	Flood Plain Buyouts, retention ponds, Drainage, Dredging	Seneca	High	1	Flooding	✓		✓
West1.1	Purchase a tornado shelter	Westview C-6	High	1	Tornado	✓		
Avilla1.1	Purchase a tornado shelter	Avilla R-XIII	High	1	Tornado	✓		
Waco1.1	Distribute pamphlets with severe weather classes, resources, advertisements	Waco	Med	1	Severe thunderstorms, severe winter weather, tornados, extreme heat, drought, flooding	✓		✓

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 schools/special districts. The documentation of each adoption is included in Appendix D, and a model resolution is included on the following page.

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

Model Resolution for the Jasper-Newton Bi-County Hazard Mitigation Plan

The following resolution was adopted by____on____, 2020.
Resolution No. _____
A RESOLUTION OF INTENT TO PARTICIPATE IN NATURAL HAZARD MITIGATION AND TO WORK TOWARD BECOMING A SAFER COMMUNITY.
WHEREAS, the_____recognizes that no community is immune from natural hazard whether it be tornado/severe thunderstorm, flood, severe winter weather, drought, heatwave, earthquake, dam failure, or wildfire, and recognizes the importance of enhancing its ability to withstand natural hazards as well as the importance of reducing the human suffering, property damage, interruption of public services and economic losses caused by those hazards; and
WHEREAS, the_____may have previously pursued measures such as building codes, fire codes, floodplain management regulations, zoning ordinance, and storm water management regulations to minimize the impact of natural hazards; and
WHEREAS, the Federal Emergency Management Agency and the State Emergency Management Agency have developed a natural hazard mitigation program that assists communities in their efforts to become Disaster-Resistant Communities which are sustainable communities after a natural disaster that focus, not just on disaster relief, but also on recovery and reconstruction that brings the community to at least pre- disaster conditions in an accelerated, orderly, and preplanned manner; and
WHEREAS, by participating in the Natural Hazards Mitigation program, the_____will be eligible to apply for post-disaster mitigation funds; and
WHEREAS, the_____desires to commit to working with government partners and community partners to implement the Natural Hazards Mitigation Plan; and
WHEREAS, the_____will implement pertinent precepts of the mitigation plan by incorporation into other community plans and mechanisms where appropriate; and
WHEREAS, the_____will participate in the evaluation and review of the Plan after a disaster as well as complete mandated five-year update submitted to the State Emergency Management Agency and the Federal Emergency Management Agency for review and approval; and
NOW, THEREFORE, BE IT RESOLVED BY THE_____OF THE____AS FOLLOWS:
The___hereby adopt the Jasper-Newton Bi-County Multi-Jurisdictional Natural Hazard Mitigation Plan attached hereto for the purpose of building a safer community by reducing natural hazard vulnerability.

_____

Presiding Official Date

_____

Secondary Official Date

_____

Tertiary Official Date

1 INTRODUCTION AND PLANNING PROCESS

1.1 Purpose

Following the severe weather, tornado, and flooding disasters that was declared in the spring of 2002 (DR-1412), Missouri's State Emergency Management Agency (SEMA) was inundated with flood buyout project proposals from 23 communities across the state. With state funding scarce, they were able to help some of these communities using federal mitigation grant funding provided by the Federal Emergency Management Agency (FEMA). After November 1, 2004, communities like these will still be eligible for federal disaster public assistance and individual assistance, but will not be eligible for hazard mitigation assistance unless they have an approved hazard mitigation plan on file. This requirement also extends to school districts requesting SEMA or FEMA Hazard Mitigation project funding.

For the nearly 1,000 cities and 114 counties in Missouri, mitigation plans are required for all federally declared disasters such as flood, earthquake, ice storm, tornado, and fire. The Stafford Act allows the governor to execute the state's emergency response. Under current rules for federal mitigation funding, relief assistance can only be obtained if there is a FEMA- approved hazard mitigation plan in place. This is as a condition to receiving federal mitigation grant funding. These plans must be updated and adopted every five years.

Mitigation is the means by which business and residential development can mitigate the impacts of a disaster if action is taken before the event occurs. The first action to reduce the effects of a disaster is the preparation and implementation of a comprehensive mitigation strategy. Given the area's history of principally ice storms, floods, and tornadic disasters, Jasper and Newton Counties are involved in intentional planning processes to make themselves more resistant to the long-term, negative impacts of these events. This process has helped both counties develop a more established partnership, a working mitigation plan through providing information to the public and encouraging all parties throughout these jurisdictions to develop their own mitigation plans.

Hazard Mitigation Plans must abide by Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288) as amended by the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. The Jasper/Newton Mitigation plan used the: FEMA's Local Mitigation Planning Handbook, March 2013 and FEMA's Local Mitigation Plan Review Guide, October 1, 2011.

Under the initiative set forth by SEMA, the Missouri Association of Councils of Governments (MACOG) agreed to meet the challenge of developing county and municipal plans on a regional level, throughout the state. The 19 regional planning commissions of MACOG provided an effective way for local governments

to work together to share technical staff and address common problems in need of an area-wide approach. They also can effectively deliver programs that might be beyond the resources of an individual county, school district, or municipal government. The intent of the regional planning commissions is Missouri is to be of service to their member counties and municipalities and to bring an organized approach to addressing a broad cross-section of area wide issues. They also are available to assist their member entities in coordinating the needs of the area with state and federal agencies, or with private companies or other public bodies. Most of the rural regional planning commissions (RPCs) in Missouri were formed under Chapter 251 of the Revised Statutes of the State of Missouri. All regional councils, or RPCs, in Missouri operate as "quasi-governmental" entities. In Missouri, RPCs are advisory in nature, and county and municipal governments hold membership on a voluntary basis.

SEMA's mitigation planning initiative further states that, due to time and funding limitations, the plan development by Missouri's regional planning commissions should cover natural hazards only. Manmade and/or technological hazards are not addressed in this plan, except in the context of cascading damages

1.2 Background and Scope

Both Jasper and Newton County passed their first individual Natural Hazard Mitigation plans in 2005. An update was completed for each county in 2010. When planning began for the previous five-year update in 2015, it was decided that a bi-county plan would best serve the region due to the geographic location of Joplin which is bisected by the county line. This updated 2021 plan continues to build on the foundation established by the previous plans, but also continues to focus on the creation and implementation of an inter-county plan which considers both existing and potential mitigation actions that can continue to improve resilience and readiness to natural disasters for both counties and their internal jurisdictions.

For this plan to be successfully implemented, it must be periodically reviewed and updated as circumstances and technological capabilities advance. Adoption of this plan is not the end, but rather the continuation of a long-term commitment to disaster mitigation planning. The Jasper- Newton Bi-County Mitigation Plan is a multi-jurisdictional plan that represents multiple local governments and entities within each county. The following local governments participated in the 2021 plan revision either by participating in planning meeting discussions and calls, and/or completing the jurisdictional survey, and acknowledge the plan through formal adoption:

- Unincorporated Jasper County
- Village of Airport Drive
- City of Alba
- City of Asbury
- City of Carl Junction
- City of Carterville
- City of Carthage
- City of Diamond
- City of Duenweg
- City of Duquesne
- Village of Fidelity
- City of Granby
- City of Jasper
- City of Joplin
- City of Leawood
- City of Neck City
- City of Oronogo
- City of Sarcoxie
- City of Waco
- City of Webb City
- Unincorporated Newton County
- City of Neosho
- City of Seneca
- City of Stark City
- City of Wentworth
- Avilla R-XIII
- Joplin R-VIII
- Westview C-VI

The local mitigation plan is the representation of the jurisdiction's commitment to reduce risks from natural hazards, serving as a guide for decision makers as they commit resources to reducing the effects of natural hazards. Information in the plan will be used to help guide and coordinate mitigation activities and decisions for local projects in the future.

1.3 Plan Organization

The Plan is organized into five chapters. The 2016 Plan included a chapter dedicated to local jurisdiction capabilities. This information has been incorporated into the Planning Area Profile Chapter. The format of the Plan was changed to conform to the local hazard mitigation plan outline template released by the Missouri State Emergency Management Agency in November of 2018. The Plan chapters include:

- Chapter 1: Introduction and Planning Process
- Chapter 2: Planning Area Profile and Capabilities
- Chapter 3: Risk Assessment
- Chapter 4: Mitigation Strategy
- Chapter 4: County Objectives
  - ***Objective 1.1: Promote enhancement of floodplain management activities and building code requirements.***
  - ***Objective 1.2: Promote the entities' capability to conduct hazard risk assessments, demonstrate funding needs, and track mitigation activities throughout the entity.***
  - ***Objective 1.3 : Track adequacy of emergency services to protect public health and safety.***
  - ***Objective 1.4 : Increase regional economic resistance to disasters.***
  - ***Objective 2.1: Take action to minimize the effects of natural disasters on people, property, and building contents.***
  - ***Objective 2.2: Incorporate drills, education programs, and planning strategies that focus on disaster response by varying populations.***
  - ***Objective 3.1: Identify and protect locations vulnerable to disasters.***
  - ***Objective 3.2: Ensure that all vital / critical facilities are protected from the effects of natural hazards to the maximum extent possible***
  - ***Objective 4.1: Increase the level of knowledge and awareness of residents on the hazards that routinely threaten the area***
  - ***Objective 4.2: Identify the citizens most vulnerable to disasters and plan accordingly***
- Chapter 5: Plan Implementation and Maintenance
- Appendices

The overall mitigation goals of the plan include: **(1) Increase internal capabilities to mitigate the effects of natural hazards**; (**2) Enhance existing policies that will help reduce the potential damaging effects of hazards**; **(3) Protect entities' most vulnerable populations, buildings, and critical facilities through the implementation of cost-effective and technically feasible mitigation projects**; and **(4) Protect public health, safety, and welfare by increasing the public awareness and by fostering both individual and public responsibility in mitigating risks due to those hazards**. Table 1.1 summarizes the changes made in the Plan by chapter. Table 1.1 includes each chapter and summary of the changes made in the update.

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. Section One introduces the multi-jurisdictional hazard mitigation planning process and a detailed look at the participation of the local jurisdictions. It also details the purpose of local hazard mitigation planning and outlined the requirements enacted by FEMA

Chapter 2 - Planning Area Profile and Capabilities	Noted new GIS capabilities for participating jurisdictions. Provides general background information and statistics for Jasper/Newton County and its municipalities and the disaster response and recovery capabilities found in the county. The first part of section two includes demographic data, identification of community anchor institutes, and information regarding infrastructure. Understanding this baseline data is a fundamental component of any planning process. This section provides a snapshot of Jasper/Newton County that will serve to assist in the implementation of this plan. The second part of section two provides a capability assessment of Jasper/Newton County. These resources are crucial in the mitigation, response, and recovery processes should one of the identified natural disasters occur. In detail, it outlines the County's response capabilities and seeks to identify those areas in which the County may improve mitigation capabilities. The section identifies key personnel, organizational leaders, and outlines existing plans regarding emergency planning. Additionally, it provides a brief assessment of each municipality's readiness regarding hazard mitigation
Chapter 3 - Risk Assessment	Combined extreme heat and extreme cold into one hazard: extreme temperatures. Identifies and explores the types of natural hazards that pose a risk to the counties, and the likelihood in which a hazard will occur. Provides a general overview of each of the identified natural hazards, in addition to explaining the impact upon the County and its municipalities should such hazards occur
Chapter 4 - Mitigation Strategy	The mitigation category of each action was added to the action worksheets. Delivers the multi-jurisdiction mitigation strategies in response to the risk assessment. Each disaster has specific problems identified with its respective occurrence probability within each jurisdiction; therefore the mitigation strategies are tailored to fit each jurisdictions circumstance. Also outlines the overall goals to reduce a disaster's effect, specific objectives toward achieving those goals, and implementation plans for the county to pursue
Chapter 5 - Plan Implementation and Maintenance	Updated MPC meetings for evaluating and updating the plan to quarterly. Outlines Hazard Mitigation Plan maintenance procedures

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.

For the update of the Jasper/Newton 2021 County Hazard Mitigation Plan, the Counties and SEMA has contracted with the Harry S Truman Coordinating Council and has participated fully in the update process. Once this plan receives final approval from the Federal Emergency Management Agency, Jasper and Newton County, and the participating cities and school districts within will be eligible for future mitigation assistance from FEMA and will be able to more effectively carry out the identified mitigation activities in an effort to lessen the adverse impact of future natural disasters that take place in the county. HSTCC's role as contractor includes the following elements:

- Assist in establishing a Mitigation Planning Committee (MPC) as defined by the Disaster Mitigation Act (DMA),
- Ensure the updated plan meets the DMA requirements as established by federal regulations and follows the most current planning guidance of the Federal Emergency Management Agency (FEMA),
- Facilitate the entire plan development process,
- Identify the data that MPC participants could provide and conduct the research and documentation necessary to augment that data,
- Assist in soliciting public input,

- Produce the draft and final plan update in a FEMA-approvable document, and Coordinate the Missouri State Emergency Management Agency (SEMA) and (FEMA) plan reviews.

Table 1.2 shows the MPC members and the entities they represent, along with their titles

Table 1.2. Jurisdictional Representatives Jasper/Newton County Mitigation Planning Committee

Name	Title	Department	Jurisdiction
Keith Stammer	Jasper County EMA	County	Jasper County
Charla Geller	Newton County Emergency Manger	County	Newton County
Rachel Holcomb	Assistant City Manager	City	Neosho
Roger Williams	Fire Chief	City	Carthage
David Myers	Asst Fire Chief	City	Carthage
Morgan Housh	Admin Assistant	City	Carthage
Don Melton	Police Chief	City	Webb City
Ron Klein	City Emergency Manager	City	City of Duenweg
Denis Desmond	Mayor	City	Village of Leawood
Jim Hounschell	Superintendent	School	Joplin
Jeff Kabanc	Superintendent	School	Sarcoxie
Monte Shoemaker	Facility Manager	School	Ozark Christian College
Greg Hickman	Newton County Emergency Mgt	County	Newton
Sue Hirshey	Trustee	City	Airport Drive
Brenda Gradner	City Administrator	City	City of Alba
Vera Rector	Trustee	City	Brooklyn Heights
Steve Lawver	City Administrator	City	City of Carl Junction
William Cline	City Administrator	City	Carterville
Name	Title	Department	Jurisdiction
Roger Williams	Fire Chief	City	Carthage
Morgan Housh	City Administrator	City	Carthage
David Meyers	Deputy Fire Chief	City	Carthage
Jim Parrell	Trustee	Village	Dennis Acres
Shelly Loyd	Mayor	City	Diamond
Rob Klien	City Administrator	City	Duenweg
Tammy O"Brian	Administrator	City	Fairview
Teri Neil	Trustee	Village	Fidelity
Fred Pugh	Clerk	Village	Grand Falls Plaza
James Ferguson	Fire Chief	City	Joplin
Matthew Stewart	Police Chief	City	Joplin
Denny Desmond	Chairman	Village	Leawood
Bruce Anderson	Chairman	Village	Loma Linda
Don Miller	Mayor	City	Neck City
Janette Kleindle	Trustee	Village	Newtonia
Chris Kerrigan	Chief of Police	Village	Oronogo
Rence Jung	Trustee	Village	Redings Mill
Diana Hawkins	City Clerk	Village	Ritchey
Jed Schlege	Chariman	Village	Saginaw
Tony Robyn	Trustee	Village	Saginaw
Bert Carnes	Fire Dept	City	Sarcoxie
Mark Bennett	Trustee	City	Seneca
Russ Cruzan	Superintendent	School	Avilla R-XIII
Gary Reed	Asst Superintendent	School	Carl Junction R-I
Greg Wolf	Administrator	School	Carthage R-IX
Melony Houlihan	Administrator	School	Carthage R-IX
Steve Hubbard	Superintendent	School	Diamond R-IV
Rusty MsDermott	Facilities Director	School	East Newton R-VI
Jim Hounschell	Director of Safety	School	Joplin R-VIII
Robert Harinton	Operations	School	Missouri Southern State College
Monte Shoemake	Vice President	School	Ozark Christian College
Dr. Kevin Goddard	Superintendent	School	Sarcoxie R-II
Brandon Eggleston	Superintendent	School	Seneca R-VII

1.4.1 Multi-Jurisdictional Participation

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

The data and results in this plan represent many months of effort. Jurisdiction officials were contacted in January of 2019 and plans were made regarding how and when to gather the necessary information for the formation of this plan. A series of meetings were held from January to September to gather organizational public input. A draft of this plan was submitted to SEMA on November 1, 2020 for review and comment.

The planning committee was composed of members drawn from local entities, city and county representatives, as well as private citizens from each jurisdiction. Table 1.3 provides the names of committee members and the jurisdictions represented in the planning process. Representatives worked to provide information about their jurisdictions through worksheets and meeting attendance. Input from the general public, as well as surrounding jurisdictions, was also solicited prior to each meeting through press releases and public announcements. The Public Survey was released in February 2019 and received 31 responses from citizens and community organizations. In June 2019, approximately 100 Organizational Surveys were sent out with xx responses. Sample survey worksheets submitted are provided as part of *Appendix B: Documentation of Public Participation*.

Beginning in January 2019 and continuing through July 2019, the Hazard Mitigation Committee met to provide information for the update of the Jasper-Newton Bi- County Hazard Mitigation Plan. At the initial meeting in January the committee reviewed and discussed the applicability of each portion in the original Hazard Mitigation Plan and opted to accept identified hazards and goals, actions, and objectives of the plan. Committee members were asked to provide updated information on critical response capabilities and assets as well as report progress on 2015 goals within their jurisdictions for the March and May 2019 meetings.

The second committee meeting was held in March 2019. The committee discussed information submitted by each jurisdiction and reviewed and approved the identified hazards and existing goals, actions, and objectives from the previous plan. Utilizing their information and suggestions, HSTCC continued the plan update. Section 1 combined information from both counties and all their included jurisdictions in terms of critical response capabilities as well as including the most recent census data. Section 2 also combined information from both counties. It was also updated with historical data as well as the latest storm and hazard records available through 2019. Vulnerabilities were reassessed in this section.

May through July 2019, the committee assessed progress from 2015 as well as discussed critical facilities. Section 3 also combined information from both counties. It was minimally updated, focusing on clarification of existing plans, hazard mitigation implementation at the local level, and other recommendations for improvement. Section 4 received the most significant focus from the planning committee. Though the mitigation strategy and overarching goals did not change, the objectives and actions were reassessed. Each objective and action was discussed during meetings, with discussion focused on the implementation, sufficiency, and applicability of each objective and action. A summary of the discussion concerning objectives and actions is located in Section 4.

Because of the new nature of this combined plan in 2015, objectives and actions were not significantly altered in 2021. Many mitigation actions were completed following the 2011 Joplin tornado disaster and jurisdictions in the region continue to focus on infrastructure changes to mitigate future disasters. Additionally, in order to ensure the viability and use of this plan, the committee focused on plan

maintenance and implementation. After discussion, the committee chose to assess the Jasper-Newton Bi-county Hazard Mitigation Plan on an annual basis using a committee-created assessment worksheet. Annual assessments will be conducted by each county's Emergency Management Director (EMD) and open to the public as part of a regular commission meeting. Press releases in local newspapers will be used to encourage public participation in the assessment process. Plan copies will be publicly accessible in each local jurisdiction for review and comment by county citizens. Additionally, the EMD will present their findings to the County Commission for official approval of the plan review.

The Harry S Truman Coordinating Council, on behalf of Jasper and Newton County, invited all incorporated cities, all school districts, many non-profit entities located within the county, and representatives from neighboring jurisdictions to participate in the Jasper/Newton County Hazard Mitigation Plan update planning meetings. FEMA accepts multi-jurisdictional plans which meet all the requirements of 44CFR §201.6(a)(3):

- **The risk assessment must assess each jurisdiction's risk where they may vary from the risks facing the entire planning area.**
- **There must be identifiable action items specific to the jurisdiction requesting FEMA approval or credit of the plan.**
- **Each jurisdiction requesting approval of the plan must document that itself has formally adopted the plan.**

DMA 2000 further requires that jurisdictions represented within a multi-jurisdictional hazard mitigation plan participate in the planning process in addition to formally adopting the completed plan. Each participating jurisdiction was required to meet planning participation requirements as defined by HSTCC at the beginning of the update process. Minimum participation requirements were defined as follows:

Provide information to support the plan update through <u>at least two</u> of the following methods:

- **Completion of jurisdiction questionnaire;**
- **Attendance at public meetings;**
- **Alternately scheduled meetings for data collection purposes;**
- **Email correspondence with HSTCC staff for data collection purposes; and**
- **Formally adopt the hazard mitigation plan**

HARRY S TRUMAN COORDINATING COUNCIL was contracted by Jasper/Newton County to revise and update the 2014 Hazard Mitigation Plan and coordinate planning efforts between the municipalities and school districts of the County. HARRY S TRUMAN COORDINATING COUNCIL planning staff led the development of the plan update by forming the planning committee, calling and facilitating meetings, compiling data, composing and reviewing drafts, issuing public notices, and drafting correspondence. All of the jurisdictions listed as participants in the plan update met the minimum participation requirements as indicated in the following tables. Documentation of meeting attendance in the form on sign in sheets is included in *Appendix A: Planning Participation Documentation*.

Participating jurisdictions are listed above on page 1.2. In the 2014 iteration of the Jasper/Newton County Hazard Mitigation Plan, all jurisdictions participated fully. Other jurisdictions which participated in the planning process, but are not seeking independent adoption and approval are: local police departments, electric cooperatives, emergency management agencies.

The Plan serves as a written document of the planning process. Active participation of local jurisdiction representatives and stakeholders in the hazard mitigation planning process is essential if the Plan is to have value. To be eligible for mitigation funding, local governments and school districts must adopt the FEMA-approved update of the Plan. The participation of the local government stakeholders in the planning process is considered critical to successful implementation of this plan. Each jurisdiction that is seeking approval for the plan must have its governing body adopt the updated plan, regardless the degree

of modifications. HSTCC collaborated with the local governments and districts in Jasper and Newton County to assure participating in the planning process to the greatest extent possible and the development of the plan that represents the needs and interests of Jasper and Newton County and its local jurisdictions.

The planning engagement took to the form of a county-wide meeting with participating jurisdictions, who reviewed findings from the updated Risk Assessment and completed a hazard mitigation data collection questionnaire (DCQ) that was developed in tandem with the Missouri SEMA planning outline template. Special meetings were held in order to meet with representatives from jurisdiction who were unable to attend the county-wide meeting. From these meetings, goal refinement and potential mitigation actions were identified and MPC representatives were decided.

The public was engaged at two points during the development of the plan update. First, a public meeting was held on 5/15/2019 and secondly a survey was posted on the HSTCC website and advertised on social media. the Cabool Enterprise and the Houston Herald Newspapers in January of 2019, the newspaper of widest circulation in the county. Second, the availability of the draft plan for review and comment was announced in the same newspaper in May of 2019. Documentation for both public engagement efforts are included in Appendix E.

Building from the feedback received from the jurisdictional meetings, the MPC was convened via conference call to finalize mitigation goals and actions and make final review and comment on the Plan prior to submittal to the Missouri State Emergency Management Agency.

Table 1.3 Jurisdictional Participation Planning Process

Jurisdiction	Attendance at a meeting	Kick-off Meeting	Meeting #2	Meeting #3	Data Collection Questionnaire Response	Formal Adoption of the Plan
Jasper County	X				X	X
City of Airport Drive	X					X
City of Alba	X					X
City of Asbury	X					X
City of Carl Junction	X				X	X
City of Carterville	X					X
City of Carthage	X				X	X
City of Duenweg	X					X
City of Duquesne					X	X
City of Joplin	X				X	X
Village of Fidelity	X					X
City of Jasper	X					X
City of Neck City	X					X
City of Oronogo	X				X	X
City of Sarcoxie						X
City of Waco	X				X	X
City of Webb City	X				X	X
Newton County	X					X
City of Diamond	X					X
City of Granby					X	X
Village of Leawood	X				X	X
City of Neosho	X				X	X
City of Seneca	X					X
Village of Stark City						X
Village of Wentworth						X
Avilla R-XIII	X					X

Joplin R-VIII	X				X	X
Westview C-VI					X	X

1.4.2 The Planning Steps

FEMA's Local Mitigation Planning Handbook (March 2013), Local Mitigation Plan Review Guide (October 2013), and Integrating Hazard Mitigation into Local Planning: Case Studies and Tools for Community Officials (March 2013) were used as sources for development the Plan update process. The development of the plan followed the 10-step planning process adapted from FEMA's Community Rating System (CRS) and Flood Mitigation Assistance Programs. The 10-step process allows the Plan to meet funding eligibility requirements of the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, Community Rating System, and Flood Migration Assistance Program. Table 1.4 shows how the CRS process aligns with the Nine Task Process outlined in the 2013 Local Mitigation Planning Handbook. The following Table 1.4 is a summary of how HSTCC staff used the Nine Task Process to develop the updated for the Jasper and Newton County Hazard Mitigation Plan.

Table 1.4. Jasper/Newton Mitigation Plan Update Process

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

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

The Council of Governments planners began the plan update process by contacting local stakeholders that were identified as key officials who would be valuable to the update of the mitigation plan. County

commissioners, city officials, and emergency management personnel were targeted as potential members of the MPC. During an introductory conference call in December 2018, the scope of the plan update was discussed, including planning participation requirements and general methodology. A timeline for completion the update was established and planning meetings were scheduled and given 'tentative' dates.

The Data Collection Questionnaires for the county's school districts and municipalities were distributed at the very beginning of the update process via email along with a follow up phone call to explain the procedure, the need for the data collection, how the data would be used, and to answer any questions the Superintendents may have had regarding the contents of the Data Collection Questionnaires. All participating jurisdictions were informed of an upcoming planning meetings in the county where HARRY S TRUMAN COORDINATING COUNCIL planners would review the questionnaire responses and help shore up any gaps in the data. In total, five planning meetings were held in Jasper/Newton County.

Table 1.5. Schedule of Planning Meetings

Meeting	Topic	Date
Kickoff Meeting	Joplin Public Library Jurisdictions represented: • Prospective participants and stakeholders identified • Raising awareness for mitigation strategy/increase countywide resilience to natural hazards • Natural hazard vulnerability • Local plan participation • Project timeline	January 25, 2019, in person
Planning Meeting	Joplin Public Library Jurisdictions represented: • Review of 2014 Mitigation Goals, Objectives and Actions • Review of Jurisdictional Risk Assessment • Identification of new mitigation actions • Completion of Data Collections Questionnaire, identifying capabilities, assets, vulnerability	March 20, 2019
Planning Meeting	Joplin Public Library. Jurisdictions represented: Jurisdictions represented: • Review of 2014 Mitigation Goals, Objectives and Actions • Review of Jurisdictional Risk Assessment • Identification of new mitigation actions • Completion of Data Collections Questionnaire, identifying capabilities, assets, vulnerability	May, 15, 2019
MPC Meeting	Mitigation Planning Committee Work Session 1:30 p.m. Jurisdictions represented: All • Discussed changes to the 2019 Plan update • Discussed STAPLEE Criteria • Discussion of lead agencies and funding sources for each mitigation action • Coordinated timing of plan adoption	May 9, 2019 *Conference Call*

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.

Options for soliciting public input on the Plan update were discussed during the Planning Kickoff Conf. Meeting held on January 25, 2019, HSTCC staff explained the importance of public involvement during the planning process.

A plan to engage the public in the plan update process was developed in accordance with 44 CFR Requirement 201.6(b), ensuring the opportunity for the public to comment on the plan during the drafting stage and prior to FEMA approval. The consensus of the group was to (**1**) develop an online survey instrument which would be publicized in the Joplin Globe and ran concurrent to the drafting of the plan update and (**2**) post the draft plan on the website of the Harry S Truman Coordinating Council website for public review and comment, and announce its availability in the Joplin Globe prior to the plan's submittal to the State Emergency Management Agency

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.

There are many organizations that are 'regional' in nature whose interests interface with hazard mitigation planning in Jasper and Newton County. These groups were engaged via telephone calls, emails, and surveys The agencies and interest groups who were invited to take part in the hazard mitigation plan update are listed below:

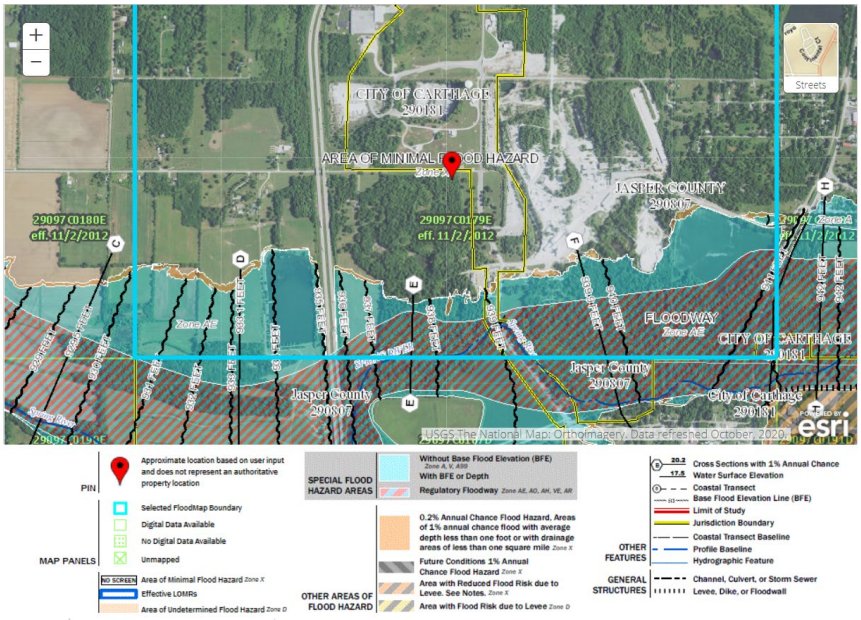
Agency	Representative	Agency	Representative
Jasper County Emergency Management	Director	Joplin Fire Department	Fire Chief
Jasper County Commission	John Bartosh	Carthage Fire Department	Fire Chief
Joplin Fire Department	Fire Chief	Sarcoxie Fire Dept	Fire Chief
Freeman Hospital	Region Supervisor and Regional Biologist	Joplin Police Dept	Chief of Police

Joplin Housing Authority	Executive Director	Joplin Fire Department	Fire Chief
Joplin Habitat for Humanity	Executive Director	Midway Fire Dept	Fire Chief
Newton County Commissionen	Jim Jackson		

Coordination with FEMA Risk MAP Project

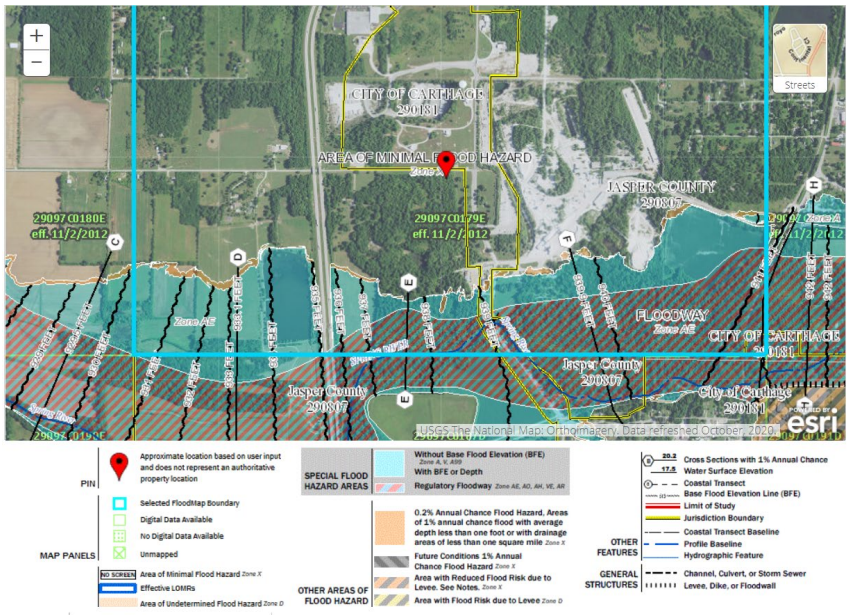
Risk Mapping, Assessment, and Planning (Risk MAP) is the Federal Emergency Management Agency (FEMA) Program that provides communities with flood information and tools that they can use to enhance their mitigation plans and take action to better protect their citizens. Through collaboration with State, Tribal, and local entities, Risk MAP delivers quality data that increases public awareness and leads to action that reduces risk to life and property. As depicted in the following map, the majority of the county is in the special flood hazard areas:

Figure 1.1 RiskMAP Study Status Map, Jasper County



ESRI Fema.gov [Fema.Gov Jasper County Mo]

Figure 1.2 RiskMAP Study Status Map, Newton County



Source: ESRI Fema.gov Fema.Gov Jasper County Mo

Integration of Other Data, Reports, Studies, and Plans

A review of the most current data, reports, studies and Plans relating to hazard mitigation planning in Jasper and Newton County were reviewed in order to provide the latest "snapshot" of existing conditions to inform the development of the 2019 Plan. Local planning documents that were reviewed were the Region G Threat Hazard Risk Assessment (THIRA), the Comprehensive Economic Development Strategy, the South Central Regional Transportation Plan, The State Transportation Plan, and the Jasper and Newton County Local Emergency Operations Plan. Where available, information from these Plans was integrated into the planning meeting discussions and into the Hazard Mitigation Plan narrative itself.

Jasper/Newton County Emergency Operations Plan (EOP)

Jasper/Newton County emergency management is set up along the following functional segments: direction and control; communications and warning; emergency public information; damage assessment; law enforcement; fire and rescue; civil disorder; hazardous materials response; public works; evacuation; in-place sheltering; reception and care; health and medial terrorism response; and resources and supply. This plan also defines lines of succession for the continuity of government operations during a disaster as well as the preservation of records and the logistics of administrative functions such as procedures for obtaining temporary use of facilities. The Jasper and Newton County County Emergency Operations Plan was last updated.

HSTCC maintains and updates annually the Regional Transportation Plan (RTP) as part of a work agreement with the Missouri Department of Transportation. The RTP begins with the statewide Long Range Transportation Plan's goals then refines them to fit the unique nature of the Southwestern region. The local planning process involves prioritization of transportation projects and defining broad transportation improvement strategies, including economic development, safety, and expansion of multimodal opportunities.

Comprehensive Economic Development Strategy (CEDS)
The regional Comprehensive Economic Development Strategy was updated in 2014 following an extensive regional planning process. A current update is currently underway for the year 2019. In 2014, A dozen planning meetings were held throughout the four county region to identify economic development goals and strategies, gain input on the function and effectiveness of the regional planning commission's services, and identify vital economic development projects & programs for every jurisdiction in the region. The CEDS provides detailed information on social and economic data, and an overview of funding programs available to local governments and not-for-profit agencies.

A wide variety of technical data gathered from a number of state and federal agencies was integrated to the 2014 Plan to develop the Risk Assessment portion of the plan. Federal Emergency Management Agency DFIRM maps were utilized to delineate flood hazard areas and at risk structures in the county. NOAA data was used to compile event history for hazard profiles. Data from Missouri Department of Transportation, Missouri Department of Natural Resources, and Missouri Economic Resource Information Center (MERIC) were utilized to define the county's vulnerability to natural hazard events.

National datasets such as the National Agriculture Imagery Program, the National Inventory of Dams, the SILVIS Lab housed at the University of Wisconsin-Madison, and the 2010 U.S. Census were referenced in the updated Risk Assessment.

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

The hazard profiles contained within the 2014 Jasper/Newton County Hazard Mitigation Plan were reassessed during the Kickoff meeting and county-wide planning meeting in February.
During the remainder of the planning meetings in the county, attendees were provided the latest hazard data via the research conducted by SEMCOG The attendees provided to HSTCC their input on hazard events from the DCQs completed by each participating jurisdiction. By consensus the participants identified the natural hazards that are not considered a threat to their own jurisdiction and eliminated those disasters from consideration in the Risk Assessment process. A Hazard Vulnerability Sheet was completed by each participating jurisdiction to help determine the perceived threat faced by their respective jurisdictions for inclusion in the Hazard Mitigation Plan.

Step 5: Assess the Problem: Identify Assets and Estimate Losses
(Handbook Task 5)

Identified assets in the planning area include population, structures, critical facilities and infrastructure, and other important assets that may be at risk to hazards. The inventory of assets for each jurisdiction were derived from GIS layers identified structures by use in the county and the local jurisdiction and school district data collection questionnaires, and FEMA HAZUS-MH Flood Analysis software. Potential losses to existing development were estimated on hazard event scenarios and annualized losses. In most cases the county assessor's valuations were used to estimate structure losses in impacted areas by structure occupancy type. The methodology for estimating losses varies by hazard. Loss estimates are included in each hazard profile contained in the Risk Assessment chapter.

Step 6: Set Goals
(Handbook Task 6)

The Mitigation Planning Committee reviewed the goals from the 2014 Jasper and Newton County Plan during the kickoff planning meeting in February 2019. It was decided that three of the four mitigation goals were still relevant and as a result they were carried over into the new Plan. The fourth, listed as Goal 2 in the previous plan, was considered redundant to Goal 1 and removed. In October 2019, the general public, surrounding communities, and local/regional agencies were invited to review the Jasper-Newton Bi-County Natural Hazard Mitigation Plan draft. The draft was made available in print form at the office of the Harry S Truman Coordinating Council as well as online through the HSTCC website (http://www.hstcc.org). Invitations were sent via mail, email, and print media.

Step 7: Review Possible Mitigation Actions and Activities
(Handbook Task 6)

The Mitigation Planning Committee and representatives from participating jurisdictions reviewed the mitigation actions from the 2014 Plan at the March 15th and March 20th meetings. It was decided that the actions from the previous plan were nebulous and the consensus of the group was that the mitigation actions needed to be more individualized in nature. New actions were identified, potential costs were discussed, lead agencies and staff were identified. Actions were prioritized using the STAPLEE methodology. The FEMA publication Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (January 2013) was used as a primary source to guide the action formulation process. Participants were encouraged to focus on mitigation efforts that could be reasonably be attained in the next five-to-ten years.

Step 8: Draft an Action Plan
(Handbook Task 6)

The MPC reviewed the results of the jurisdiction-specific action identification and discussed the results of the previously completed action prioritization during a conference call work session on May 9th, 2019. Progress in implementing the mitigation actions will be reviewed annually by the regional planner housed at the Harry S Truman Coordinating Council of Governments. Additionally, as potential grant funding becomes available, HSTCC planners will work with the jurisdictions of Jasper/Newton County to develop applications when a viable project arises.

Step 9: Adopt the Plan
(Handbook Task 8)

The 2019 update of the Jasper/Newton County Plan brings a new paradigm in plan adoption. The jurisdictions will be asked to adopt the plan prior to the initial submittal to SEMA in order the streamline the coordination of adoption of the participating jurisdictions. HSTCC planners worked with the governing bodies of the local jurisdictions to facilitate the adoption processes in a timely fashion.

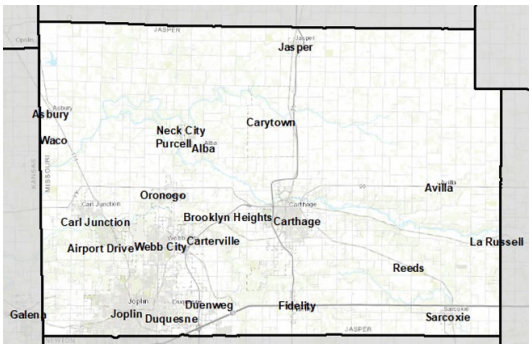
Step 10: Implement, Evaluate, and Revise the Plan
(Handbook Tasks 7 & 9)

During the conference call of the MPC on 5/6, it was decided that the implementation the mitigation actions will be reviewed annually and revised (as needed) by the regional planner housed at the South Central Ozark Council of Governments. Additionally, as potential grant funding becomes available, HSTCC planners will work with the jurisdictions of Jasper and Newton County to develop applications when a viable project arises. The process for Plan Maintenance is detailed in Chapter 5 of this document.

2 PLANNING AREA PROFILE AND CAPABILITIES

2.1 Jasper County Planning Area Profile

Table 3.1 Map of Jasper County



Source: Jasper County

According to the US Census Bureau, the 2019 ACS Population Estimate of Jasper County was 121,328. This represents an estimated increase of 16,642 residents, or 15.9% incline, since the 2000 census. The population growth of the county is similar when compared to the State of Missouri's growth of 542,217 residents (9.5% increase) and the United States' growth of 46,817,617 residents (16.6% increase) during the same time period.

The median household income for Jasper County rose nearly 49% from $32,410 in 2000 to $48,357 in 2019, but family income still lags the state and national figures of $55,461 and $62,843, respectively. The median house value in Jasper County is $118,400. This lagging behind the state's house value of $157,200 and even further behind the country's median value of $217,500.

Source: Census Population Change 2000-2010, Census Quick Facts, https://fred.stlouisfed.org/series/MHIMO29097A052NCEN

2.1.1 Geography, Geology and Topography

Jasper County is in the southwest region of Missouri, laying east of the Kansas border. Most of Jasper County is in the Osage Plains region of the United States with rolling hills and flat prairie land, but about one-third of the county is in the Ozark Border with a hilly topography. This part of Missouri is characterized by one of the most karstic regions in the continental United States. A region with outstanding water resources, numerous springs, sinkholes, losing streams, caves, and hollows. The underground and surface water resources are very much connected because of the karst topography of the county and region. Zinc and lead were heavily mined in both Jasper and Newton County for over a hundred years.

Jasper County is 641.6 square miles, representing 638.49 square miles of land and 1.6 square miles of water. According to the 2017 Census of Agriculture, farmland in Jasper County consists of about 413.3 square miles, 64.4% of total land area in Jasper County. The remaining non-farm acreage in Jasper County is made up of land inside several municipalities—Carthage is the county seat and Joplin is the major city of the county— along with state and federally owned lands, private real estate, roads, highways, and other public properties. Major rivers and creeks include the Spring River, Center Creek, the North Fork of the

Spring River, Dry Creek, White Oak Creek, and Jenkins Creek; drainage is generally to the west. The Spring River watershed in southwest Missouri is an interstate watershed encompassing an area of 2,589 square miles. The headwaters originate in Missouri and generally flow west, downstream into southeast Kansas before joining the Grand Lake O' the Cherokees, a popular and well-known recreational lake in eastern Oklahoma Jasper Counties within the Spring River Watershed include: Alba, Asbury, Avilla, Carl Junction, Carterville, Carthage, and Carytown.

Source: NRCS Soil Survey, 2017 Census of Agriculture, MDNR Spring River Watershed

2.1.2 Climate

Jasper County has a warm humid temperate climate with hot summers and no dry season; the winters are moderately cool. Jasper County's average annual temperature is 57°F. On average, the hottest month of the year is July, with a mean temperature of 79.1°F; the coldest month is January, with a mean temperature of 33°F for Jasper. Annual precipitation averages 46.38 inches and snowfall averages 10.11 inches. Source: Jasper CO.

2.1.3 Population/Demographics

Table 2.1. Jasper County Population 2000-2019 by Jurisdiction

Jurisdiction	2000 Population	2010 Population	2019 Annual Population Estimate or ACS Population	# Change (2010-2019)	% Change (2010-2019)
Jasper County	104,686	117,404	121,328	+16,642	15.9%
City of Alba	588	530	681	+93	15.8%
City of Asbury	218	207	279	+61	28%
City of Carl Junction	5,294	7,445	8,072	+2,778	52.5%
City of Carterville	1,850	1,891	2,253	+403	21.8%
City of Carthage	12,668	14,502	14,708	+2,040	16.1%
City of Duenweg	1,034	1,121	1,384	+350	33.8%
City of Duquesne	1,640	1,763	1,185	-455	-27.7%
Village of Fidelity	252	257	269	+16	6.7%
City of Jasper	x	879	920	+41	4.7%
City of Neck City	119	186	161	+42	35.3%
City of Oronogo	976	2,381	2,609	+1,633	167.3%
City of Sarcoxie	1,354	1,341	1,682	+328	24.2%
City of Waco	86	87	67	-19	-22.1%

Source: U.S. Bureau of the Census, Decennial Census, annual population estimates/ 5-Year American Community Survey 2019;
*population includes the portions of these cities in adjacent counties

As of the 2019 ACS estimate, in Jasper County there were 52,254 household units out of which 27.4% had children under the age of 18 living with them, 52% were married couples living together, 21% had a female householder with no husband present, and 19% were non-families. 27.9% of all households were made up of individuals and 12% had someone living alone who was 65 years of age or older. The average household size was 2.57 and the average family size was 3.12.

Within Jasper County, 6.6% of the population is under the age of 5 and 16% is over 65. Both numbers are close to the state's averages, 6% under 5 and 17.3% over 65, and the nations averages of 6% under 5 and 16.5% over 65. Jasper County also has roughly 45,759 households with an average of 2.57 persons per household, which this number is also very close to state and national averages of 2.46 and 2.62, respectively.

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

Table 2.2. Unemployment, Poverty, Education, and Language Percentage Demographics,

Jasper, Missouri

Jurisdiction	Total in Labor Force	Percent of Population Unemployed	Percent of Families Below the Poverty Level	Percentage of Population (High School graduate)	Percentage of Population (Bachelor's degree or higher)	Percentage of population with spoken language other than English
Jasper County	59,580	3.3%	12.4%	86.7%	23.6%	7.6%
City of Alba	337	0.0%	4.5%	88.8%	16.4%	0.0%
City of Asbury	125	0.9%	9.2%	81.0%	16.9%	1.5%
City of Carl Junction	3,539	1.3%	7.6%	91.8%	35.6%	1.5%
City of Carterville	1,088	3.1%	14.8%	78.2%	7.2%	1.6%
City of Carthage	6,587	3.8%	21.8%	74.0%	17.7%	29.9%
City of Duenweg	780	4.3%	16.7%	87.8%	18.2%	4.2%
City of Duquesne	1,091	1.6%	9.4%	90.0%	23.2%	6.7%
Village of Fidelity	137	2.8%	10.4%	80.5%	10.8%	1.2%
City of Jasper	454	X	X	47.5%	9.4%	1.5%
City of Neck City	75	0.0%	12.0%	88.0%	6.5%	0.7%
City of Oronogo	1,408	3.6%	3.7%	94.3%	33.3%	3.8%
City of Sarcoxie	875	5.3%	7.5%	82.3%	9.3%	0.5%
City of Waco	32	0.0%	22.2%	86.8%	24.5%	3.1%
Missouri	3,074,639	2.9%	9.4%	89.9%	29.2%	6.3%
USA	164,629,492	3.4%	9.5%	88.0%	32.1%	21.6%

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates.

2.1.4 History

Jasper County was established in 1838 when a reorganization of the territory prompted the splitting of the larger Barry County into four separate areas: Jasper, Newton, Barry, and Dade. The four regions remained tied together until 1841 when the Missouri Legislature passed a bill separating the four into independent counties. On March 28, 1842, the Court adopted the site of Carthage as the permanent county seat.

Soon after the county's inception, the Civil War brought turmoil and division to the county. There were several skirmishes within the area. After the Civil War, development began to flow into the surrounding counties when railroads tied together the region. Over the past century, the population of Jasper has steadily increased as it grew from a collection of small mining towns into what it is today. Since 1900, the population of Jasper County has more than doubled its size. Like the county itself, many jurisdictions within the counties have also seen growth, but several small communities have experienced population decreases—all locations with less than 1,000 people. Joplin remains to be the biggest city with a population of over 50,000.

Senior High School opened in 1885. From 1934 to 1956 Joplin had two public high schools: Joplin Senior High School and Lincoln High School, which offered African American students a high school education. Following Brown v. Board of Education, Lincoln High School students integrated with Joplin Senior High School students and attended school together. On May 22, 2011 Joplin was hit by an F5 tornado, which left a chunk of Joplin—including the high school—in despair. 162 people died during this tragic accident. In September of 2014, the new state-of-the art Joplin High School and Franklin Technology Center opened. The tornado's devastating impacts are still seen throughout Joplin today.

Source: Jaspercounty.org, Joplin School History

2.1.5 Occupations

Table 2.3. Occupation Statistics, Jasper 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
Jasper County	31.0%	18.0%	22.9%	8.9%	19.2%
City of Alba	25.8%	22.0%	18.7%	6.5%	27.0%
City of Asbury	30.1%	7.3%	17.9%	13.8%	30.9%
City of Carl Junction	46.4%	14.3%	21.5%	5.6%	12.2%
City of Carterville	18.6%	18.4%	25.1%	17.5%	20.4%
City of Carthage	20.3%	21.8%	22.0%	12.8%	23.2%
City of Duenweg	26.3%	19.1%	26.5%	6.7%	21.4%
City of Duquesne	32.5%	15.8%	28.0%	9.1%	14.6%
Village of Fidelity	25.2%	22.9%	24.4%	13.7%	13.7%
City of Jasper	22.8%	4.5%	26.4%	17.1%	29.2%
City of Neck City	21.3%	13.3%	10.7%	29.3%	25.3%
City of Oronogo	36.5%	14.4%	24.3%	7.2%	17.6%
City of Sarcoxie	19.7%	21.0%	18.3%	4.5%	36.6%
City of Waco	37.5%	12.5%	9.4%	25.0%	15.6%

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates.

2.1.6 Agriculture

According to the 2017 Census of Agriculture County Profile, Jasper County is home to 1,315 farms, consisting of 264,509 acres. The number of farms in the county has decreased by 1% since the 2012 Census of Agriculture. The average farm size is 201 acres. The total market sales for farms in Jasper County in 2017 was $97,24 and the average market value of products sold per farm is $73,947, a 4% decrease in value from 2012. The top crops in the county are soybeans for beans, forage (hay/haylage), and corn for grain and wheat for grain. The top livestock items are turkeys and cattle and calves.

2.1.7 FEMA Hazard Mitigation Assistance (HMA) Grants in Planning Area

Table 2.4. Jasper County FEMA HMA Grants in County from 1993-2019

Disaster Declaration	Project Type	Sub-Grantee	Date Approved	Project Total
DR-1980-0016-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-07-30	$1,401,325.00
DR-1980-0007-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-06-11	$1,401,325.00
DR-1980-0046-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb City R-7 Schools	2015-07-13	$1,423,525.00
DR-1980-0077-R	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine	Joplin	2018-03-05	$1,421,689.00
DR-1980-0011-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-08-07	$126,640.00
DR-1980-0017-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2018-03-02	$1,413,325.00
DR-1980-0012-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-05-20	$9,500.00
DR-1980-0020-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-07-30	$1,509,325.00
DR-1980-0030-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Sarcoxie Superintendent	2015-08-06	$1,386,625.00
DR-1980-0087-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	MSSU	2014-05-13	$1,116,291.00

DR-1980-0043-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb CityRr-7 Schools	2015-07-07	$1,853,734.00
DR-4250-0011-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Carthage IX School	2020-01-06	$1,460,137.00
DR-4317-0034-R	200.1: Acquisition of Private Real Property (Structures and Land) - Riverine	Jasper (county)	2018-07-23	$3,500,000.00
DR-1980-0004-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2015-12-16	$415,380.00
DR-1980-0008-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-05-20	$3,172,521.00
DR-1980-0039-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Avilla R-XIII School	2015-12-22	$1,473,325.00
DR-1980-0042-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb City R-7 Schools	2015-01-21	$1,062,740.00
DR-1980-0018-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2014-11-18	$4,178,684.00
DR-1980-0005-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2012-07-20	$9,500.00
DR-1980-0013-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2014-01-22	$1,156,525.00
DR-1980-0031-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Sarcoxie Superintendent	2014-05-05	$1,301,610.00
DR-1980-0048-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb City R-7 Schools	2015-07-07	$1,374,865.00
DR-1847-0006-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Crowder College	2013-05-02	$1,345,477.00
DR-1980-0082-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb City R-7 Schools	2015-12-01	$1,533,881.00
DR-1980-0014-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2014-01-22	$1,896,337.00
DR-1822-0005-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Jasper R-5 School District	2013-07-31	$1,376,430.00
DR-1980-0006-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2015-10-19	$1,264,070.00
DR-1980-0010-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2015-07-28	$1,262,125.00
DR-1980-0015-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-06-13	$1,437,325.00
DR-1980-0041-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb City R-7 Schools	2015-06-19	$1,929,325.00
DR-1412-0006-F	602.1: Other Equipment Purchase and Installation	Duenweg	2007-10-10	$1,858,071.00
DR-1980-0049-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Webb City R-7 Schools	2015-08-05	$6,500.00
DR-1980-0009-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Joplin Schools	2013-05-20	$1,729,124.00
Total				**$47,915,256.00**

Source: Federal Emergency Management Agency, 2019

2.1.8 FEMA Public Assistance (PA) Grants in Planning Area

Table 2.5. FEMA PA Grants in County from 1993-2019

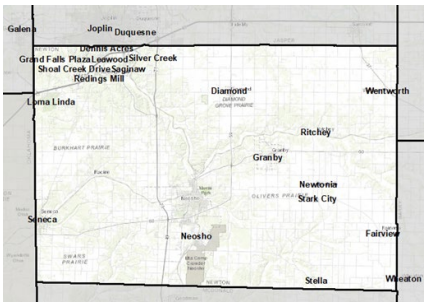
Disaster Date	Project Type	Sub-Grantee	Date of Approval	Project Total
06-05-2003	Severe Storm(s)	Carl Junction	01-06-2020	$977,092.00
06-05-2003	Severe Storm(s)	Carl Junction	01-06-2020	$2,737.50
06-05-2003	Severe Storm(s)	Carl Junction	01-06-2020	$ 750.00
06-05-2003	Severe Storm(s)	Carl Junction	01-06-2020	$ 54,177.10
06-05-2003	Severe Storm(s)	Carthage	01-06-2020	$2,108.93
06-05-2003	Severe Storm(s)	Jasper County	06-15-2020	$26,853.04
06-05-2003	Severe Storm(s)	Joplin Special Roads District	06-15-2020	$3,622.93
12-23-2007	Severe Ice Storm	ALBA, CITY OF	06-15-2020	$22,542.17
12-23-2007	Severe Ice Storm	ASBURY, CITY OF	06-15-2020	$13,172.63
12-23-2007	Severe Ice Storm	CARL JUNCTION, CITY OF	06-15-2020	$198,790.7
12-23-2007	Severe Ice Storm	CARTERVILLE, CITY OF	06-15-2020	$54,802.7
12-23-2007	Severe Ice Storm	CARTHAGE SPECIAL ROADS DISTRICT	06-15-2020	$80,953.28

12-23-2007	Severe Ice Storm	CARTHAGE WATER & ELECTRIC	06-15-2020	$275,364.00
12-23-2007	Severe Ice Storm	CARTHAGE, CITY OF	06-15-2020	$385,200.10
12-23-2007	Severe Ice Storm	DUQUESNE, CITY OF	06-15-2020	$98,020.32
12-23-2007	Severe Ice Storm	DUENWEG, CITY OF	06-15-2020	$23,730.05
12-23-2007	Severe Ice Storm	HAMPSHIRE TERRACE, INC.	06-15-2020	$3,408.75
12-23-2007	Severe Ice Storm	JASPER COUNTY	06-15-2020	$237,817.2
12-23-2007	Severe Ice Storm	JASPER COUNTY SHELTERED	06-15-2020	$1,767.59
12-23-2007	Severe Ice Storm	JASPER HOMES, INC.	06-15-2020	$2,115.00
12-23-2007	Severe Ice Storm	JASPER R-5 SCHOOL DISTRICT	06-15-2020	$750.00
12-23-2007	Severe Ice Storm	JOPLIN SPECIAL ROADS DISTRICT	06-15-2020	$47,862.81
12-23-2007	Severe Ice Storm	JASPER, CITY OF	06-15-2020	$102,163.40
12-23-2007	Severe Ice Storm	MISSOURI SOUTHERN STATE	06-15-2020	$72,259.46
12-23-2007	Severe Ice Storm	NECK CITY, CITY OF	06-15-2020	$17,053.67
12-23-2007	Severe Ice Storm	JOPLIN, CITY OF	06-15-2020	$152,238.00
12-23-2007	Severe Ice Storm	WEBB CITY, CITY OF	06-15-2020	$73,6972.70
Total				**9,853,435.30**

Source: Federal Emergency Management Agency, Date

2.2 Newton County Planning Area Profile

Table 3.2 Map of Newton County



Source: Newton County

According to the US Census Bureau, the 2019 ACS Population Estimate of Newton County was 58,236. This represents an estimated increase of 5,600 residents, or a 10% incline since the 2000 Census. The population growth of the county is similar when compared to the State of Missouri's growth of 542,217 residents (9.5% increase) and the United States' growth of 46,817,617 residents (16.6% increase) during the same time period. The median household income for Newton County rose 43.5% from $35,415 In 2000 to $50,813 in 2019, but family income still lags behind the state and national figures of $55,461 and $62,843, respectively. The median house value in Jasper County is $118,400. This lagging behind the state's house value of $131,300 and even further behind the country's median value of $217,500.

Source: Census Population Change 2000-2010, Census Quick Facts, FRED Economic Research

2.2.1 PGeography, Geology and Topography

Newton County is in the southwest region of Missouri, laying east of Oklahoma on the western fringe of the Ozark region. This part of Missouri is characterized by one of the most karstic regions in the continental United States. A region with outstanding water resources, numerous springs, sinkholes, losing streams, caves, and hollows. The underground and surface water resources found in Newton is very much connected as a result of the karst topography of the county and region. Zinc and lead were heavily mined in both Jasper and Newton County for over a hundred years.

Newton County is 627 square miles, representing 625 square miles of land and 1.8 square miles of water. According to the 2017 Census of Agriculture, farmland in Newton County consists of about 408.4 square miles, 65.1% of total land area in Newton County. The remaining non-farm acreage in Jasper County is made up of land inside several municipalities—Neosho is the county seat and the largest town—along with state and federally owned lands, private real estate, roads, highways and other public properties. The Spring River watershed in southwest Missouri is an interstate watershed encompassing an area of 2,589 square miles. The headwaters originate in Missouri and generally flow west, downstream into southeast Kansas before joining the Grand Lake O' the Cherokees, a popular and well-known recreational lake in eastern Oklahoma Jasper Counties within the Spring River Watershed include: Diamond, Granby, Loma Linda, Neosho, Newtonia, Ritchey, Saginaw and Wentworth. Source: 2017 Census of Agriculture, Newton Soil Survey, MDNR Spring River Watershed

2.2.2 Climate

Newton County has a warm humid temperate climate with hot summers and no dry season; the winters are moderately cool. Newton County's annual temperature is 57.2°F. On average, the hottest

month of the year is July, with a mean temperature of 78.8 °F and the coldest month on average is January, with mean temperature of 33.5°F. Annual precipitation averages 45.54 inches in Newton County; snowfall averages 10.2 inches. Source: Newton CO.

2.2.3 Population/Demographics

Table 2.6. Newton County Population 2000-2019 by Jurisdiction

Jurisdiction	2000 Population	2010 Population	2019 Annual Population Estimate or ACS Population	# Change (2010-2019)	% Change (2010-2019)
Newton County	52,636	58,114	58,236	+5,600	10.6%
City of Diamond	808	902	874	+66	8.2%
City of Granby	2,121	2,134	2,047	-74	-3.5%
Village of Leawood	904	682	646	-258	-28.5%
City of Neosho	10,505	11,835	11,990	+1,485	14.1%
City of Seneca	2,135	2,336	2,490	+355	16.6%
Village of Stark City	156	139	119	-37	-23.7%
Village of Wentworth	141	151	134	-7	-5%

Source: U.S. Bureau of the Census, Decennial Census, annual population estimates/ 5-Year American Community Survey 2019;
*population includes the portions of these cities in adjacent counties

As of the 2019 ACS estimate, Newton County had 22,202 total households out of which 22.7% had children under the age of 18 living with them, 56.8% were married couples living together, 22.3% had a female householder with no husband present, and 10.5% were householder living alone. Of the percentage living alone, 3.7% was 65 years of age or older. Within Newton County, 6.1% of the population is under the age of 5 and 18.4% is over 65. Both numbers are close to the state's averages, 6% under 5 and 17.3% over 65, and the nations averages of 6% under 5 and 16.5% over 65. Newton County also has roughly 22,202 households with an average household size of 2.57—this number is also very close to state and national averages of 2.46 and 2.62, respectively.

Table 2.7. Unemployment, Poverty, Education, and Language Percentage Demographics, Newton County, Missouri

Jurisdiction	Total in Labor Force	Percent of Population Unemployed	Percent of Families Below the Poverty Level	Percentage of Population (High School graduate)	Percentage of Population (Bachelor's degree or higher)	Percentage of population with spoken language other than English
Newton County	9,543	7.1%	17%	82.3%	13.8%	1.9%
City of Diamond	672	8.9%	31.9%	82.1%	19.9%	0.4%
City of Granby	849	13.8%	24.2%	81.9%	13.5%	1.1%
Village of Leawood	596	9.7%	21.8%	77.5%	6.3%	2.1%
City of Neosho	29	7.7%	16.3%	86.7%	31.7%	0.1%
City of Seneca	302	3.6%	13.3%	76.3%	10%	0.2%
Village of Stark City	260	8.5%	25.6%	87.5%	19.1%	0.4%
Village of Wentworth	3,005,604	8.4	11.1	88.0	26.7	6.1
Missouri	3,074,639	2.9%	9.4%	89.9%	29.2%	6.3%
USA	164,629,492	3.4%	9.5%	88.0%	32.1%	21.6%

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates.

2.2.4 History

Newton County was collectively established in 1838 when a reorganization of the territory prompted the splitting of the larger Barry County into four separate areas: Jasper, Newton, Barry, and Dade. The four regions remained tied together until 1841 when the Missouri Legislature passed a bill separating the four into independent counties. Newton County was thus established as independent entity and named after a Revolutionary War hero, Newton John Newton. The county seat is Neosho.

Soon after the counties' inception, the Civil War brought turmoil and division to the county. There were several skirmishes in the area, a famous one being the Battle of Carthage. After the Civil War, development began to flow into the area when the Atlantic and Pacific Railroad (now the Burlington Northern Sante Fe – BNSF Railroad) brought a continental connection to the region. Other railroads subsequently entered the county, and development and business has followed national and global trends ever since.

Over the past century, the population of Newton County has steadily increased, with significant growth taking place from 1980 – 2018. Since 1900, the population of Newton County has steadily increased, more than doubling its size. Many jurisdictions within the counties have also seen growth. Several small communities have experienced population decreases, all locations with less than 1,000 people. Source: Newton County

2.2.5 Occupations

Table 2.8. Occupation Statistics, Newton 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
Newton County	28.6%	16.1%	22.8%	10.9%	21.6%
City of Diamond	24.7%	13.9%	23.5%	13.0%	24.9%
City of Granby	19.4%	15.9%	27.6%	8.8%	28.3%
Village of Leawood	50.3%	18.6%	21.7%	3.8%	5.7%
City of Neosho	23.6%	18.3%	22.4%	11.0%	24.7%
City of Seneca	26.8%	29.9%	17.7%	8.6%	17.0%
Village of Stark City	15.8%	13.2%	13.2%	5.3%	52.6%
Village of Wentworth	20.5%	19.2%	23.1%	16.7%	20.5%

Source: U.S. Census, 2019 American Community Survey, 5-year Estimates.

2.2.6 Agriculture

According to the 2017 Census of Agriculture, Newton County is home to 1,588 farms, consisting of 261,359 acres. The average farm size is 165 acres. The number of farms in the county has increased by 1% since the 2012 Census of Agriculture: the average size of farm increasing by 5% since 2012. The total market value of products sold is $245,996,000—$154,909 per farm on average, which is a 3% decrease since 2012. The top crop in the county is Forage (hay/haylage), the top livestock item is Broilers and other meat-type chickens. Source: Census of Agriculture

2.2.7 FEMA Hazard Mitigation Assistance (HMA) Grants in Planning Area

Table 2.9. Newton County FEMA HMA Grants in County from 1993-2019

Disaster Declaration	Project Type	Sub-Grantee	Date Approved	Project Total
DR-1412-0009-R	200.1: Acquisition of Private Real Property (Structures	Neosho	2009-10-22	$45,965.00
DR-1822-0009-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	EAST NEWTON VI	2014-09-04	$1,140,729.00
DR-1980-0044-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	NEOSHO	2015-01-21	$1,552,728.00
DR-1980-0073-R	206.2: Safe Room (Tornado and Severe Wind Shelter) - Public Structures	DIAMOND R-4 SCHOOL SUPT'S OFC	2016-07-20	$2,113,049.00
DR-1980-0045-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	NEOSHO	2014-12-09	$3,878,412.00
DR-1403-0002-R	200.1: Acquisition of Private Real Property (Structures	Neosho	2007-02-06	$164,866.00
DR-1676-0004-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	SENECA VII SCHOOL	2012-02-08	$1,982,997.00
DR-1980-0047-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	NEOSHO	2014-12-09	$1,275,520.00
DR-1673-0006-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	Newton (County)	2011-04-26	$250,613.00
DR-0995-0036-R	200.1: Acquisition of Private Real Property (Structures	NEOSHO	1994-06-29	$1,580,315.00
DR-1676-0003-R	206.2: Safe Room (Tornado and Severe Wind Shelter)	CROWDER COLLEGE	2008-10-27	$2,909,282.00
FMA-PJ-07-MO-	200.1: Acquisition of Private Real Property (Structures	Newton County Missouri	2020-09-09	$180,952.50
Total				**$17,075,428.50**

2.2.8 FEMA Public Assistance (PA) Grants in Planning Area

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

Disaster Date	Project Type	Sub-Grantee	Date of Approval	Project Total
12-27-2007	Severe Ice Storm	NEOSHO, CITY OF	06-15-2020	$18,690.00
12-27-2007	Severe Ice Storm	REDINGS MILL, VILLAGE	06-15-2020	$4,783.13
12-27-2007	Severe Ice Storm	SHOAL CREEK DRIVE, VILLAGE OF	06-15-2020	$4,912.50
12-27-2007	Severe Ice Storm	SAGINAW (VILLAGE OF)	06-15-2020	$6,750.00
12-27-2007	Severe Ice Storm	SENECA, CITY OF	06-15-2020	$26,470.40
12-27-2007	Severe Ice Storm	SILVER CREEK, VILLAGE OF	06-15-2020	$16,830.00
12-27-2007	Severe Ice Storm	LEAWOOD, VILLAGE OF	06-15-2020	$3,835.39
12-27-2007	Severe Ice Storm	LEAWOOD, VILLAGE OF	06-15-2020	$5,550.00
Total				**87,820.31**

Source: Federal Emergency Management Agency, Date

Source: FEMA, 2019

2.3 Jurisdictional Profiles and Mitigation Capabilities

2.3.1 Unincorporated Jasper County

Jasper County's jurisdiction includes all unincorporated areas within the county boundaries and functions through its County Commissions, a three-member board with final authority; Jasper County

operates as a first-class county. The Commission consists of a Presiding Commissioner, an Eastern District Commissioner, and a Western District Commissioner. Jasper County's county seat is in Carthage. The County's elected governing body, the Board of County Commissioners, directs the general administration of County Government. The Commission allocates funds, approves and amends annual budget, approves all general revenue and road and bridge expenditures, maintains County roads and bridges, maintains County buildings, is involved with environmental concerns, purchasing, emergency Management, general services, purchase and maintenance of all County vehicles, and appoints citizens to various boards. The departments of the County government include:

- Board of Commissioners
- County Assessor
- County Auditor
- County Circuit Clerk
- County Collector
- County Coroner
- County Clerk
- County Prosecuting Attorney
- County Public Administrator
- County Recorder of Deeds
- County Sheriff
- County Treasurer

Mitigation Initiatives/Capabilities

The county can administer county structures, infrastructure, and finances. In addition, it also has the authority to administer a master plan, zoning codes, subdivision regulations, floodplain, and stormwater regulations, but has no authority over building regulations. Staff capabilities to mitigate the impact of natural hazards include the local emergency management officials and local law enforcement members who are involved in mitigation planning, response, and recovery processes. Efforts in coordinating with local government officials and cooperating with private organizations to 1) prevent avoidable disasters and reduce the vulnerability of the residents to any disaster that may strike; 2) establish capabilities for protecting citizens from the effects of disasters; 3) respond effectively to the actual occurrences of disasters; and 4) provide for recovery in the aftermath of any emergency involving extensive damage within the county. The Emergency Management Director (EMD) is responsible for the development and maintenance of the Local Emergency Operations Plan. Jasper County has a Local Emergency Planning Committee and a Storm Water Management Plan, with over 43 tornado sirens and numerous public storm shelters within the county.

Table 2.11. provides information about the mitigation capabilities and policies for the unincorporated county based on responses from the Mitigation Planning Data Collection Questionnaire.

Table 2.1. Unincorporated Jasper County Mitigation Capabilities

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y
Builder's Plan	Y
Capital Improvement Plan	Y
City Emergency Operations Plan	Y
County Emergency Operations Plan	Y
Local Recovery Plan	Y
County Recovery Plan	Y
City Mitigation Plan	Y
County Mitigation Plan	Y
Debris Management Plan	Y
Economic Development Plan	Y
Transportation Plan	Y
Land-use Plan	Y
Flood Mitigation Assistance (FMA) Plan	Y
Watershed Plan	Y
Firewise or other fire mitigation plan	Y
School Mitigation Plan	Y
Critical Facilities Plan (Mitigation/Response/Recovery)	Y
Policies/Ordinance	
Zoning Ordinance	N
Building Code	N
Floodplain Ordinance	Y
Subdivision Ordinance	N
Tree Trimming Ordinance	N
Nuisance Ordinance	N
Stormwater Ordinance	N
Drainage Ordinance	N
Site Plan Review Requirements	N
Historic Preservation Ordinance	Y
Landscape Ordinance	N
Seismic Construction Ordinance	N
Program	
Zoning/Land Use Restrictions	N
Codes Building Site/Design	N
Hazard Awareness Program	Y
National Flood Insurance Program (NFIP)	Y: Clayton Cristy
NFIP Community Rating System (CRS) program	Y
National Weather Service (NWS) Storm Ready	Y
Firewise Community Certification	N
Building Code Effectiveness Grading (BCEGs)	N
ISO Fire Rating	Y

Capabilities	Status Including Date of Document or Policy
Economic Development Program	Y
Land Use Program	N
Public Education/Awareness	Y
Property Acquisition	N
Planning/Zoning Boards	N
Stream Maintenance Program	Y
Tree Trimming Program	Y
Engineering Studies for Streams (Local/County/Regional)	Y
Mutual Aid Agreements	Y
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	Y
Hazard Analysis/Risk Assessment (County)	Y
Flood Insurance Maps	Y
FEMA Flood Insurance Study (Detailed)	Y
Evacuation Route Map	Y
Critical Facilities Inventory	Y
Vulnerable Population Inventory	Y
Land Use Map	Y
Staff/Department	
Building Code Official	N
Building Inspector	N
Mapping Specialist (GIS)	Y
Engineer	Y
Development Planner	N
Public Works Official	Y
Emergency Management Director	Y
NFIP Floodplain Administrator	Y
Emergency Response Team	Y
Hazardous Materials Expert	Y
Local Emergency Planning Committee	Y
County Emergency Management Commission	Y
Sanitation Department	Y
Transportation Department	N
Economic Development Department	Y
Housing Department	N
Historic Preservation	Y
Non-Governmental Organizations (NGOs)	
American Red Cross	Y
Salvation Army	Y
Veterans Groups	Y
Local Environmental Organization	Y
Homeowner Associations	N
Neighborhood Associations	Y
Chamber of Commerce	Y
Community Organizations (Lions, Kiwanis, etc.)	Y

Capabilities	Status Including Date of Document or Policy
Local Funding Availability	
Apply for Community Development Block	Y
Fund projects through Capital	Y
Authority to levy taxes for a specific purpose	Y
Fees for water, sewer, gas, or electric services	Y
Impact fees for new development	Y
Ability to incur debt through general obligation bonds	Y
Ability to incur debt through special tax bonds	Y
Ability to incur debt through private activities	Y
Withhold spending in hazard prone areas	Y

Source: Data Collection Questionnaire, 2020

2.3.2 City of Alba

The City of Alba is centrally located in Jasper County, north of Missouri State Highway 96. The governing body of Alba includes the Mayor and city council members. Alba's population grew between the years 2000 and 2019, with an estimated 15.8% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 681. City departments include:

- Mayor, Council
- Water, Sewer
- Jasper County Sheriff's Department
- Tri-City Fire Department

According to 2019 Estimates, the median year built for structures in in Alba is 1970-1979. Additionally, 15% of the population has a disability, with 55.6% of those over 65 having a disability. The median household income was $42,656. Alba participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by the City have been limited since 2016. Alba was awarded a HMGP grant to install new safe rooms and expand storm sirens. Mitigation capabilities in Alba include:

- Storm shelters
- Several storm sirens
- Mutual aid agreements with local fire and law enforcement

Table 2.2. City of Alba Mitigation Capabilities – participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	

Capability	Status Including Date of Document or Policy
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	Y
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	N
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	

Capability	Status Including Date of Document or Policy
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.3 City of Asbury

The City of Asbury is in the northeast portion of Jasper County along Missouri State Highway 171. The governing body of Asbury includes the Mayor and city council members. Asbury's population has increased between the years 2000 and 2019, showing an estimated 28% increase in city residents. The 2019 ACS estimates indicate that Asbury's current population is 279. City departments include:

- Mayor, Council
- Water, Sewer
- Jasper County Sheriff's Department

- Asbury Fire Protection District

According to 2019 Estimates, the median year built for structures in in Asbury is 1939 or earlier. Additionally, 21.5% of the population were over the age of 65, median household income was $43,214, and 9.2% of the families in Asbury were living below the poverty level.

Mitigation capabilities in Asbury include:

- Mutual aid agreements with local fire and law enforcement

Table 2.3. City of Asbury Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	S-2/21/1976; Charla Geller
NFIP Community Rating System (CRS) Participating Community	

Capability	Status Including Date of Document or Policy
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	

Capability	Status Including Date of Document or Policy
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.4 City of Carl Junction

The City of Carl Junction is located in the western portion of Jasper County, slightly west of Missouri State Highway 171. The governing body of Carl Junction includes a Mayor and 8 city council members. Carl Junction's population has increased significantly between the years 2000 and 2019, showing an estimated 52.5% increase in city residents. The 2019 ACS estimates indicate that the city's population is 8,072 persons. Carl Junction participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by the City have been limited since 2016. City departments include:

- Mayor, Administrator, Council
- City Administration
- Water, Sewer
- Municipal Court
- Parks and Recreation
- Carl Junction Fire and Police Department

According to 2019 Estimates, 23.4% of houses were built between 1970-1979. Additionally, 13.3% of the population were over the age of 65, of which 25.2% had a disability. The median household income was $66,144, and 7.6% of the families in Carl Junction were living below the poverty level. Carl Junction mitigation capabilities include:

- Mutual aid agreements with local fire and law enforcement

Table 2.4. City of Carl Junction Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y, 2020
Builder's Plan	N
Capital Improvement Plan	N
Local Emergency Plan	Y, 2014 – AMENDED 2019
County Emergency Plan	N/A
Local Recovery Plan	N
County Recovery Plan	N/A
Local Mitigation Plan	N
County Mitigation Plan	N
Local Mitigation Plan (PDM)	N
County Mitigation Plan (PDM)	N/A
Economic Development Plan	N
Transportation Plan	Y
Land-use Plan	Y, 2020 – PART OF COMP PLAN
Flood Mitigation Assistance (FMA) Plan	N
Watershed Plan	N
Firewise or other fire mitigation plan	N
School Mitigation Plan	UNK

Capability	Status Including Date of Document or Policy
Critical Facilities Plan (Mitigation/Response/Recovery)	N
Policies/Ordinance	
Zoning Ordinance	Y
Building Code	Y, 2018
Floodplain Ordinance	Y, 2006
Subdivision Ordinance	Y
Tree Trimming Ordinance	Y
Nuisance Ordinance	Y
Storm Water Ordinance	Y
Drainage Ordinance	Y
Seismic Construction Ordinance	N
Capability	
Site Plan Review Requirements	Y
Historic Preservation Ordinance	N
Landscape Ordinance	N
Iowa Wetlands and Riparian Areas Conservation Plan	N/A
Debris Management Plan	Y, 2014 – AMENDED 2019
Program	
Zoning/Land Use Restrictions	Y
Codes Building Site/Design	Y
National Flood Insurance Program (NFIP) Participant	Y: Charla Geller
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	Y
National Weather Service (NWS) Storm Ready	N
Building Code Effectiveness Grading (BCEGs)	N
ISO Fire Rating	N
Economic Development Program	N
Land Use Program	Y
Public Education/Awareness	Y
Property Acquisition	N
Planning/Zoning Boards	Y
Stream Maintenance Program	N
Tree Trimming Program	Y
Engineering Studies for Streams (Local/County/Regional)	N
Mutual Aid Agreements	Y, POLICE
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	N
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	N/A
FEMA Flood Insurance Study (Detailed)	N/A
Evacuation Route Map	N/A
Critical Facilities Inventory	Y
Vulnerable Population Inventory	N
Land Use Map	Y
Staff/Department	
Building Code Official	Y, FULL TIME
Building Inspector	Y, FULLTIME
Mapping Specialist (GIS)	N
Engineer	Y, CONTRACT
Development Planner	Y, FULL TIME
Public Works Official	Y, FULL TIME
Emergency Management Coordinator	Y, FULL TIME

Capability	Status Including Date of Document or Policy
NFIP Floodplain Administrator	Y
Emergency Response Team	Y
Hazardous Materials Expert	N
Local Emergency Planning Committee	Y
County Emergency Management Commission	N/A
Sanitation Department	N
Transportation Department	Y
Economic Development Department	N
Housing Department	N
Historic Preservation	N
Non-Governmental Organizations (NGOs)	
American Red Cross	N
Salvation Army	N
Veterans Groups	Y
Environmental Organization	N
Homeowner Associations	N
Neighborhood Associations	N
Chamber of Commerce	Y
Community Organizations (Lions, Kiwanis, etc.	Y, Lions, OES
Local Funding Availability	
Ability to apply for Community Development Block Grants	Y
Ability to fund projects through Capital Improvements funding	Y
Authority to levy taxes for a specific purpose	Y
Fees for water, sewer, gas, or electric services	Y
Impact fees for new development	N
Ability to incur debt through general obligation bonds	Y
Ability to incur debt through special tax bonds	Y
Ability to incur debt through private activities	Y
Ability to withhold spending in hazard prone areas	N

Source: Data Collection Questionnaire, 2020

2.3.5 City of Carterville

Carterville is centrally located in Jasper County, along US Route 66. The governing body of Carterville includes the mayor and 8 city council members. Carterville's population grew between the years 2000 and 2019, with an estimated 21.8% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population was 2,253. City departments include:

- Mayor, Council
- Water, Sewer
- Carterville Police Department
- Carterville Fire Department

According to 2019 Estimates, the median year built for structures in in Carterville is 1939 or earlier or 1970-1079. Additionally, 15.7% of the population has a disability, 11.8% over 65 and with 40.1% of those over 65 have a disability. The median household income was $40,238 and 18.15 of families were under the national poverty level. Carterville participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Carterville have been limited since 2016.

Carterville was awarded a HMGP grant to build a community storm shelter at the elementary school and added backup generators the police department and waterworks. Mitigation capabilities in Carterville include:

- Mutual aid agreements with local fire and law enforcement

Table 2.5. City of Carterville Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	Y
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	Y
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	Y: William L. Cline
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	

Capability	Status Including Date of Document or Policy
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	

Capability	Status Including Date of Document or Policy
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.6 City of Carthage

The City of Carthage is centrally located in Jasper County, on of State Highway 96 and east of I-49 and is the county seat for Jasper County. The governing body of Carthage includes the mayor and city council members. Carthage's population grew between the years 2000 and 2019, with an estimated 16.1% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 14,708. City departments include:

- Mayor, Council
- City Administration
- Public safety
- Municipal Courts
- Public Works
- Parks and Recreation
- Water, Sewer, Electric
- Carthage Fire and Police Departments

According to 2019 Estimates, the median year built for structures in in Carthage is 1939 or earlier. Additionally, 29.9% of the population speaks another language than English at home, 13% over 65 and with 37.6% of those over 65 having a disability. The median household income was $41,226, 21.9% of families were under the poverty level. Carthage participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Carthage have been limited since 2016. Mitigation capabilities in Carthage include:

- Mutual aid agreements with local volunteer fire and law enforcement

Table 2.6. City of Carthage Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y, 1-27-2009
Builder's Plan	N, updated yearly as a 5-year plan for budgeting
Capital Improvement Plan	Y
Local Emergency Plan	Y
County Emergency Plan	Y
Local Recovery Plan	N/A
County Recovery Plan	N/A
Local Mitigation Plan	Y, 2016 - CITY PARTICIPATES IN HSTCC PLANS
County Mitigation Plan	Y, 2016 - CITY PARTICIPATES IN HSTCC PLANS
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	Y, plan is developed and presented yearly for budget
Transportation Plan	Y, 1-27-2009 – IN THE COMP PLAN
Land-use Plan	Y, 2009 – IN THE COMP PLAN
Flood Mitigation Assistance (FMA) Plan	N
Watershed Plan	Y, 9-22-2015 – HSTCC Plan/Spring River
Firewise or other fire mitigation plan	N
School Mitigation Plan	

Capability	Status Including Date of Document or Policy
Critical Facilities Plan (Mitigation/Response/Recovery)	N
Policies/Ordinance	
Zoning Ordinance	Y
Building Code	Y, IBC/2006
Floodplain Ordinance	Y, 8-10-2004
Subdivision Ordinance	Y
Tree Trimming Ordinance	Y
Nuisance Ordinance	Y
Storm Water Ordinance	Y
Drainage Ordinance	Y
Seismic Construction Ordinance	N/A
Capability	
Site Plan Review Requirements	Y
Historic Preservation Ordinance	Y
Landscape Ordinance	Y
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	N
Program	
Zoning/Land Use Restrictions	Y, ZONING CODES
Codes Building Site/Design	N
National Flood Insurance Program (NFIP) Participant	Y, 46 policies: Zeb Carney
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	N
National Weather Service (NWS) Storm Ready	N
Building Code Effectiveness Grading (BCEGs)	Y
ISO Fire Rating	Y, 3/6
Economic Development Program	Y
Land Use Program	Y, IN COMP PLAN
Public Education/Awareness	Y
Property Acquisition	N
Planning/Zoning Boards	Y
Stream Maintenance Program	N
Tree Trimming Program	Y
Engineering Studies for Streams (Local/County/Regional)	Y, LOCAL
Mutual Aid Agreements	Y
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	N
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	N
Critical Facilities Inventory	N
Vulnerable Population Inventory	N
Land Use Map	Y
Staff/Department	
Building Code Official	Y, FULL TIME
Building Inspector	Y, FULL TIME
Mapping Specialist (GIS)	Y, FULL TIME/CONTRACTED ANDERSON ENGINEERING
Engineer	Y, FULL TIME/CONTRACTED ANDERSON ENGINEERING
Development Planner	Y, FULL TIME
Public Works Official	Y, FULL TIME
Emergency Management Coordinator	Y, FULL TIME

Capability	Status Including Date of Document or Policy
NFIP Floodplain Administrator	Y
Emergency Response Team	Y, FIRE DEPARTMENT INITIALLY
Hazardous Materials Expert	Y, FIRE DEPARTMENT AS NEEDED
Local Emergency Planning Committee	Y, COTY PARTIPATES w/ JASPER CO. LEPC
County Emergency Management Commission	N/A
Sanitation Department	N
Transportation Department	Y
Economic Development Department	Y
Housing Department	Y
Historic Preservation	Y-PLANNING, ZOMING, HISTORIC PRESERVATION COM.
Non-Governmental Organizations (NGOs)	
American Red Cross	Y
Salvation Army	Y
Veterans Groups	Y
Environmental Organization	N
Homeowner Associations	Y
Neighborhood Associations	N
Chamber of Commerce	Y
Community Organizations (Lions, Kiwanis, etc.	Y, Kiwanis, rotary, optrmyist
Local Funding Availability	
Ability to apply for Community Development Block Grants	Y
Ability to fund projects through Capital Improvements funding	Y
Authority to levy taxes for a specific purpose	Y
Fees for water, sewer, gas, or electric services	Y
Impact fees for new development	N
Ability to incur debt through general obligation bonds	Y
Ability to incur debt through special tax bonds	Y
Ability to incur debt through private activities	Y
Ability to withhold spending in hazard prone areas	Y

Source: Data Collection Questionnaire, 2020

2.3.7 City of Duenweg

The City of Duenweg is located in the southern portion of Jasper County, east of Missouri Highway 249. The governing body of Duenweg includes the mayor and 4 city council members. Duenweg's population grew between the years 2000 and 2019, with an estimated 33.8% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 1,384. City departments include:

- Mayor, Council
- Water, Sewer
- Jasper County Sheriff's Department
- Duenweg Volunteer Fire Department
- Duenweg Police department

According to 2019 Estimates, the median year built for structures in in Duenweg is 1980-1989. Additionally, 12.2% of the population has a disability, 13.4% over 65 and with 54.1% of those over 65 having a disability. The median household income was $40,875, 16.7% of families were under the poverty level. Duenweg participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Duenweg have been limited since 2016. Mitigation capabilities in Duenweg include:

- Mutual aid agreements with local volunteer fire and law enforcement

Table 2.7. City of Duenweg Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	Y: Russell Olds
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	

Capability	Status Including Date of Document or Policy
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.8 City of Duquesne

Duquesne is located in southern Jasper County, next to I-44 and near Joplin. The governing body of Duquesne includes the mayor and 4 city council members. Duquesne's population shrank between the years 2000 and 2019, with an estimated 27.7% decrease in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 1,185. City departments include:

- Mayor, Council
- Municipal Court
- Duquesne Police Department
- Duquesne Fire Department

According to 2019 Estimates, the median year built for structures in in Duquesne is 2010-2013. Additionally, 14% of the population has a disability, 15.7% over 65 and with 43.9% of those over 65 having a disability. The median household income was $56,705, 9.4% of families were under the poverty level. Duquesne participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Duquesne have been limited since 2016. Mitigation capabilities in Duquesne include:

- Mutual aid agreements with local volunteer fire and law enforcement
- Stormwater Management Plan 2017-2021

Table 2.8. City of Duquesne Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y
Builder's Plan	N/A
Capital Improvement Plan	N/A
Local Emergency Plan	Y, 2020
County Emergency Plan	N/A
Local Recovery Plan	N/A
County Recovery Plan	N/A
Local Mitigation Plan	N/A
County Mitigation Plan	N/A
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	N/A
Transportation Plan	N/A
Land-use Plan	N/A
Flood Mitigation Assistance (FMA) Plan	N/A
Watershed Plan	N/A
Firewise or other fire mitigation plan	N/A
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	N/A
Policies/Ordinance	
Zoning Ordinance	Y
Building Code	Y
Floodplain Ordinance	Y
Subdivision Ordinance	Y
Tree Trimming Ordinance	N/A
Nuisance Ordinance	Y
Storm Water Ordinance	Y
Drainage Ordinance	N/A

Capability	Status Including Date of Document or Policy
Seismic Construction Ordinance	N/A
Capability	
Site Plan Review Requirements	Y
Historic Preservation Ordinance	N/A
Landscape Ordinance	N/A
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	N/A
Program	
Zoning/Land Use Restrictions	Y
Codes Building Site/Design	Y
National Flood Insurance Program (NFIP) Participant	Y, 10 POLICIES: Chevelle Lawver
NFIP Community Rating System (CRS) Participating Community	N/A
Hazard Awareness Program	Y
National Weather Service (NWS) Storm Ready	N/A
Building Code Effectiveness Grading (BCEGs)	Y
ISO Fire Rating	Y
Economic Development Program	N/A
Land Use Program	N/A
Public Education/Awareness	N/A
Property Acquisition	N/A
Planning/Zoning Boards	Y
Stream Maintenance Program	N/A
Tree Trimming Program	N/A
Engineering Studies for Streams (Local/County/Regional)	N/A
Mutual Aid Agreements	N/A
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	N/A
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	Y
Critical Facilities Inventory	N/A
Vulnerable Population Inventory	N/A
Land Use Map	N/A
Staff/Department	
Building Code Official	Y
Building Inspector	Y
Mapping Specialist (GIS)	N/A
Engineer	N/A
Development Planner	N/A
Public Works Official	N/A
Emergency Management Coordinator	N/A
NFIP Floodplain Administrator	N/A
Emergency Response Team	N/A
Hazardous Materials Expert	N/A
Local Emergency Planning Committee	N/A
County Emergency Management Commission	N/A
Sanitation Department	N/A
Transportation Department	N/A
Economic Development Department	N/A
Housing Department	N/A
Historic Preservation	N/A
Non-Governmental Organizations (NGOs)	
American Red Cross	N/A

Capability	Status Including Date of Document or Policy
Salvation Army	N/A
Veterans Groups	N/A
Environmental Organization	N/A
Homeowner Associations	Y
Neighborhood Associations	Y
Chamber of Commerce	N/A
Community Organizations (Lions, Kiwanis, etc.	N/A
Local Funding Availability	
Ability to apply for Community Development Block Grants	Y
Ability to fund projects through Capital Improvements funding	N/A
Authority to levy taxes for a specific purpose	Y
Fees for water, sewer, gas, or electric services	N/A
Impact fees for new development	N/A
Ability to incur debt through general obligation bonds	Y
Ability to incur debt through special tax bonds	N/A
Ability to incur debt through private activities	N/A
Ability to withhold spending in hazard prone areas	N/A

Source: Data Collection Questionnaire, 2020

2.3.9 Village of Fidelity

Fidelity is located in the southern portion of Jasper County, on Missouri State Highway 59. The governing body of Fidelity includes the mayor and city council members. Fidelity's population grew between the years 2000 and 2019, with an estimated 6.7% increase in the city's number of residents. The 2019 ACS estimates indicate that the village's current population is 269. Village departments include:

- Mayor, Council
- Jasper County Sheriff's Department
- Carthage Fire District

According to 2019 Estimates, the median year built for structures in in Fidelity is 1970-1979. Additionally, 26.4% of the population has a disability, 18.2% over 65 and with 24.5% of those over 65 having a disability. The median household income was $46,458, 10.4% of families were under the poverty level. Fidelity participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Fidelity have been limited since 2016. Mitigation capabilities in Fidelity include:

- Mutual aid agreements with local volunteer fire and law enforcement
- 2016 Emergency Preparedness Plan

Table 2.9. Village of Fidelity Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	

Capability	Status Including Date of Document or Policy
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	S-5/2/2008
NFIP Community Rating System (CRS) Participating Community	S-5/2/2008
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	

Capability	Status Including Date of Document or Policy
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.10 City of Jasper

The City of Jasper is in the south east portion of Jasper County, east of I-49. The governing body of Jasper includes the mayor and city council members. Jasper's population grew between the years 2000 and 2019, with an estimated 4.7% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 920. City departments include:

- Mayor, Council
- Jasper County Sheriff's Department
- Fire Department
- Police department

According to 2019 Estimates, the median year built for structures in Jasper is 1970-1979. Additionally, 18.7% of the population has a disability, 17.6% over 65 and with 36.4% of those over 65 having a disability. The median household income was $42,625. Jasper participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Duenweg have been limited since 2016. Mitigation capabilities in Jasper include:

- Mutual aid agreements with local volunteer fire and law enforcement

Table 2.10. City of Jasper Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	S-2/21/1976: Clayton Cristy
NFIP Community Rating System (CRS) Participating Community	S-2/21/1976
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	

Capability	Status Including Date of Document or Policy
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.11 City of Neck City

Neck City is located in the north western portion of Jasper County, east of Missouri State Highway 43. The governing body of Neck City includes the mayor and city council members. Neck City's population grew between the years 2000 and 2019, with an estimated 35.3% increase in the city's number of residents. The 2019 ACS estimates indicate that the city's current population is 161. City departments include:

- Mayor, Council
- Jasper County Sheriff's Department
- Tri-City Fire Department

According to 2019 Estimates, the median year built for structures in in Neck City is 2000-2009. Additionally, 12.4% of the population has a disability, 15.5% over 65 and with 28% of those over 65 having a disability. The median household income was $56,667, 12% of families were under the poverty level. Neck City participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Neck City have been limited since 2016.Mitigation capabilities in Neck City include:

- Mutual aid agreements with local volunteer fire and law enforcement
- 4 portable electric generators

Table 2.11. City of Neck City Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	

Capability	Status Including Date of Document or Policy
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	S-5/2/2008: Clayton Cristy
NFIP Community Rating System (CRS) Participating Community	S-5/2/2008
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	

Capability	Status Including Date of Document or Policy
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.12 City of Oronogo

The City of Oronogo is located in the western portion of Jasper County, north of Webb City on D Highway. The governing body of Oronogo includes the mayor and Board of Aldermen with 3 wards. Oronogo's population grew immensely between the years 2000 and 2019, with an estimated 167.3% increase in the city's number of residents. The 2019 ACS estimates indicate that the city's current population is 2,609. City departments include:

- Mayor, Board of Trustees
- Water, Sewer
- Oronogo Fire and Police Department

According to 2019 Estimates, the median year built for structures in in Oronogo is 2000-2009. Additionally, 8.4% of the population has a disability, 5.7% over 65 and with 33.8% of those over 65 having a disability. The median household income was $75,085, 3.7% of families were under the poverty level. Oronogo participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Oronogo have been limited since 2016.Mitigation capabilities in Oronogo include:

- NIMS Training
- Mutual aid agreements with local volunteer fire and law enforcement

Table 2.12. City of Oronogo Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	N, NEED TO UPDATE
Builder's Plan	N, USE 2018 BUILDING CODE
Capital Improvement Plan	
Local Emergency Plan	N
County Emergency Plan	Y
Local Recovery Plan	
County Recovery Plan	

Capability	Status Including Date of Document or Policy
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	N
Transportation Plan	N
Land-use Plan	N
Flood Mitigation Assistance (FMA) Plan	Y
Watershed Plan	N
Firewise or other fire mitigation plan	Y
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	N
Policies/Ordinance	
Zoning Ordinance	Y
Building Code	Y, 2018
Floodplain Ordinance	Y
Subdivision Ordinance	N
Tree Trimming Ordinance	N
Nuisance Ordinance	Y
Storm Water Ordinance	Y
Drainage Ordinance	Y
Seismic Construction Ordinance	N/A
Capability	
Site Plan Review Requirements	Y
Historic Preservation Ordinance	Y
Landscape Ordinance	N
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	N
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	Y, 5 POLICIES: Steve Weaver
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	N
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	Y, 4 – FIRE DEPARTMENT
Economic Development Program	N
Land Use Program	N
Public Education/Awareness	N
Property Acquisition	N
Planning/Zoning Boards	Y
Stream Maintenance Program	N
Tree Trimming Program	N
Engineering Studies for Streams (Local/County/Regional)	N
Mutual Aid Agreements	WORKING WITH W.C. FOR TORNADO SIRENS
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	N

Capability	Status Including Date of Document or Policy
Vulnerable Population Inventory	N
Land Use Map	NOT UP TO DATE
Staff/Department	
Building Code Official	Y – CONTRACT
Building Inspector	N
Mapping Specialist (GIS)	N
Engineer	N
Development Planner	N
Public Works Official	Y
Emergency Management Coordinator	Y
NFIP Floodplain Administrator	Y
Emergency Response Team	N
Hazardous Materials Expert	N
Local Emergency Planning Committee	N
County Emergency Management Commission	N
Sanitation Department	Y
Transportation Department	Y
Economic Development Department	N
Housing Department	
Historic Preservation	N
Non-Governmental Organizations (NGOs)	
American Red Cross	N
Salvation Army	N
Veterans Groups	N
Environmental Organization	N
Homeowner Associations	N
Neighborhood Associations	N
Chamber of Commerce	N
Community Organizations (Lions, Kiwanis, etc.	N
Local Funding Availability	
Ability to apply for Community Development Block Grants	N
Ability to fund projects through Capital Improvements funding	N
Authority to levy taxes for a specific purpose	N
Fees for water, sewer, gas, or electric services	N
Impact fees for new development	N
Ability to incur debt through general obligation bonds	N
Ability to incur debt through special tax bonds	N
Ability to incur debt through private activities	N
Ability to withhold spending in hazard prone areas	N

Source: Data Collection Questionnaire, 2020

2.3.13 City of Sarcoxie

Sarcoxie is located in the southwestern portion of Jasper County, south of I-44. The governing body of Sarcoxie includes the mayor and 4 city council members. Sarcoxie's population grew between the years 2000 and 2019, with an estimated 24.2% increase in the city's number of residents. The 2019 ACS estimates indicate that the city's current population is 1,682. City departments include:

- Mayor, Council
- Municipal Courts
- License office
- Parks and Recreation

- Water, Sewer
- Sarcoxie Police Department
- Sarcoxie Fire Department

According to 2019 Estimates, the median year built for structures in in Sarcoxie is 1939 or earlier. Additionally, 15.9% of the population has a disability, 12.4% over 65 and with 49.5% of those over 65 having a disability. The median household income was $45,179, 7.5% of families were under the poverty level. Sarcoxie participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Sarcoxie have been limited since 2016. Sarcoxie mitigation capabilities include:

- Mutual aid agreements with local fire and law enforcement

Table 2.13. City of Sarcoxie Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	

Capability	Status Including Date of Document or Policy
National Flood Insurance Program (NFIP) Participant	Y: Logan Clevenger
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	

Capability	Status Including Date of Document or Policy
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.3.14 City of Waco

Waco is located in the western portion of Jasper County, west of Missouri Highway 171. The governing body of Waco includes the mayor and city council members. Waco's population shrank between the years 2000 and 2019, with an estimated 22.1% decrease in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 67. City departments include:

- Mayor, Council
- Jasper County Sheriff's Department
- Carl Junction Fire Department

According to 2019 Estimates, the median year built for structures in in Waco is 1980-1989. Additionally, 13.4% of the population has a disability, 16.4% over 65 and with 36.4% of those over 65 having a disability. The mean household income was $49,957, 22.2% of families were under the poverty level. Waco participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Waco have been limited since 2016Mitigation capabilities in Waco include:

- Mutual aid agreements with local fire and law enforcement

Table 2.14. City of Waco Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	N/A
Builder's Plan	N/A
Capital Improvement Plan	N/A
Local Emergency Plan	N/A
County Emergency Plan	N/A
Local Recovery Plan	N/A
County Recovery Plan	N/A
Local Mitigation Plan	N/A
County Mitigation Plan	Y
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	N/A
Transportation Plan	N/A
Land-use Plan	N/A
Flood Mitigation Assistance (FMA) Plan	N/A
Watershed Plan	N/A
Firewise or other fire mitigation plan	N/A

Capability	Status Including Date of Document or Policy
School Mitigation Plan	N/A
Critical Facilities Plan (Mitigation/Response/Recovery)	N/A
Policies/Ordinance	
Zoning Ordinance	N
Building Code	N
Floodplain Ordinance	N
Subdivision Ordinance	N
Tree Trimming Ordinance	N
Nuisance Ordinance	N
Storm Water Ordinance	N
Drainage Ordinance	N
Seismic Construction Ordinance	N
Capability	
Site Plan Review Requirements	N
Historic Preservation Ordinance	N
Landscape Ordinance	N
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	N
Program	
Zoning/Land Use Restrictions	N
Codes Building Site/Design	N
National Flood Insurance Program (NFIP) Participant	Y
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	N
Building Code Effectiveness Grading (BCEGs)	N
ISO Fire Rating	N
Economic Development Program	N
Land Use Program	N
Public Education/Awareness	N
Property Acquisition	N
Planning/Zoning Boards	N/A
Stream Maintenance Program	N/A
Tree Trimming Program	N/A
Engineering Studies for Streams (Local/County/Regional)	N/A
Mutual Aid Agreements	N/A
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	N/A
Hazard Analysis/Risk Assessment (County)	N/A
Flood Insurance Maps	N/A
FEMA Flood Insurance Study (Detailed)	N/A
Evacuation Route Map	N/A
Critical Facilities Inventory	N/A
Vulnerable Population Inventory	N/A
Land Use Map	N/A
Staff/Department	
Building Code Official	N
Building Inspector	N
Mapping Specialist (GIS)	N
Engineer	N
Development Planner	N
Public Works Official	N
Emergency Management Coordinator	N

Capability	Status Including Date of Document or Policy
NFIP Floodplain Administrator	N
Emergency Response Team	N
Hazardous Materials Expert	N
Local Emergency Planning Committee	N
County Emergency Management Commission	N
Sanitation Department	N
Transportation Department	N
Economic Development Department	N
Housing Department	N
Historic Preservation	N
Non-Governmental Organizations (NGOs)	
American Red Cross	N
Salvation Army	N
Veterans Groups	N
Environmental Organization	N
Homeowner Associations	N
Neighborhood Associations	N
Chamber of Commerce	N
Community Organizations (Lions, Kiwanis, etc.	N
Local Funding Availability	
Ability to apply for Community Development Block Grants	N
Ability to fund projects through Capital Improvements funding	N
Authority to levy taxes for a specific purpose	N
Fees for water, sewer, gas, or electric services	N
Impact fees for new development	N
Ability to incur debt through general obligation bonds	N
Ability to incur debt through special tax bonds	N
Ability to incur debt through private activities	N
Ability to withhold spending in hazard prone areas	N

Source: Data Collection Questionnaire, 2020

2.3.15 Summary of Jasper County Jurisdictional Capabilities

Table 2.15. Mitigation Capabilities Summary Table

CAPABILITIES	Jasper County	Alba	Asbury	Carl Junction	Carterville	Carthage	Duenweg	Duquesne	Fidelity	Neck City	Oronogo	Sarcoxie	Waco
Planning Capabilities		UNK	UNK		UNK		UNK		UNK	UNK		UNK	
Comprehensive Plan	Y			Y		Y		Y			N		N/A
Builder's Plan	Y			N		N		N/A			N		N/A
Capital Improvement Plan	Y			N		Y		N/A					N/A
Local Emergency Plan	Y			Y		Y		Y			N		N/A
County Emergency Plan	Y			N/A		Y		N/A			Y		N/A
Local Recovery Plan	Y			N		N/A		N/A					N/A
County Recovery Plan	Y			N/A		N/A		N/A					N/A
Local Mitigation Plan	Y			N		Y		N/A					N/A
County Mitigation Plan	Y			N		Y		N/A					Y
Local Mitigation Plan (PDM)	Y			N									
County Mitigation Plan (PDM)	Y			N/A									
Debris Management Plan	Y			N		Y		N/A			N		N/A
Economic Development Plan	Y			Y		Y		N/A			N		N/A
Transportation Plan	Y			Y		Y		N/A			N		N/A
Land-use Plan	Y			N		N		N/A			Y		N/A
Flood Mitigation Assistance (FMA) Plan	Y			N		Y		N/A			N		N/A
Watershed Plan	Y			N		N		N/A			Y		N/A
Firewise or other fire mitigation plan	Y			UNK									N/A
School Mitigation Plan	Y			N		N		N/A			N		N/A
Critical Facilities Plan (Mitigation/Response/Recovery)	Y			Y		Y		Y			N		N/A
Policies/Ordinance		UNK	UNK		UNK		UNK		UNK	UNK		UNK	
Zoning Ordinance	N			Y		Y		Y			Y		N
Building Code	N			Y		Y		Y			Y		N
Floodplain Ordinance	Y			Y		Y		Y			Y		N

CAPABILITIES	Jasper County	Alba	Asbury	Carl Junction	Carterville	Carthage	Duenweg	Duquesne	Fidelity	Neck City	Oronogo	Sarcoxie	Waco
Subdivision Ordinance	N			Y		Y		Y			N		N
Tree Trimming Ordinance	N			Y		Y		N/A			N		N
Nuisance Ordinance	N			Y		Y		Y			Y		N
Storm Water Ordinance	N			Y		Y		Y			Y		N
Drainage Ordinance	N			Y		Y		N/A			N		N
Site Plan Review Requirements	N			Y		Y		Y			Y		N
Historic Preservation Ordinance	Y			N		Y		N/A			Y		N
Landscape Ordinance	N			N		Y		N/A			N		N
Seismic Construction Ordinance	N			N		N/A		N/A			N/A		N
Program		UNK	UNK		UNK		UNK		UNK	UNK		UNK	
Zoning/Land Use Restrictions	N			**Y**		Y		Y					N
Codes Building Site/Design	N			Y		N		Y					N
National Flood Insurance Program (NFIP) Participant	Y			Y		Y		Y			Y		Y
NFIP Community Rating System (CRS) Participating Community	Y			Y		Y		N/A					
Hazard Awareness Program	Y			Y		N		Y					
National Weather Service (NWS) Storm Ready	Y			N		N		N/A			N		N
Building Code Effectiveness Grading (BCEGs)	N			N		Y		Y					N
ISO Fire Rating	N			N		Y		Y			Y		N
Economic Development Program	Y			N		Y		N/A			N		N
Land Use Program	N			Y		Y		N/A			N		N
Public Education/Awareness	Y			Y		Y		N/A			N		N
Property Acquisition	N			N		N		N/A			N		N
Planning/Zoning Boards	N			Y		Y		Y			Y		N
Stream Maintenance Program	Y			N		N		N/A			N		N/A
Tree Trimming Program	Y			Y		Y		N/A			N		N/A
Engineering Studies for Streams (Local/County/Regional)	Y			N		Y		N/A			N		N/A
Mutual Aid Agreements	Y			Y		Y		N/A			Y		N/A
Studies/Reports/Maps		UNK	UNK		UNK		UNK		UNK	UNK		UNK	

CAPABILITIES	Jasper County	Alba	Asbury	Carl Junction	Carterville	Carthage	Duenweg	Duquesne	Fidelity	Neck City	Oronogo	Sarcoxie	Waco
Hazard Analysis/Risk Assessment (Local)	**Y**			N		N		N/A					N/A
Hazard Analysis/Risk Assessment (County)	Y			N/A		N/A		N/A					N/A
Flood Insurance Maps	Y			N/A									N/A
FEMA Flood Insurance Study (Detailed)	Y			N/A									N/A
Evacuation Route Map	Y			N/A		N		Y					N/A
Critical Facilities Inventory	Y			Y		N		N/A			N		N/A
Vulnerable Population Inventory	Y			N		N		N/A			N		N/A
Land Use Map	Y			Y		Y		N/A					N/A
Staff/Department		UNK	UNK		UNK		UNK		UNK	UNK		UNK	
Building Code Official	N			Y		Y		Y			Y		N
Building Inspector	N			Y		Y		Y			N		N
Mapping Specialist (GIS)	Y			N		Y		N/A			N		N
Engineer	Y			Y		Y		N/A			N		N
Development Planner	N			Y		Y		N/A			N		N
Public Works Official	Y			Y		Y		N/A			Y		N
Emergency Management Coordinator	Y			Y		Y		N/A			Y		N
NFIP Floodplain Administrator	Y			Y		Y		N/A			Y		N
Emergency Response Team	Y			Y		Y		N/A			N		N
Hazardous Materials Expert	Y			N		Y		N/A			N		N
Local Emergency Planning Committee	Y			Y		Y		N/A			N		N
County Emergency Management Commission	Y			N/A		N/A		N/A			N		N
Sanitation Department	Y			N		N		N/A			Y		N
Transportation Department	N			Y		Y		N/A			Y		N
Economic Development Department	Y			N		Y		N/A			N		N
Housing Department	N			N		Y		N/A					N
Historic Preservation	Y			N		Y		N/A			N		N
Non-Governmental Organizations (NGOs)		UNK	UNK		UNK		UNK		UNK	UNK		UNK	

CAPABILITIES	Jasper County	Alba	Asbury	Carl Junction	Carterville	Carthage	Duenweg	Duquesne	Fidelity	Neck City	Oronogo	Sarcoxie	Waco
American Red Cross	Y			N		Y		N/A			N		N
Salvation Army	Y			N		Y		N/A			N		N
Veterans Groups	Y			Y		Y		N/A			N		N
Environmental Organization	Y			N		N		N/A			N		N
Homeowner Associations	N			N		Y		Y			N		N
Neighborhood Associations	Y			N		N		Y			N		N
Chamber of Commerce	Y			Y		Y		N/A			N		N
Community Organizations (Lions, Kiwanis, etc.	Y			Y		Y		N/A			N		N
Financial Resources		UNK	UNK		UNK		UNK		UNK	UNK		UNK	
Apply for Community Development Block Grants	Y			Y		Y		Y			N		N
Fund projects through Capital Improvements funding	Y			Y		Y		N/A			N		N
Authority to levy taxes for specific purposes	Y			Y		Y		Y			N		N
Fees for water, sewer, gas, or electric services	Y			Y		Y		N/A			N		N
Impact fees for new development	Y			N		N		N/A			N		N
Incur debt through general obligation bonds	Y			Y		Y		Y			N		N
Incur debt through special tax bonds	Y			Y		Y		N/A			N		N
Incur debt through private activities	Y			Y		Y		N/A			N		N
Withhold spending in hazard prone areas	Y			N		Y		N/A			N		N

Source: Data Collection Questionnaire, 2020

2.2.15 Unincorporated Newton County

Newton County's jurisdiction includes all unincorporated areas within the county boundaries and functions through its County Commissions, a three-member board with final authority; Newton County operates as a second-class county. The Commission consists of a Presiding Commissioner, a District 1 Commissioner, and a District 2 Commissioner. Newton County's county seat is in Neosho. The County's elected governing body, the Board of County Commissioners, directs the general administration of County Government. The Commission allocates funds, approves and amends annual budget, approves all general revenue and road and bridge expenditures, maintains County roads and bridges, maintains County buildings, is involved with environmental concerns, purchasing, emergency Management, general services, purchase and maintenance of all County vehicles, and appoints citizens to various boards. The departments of the County government include:

- Board of Commissioners
- County Assessor
- County Auditor
- County Circuit Clerk
- County Collector
- County Coroner
- County Surveyor
- County Prosecuting Attorney
- County Public Administrator
- County Recorder of Deeds
- County Sheriff, Central Dispatch
- Emergency Management
- County Treasurer

Mitigation Initiatives/Capabilities

The county can administer county structures, infrastructure, and finances. In addition, it also has the authority to administer a master plan, zoning codes, subdivision regulations, floodplain, and stormwater regulations, but has no authority over building regulations. Staff capabilities to mitigate the impact of natural hazards include the local emergency management officials and local law enforcement members who are involved in mitigation planning, response, and recovery processes. Efforts in coordinating with local government officials and cooperating with private organizations to 1) prevent avoidable disasters and reduce the vulnerability of the residents to any disaster that may strike; 2) establish capabilities for protecting citizens from the effects of disasters; 3) respond effectively to the actual occurrences of disasters; and 4) provide for recovery in the aftermath of any emergency involving extensive damage within the county. The Emergency Management Director (EMD) is responsible for the development and maintenance of the Local Emergency Operations Plan. Jasper County has a Local Emergency Planning Committee and a Storm Water Management Plan, with over 43 tornado sirens and numerous public storm shelters within the county.

Table 2.25 provides information about the mitigation capabilities and policies for the unincorporated county based on responses from the Mitigation Planning Data Collection Questionnaire.

Table 2.16. Unincorporated Newton County Mitigation Capabilities– participant did not respond to survey

Capabilities	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
City Emergency Operations Plan	
County Emergency Operations Plan	
Local Recovery Plan	
County Recovery Plan	
City Mitigation Plan	
County Mitigation Plan	
Debris Management Plan	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Stormwater Ordinance	
Drainage Ordinance	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Seismic Construction Ordinance	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
Hazard Awareness Program	
National Flood Insurance Program (NFIP)	Y, 62 POLICIES: Charla Geller
NFIP Community Rating System (CRS) program	Y
National Weather Service (NWS) Storm Ready	
Firewise Community Certification	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	

Capabilities	Status Including Date of Document or Policy
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Director	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Local Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	

Capabilities	Status Including Date of Document or Policy
Local Funding Availability	
Apply for Community Development Block	
Fund projects through Capital	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.2.16 City of Diamond

Diamond is located in northern Newton County, on of Missouri State Highway 59. The governing body of Diamond includes the mayor and 4 city council members. Diamond's population grew between the years 2000 and 2019, with an estimated 8.2% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 874. City departments include:

- Mayor, Council
- City Administration
- Municipal Courts
- Financial
- Water, Sewer
- Diamond Police Department, Fire Department

According to 2019 Estimates, the median year built for structures in in Diamond is 1970-1979. Additionally, 15.4% of the population has a disability, 16.9% over 65 and with 38.5% of those over 65 having a disability. The median household income was $46,595, 9.4% of families were under the poverty level. Diamond participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Diamond have been limited since 2016. Mitigation capabilities in Diamond include:

- Mutual aid agreements with local fire and law enforcement

Table 2.17. City of Diamond Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	Y
Capital Improvement Plan	Y
Local Emergency Plan	
County Emergency Plan	Y
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	Y
County Mitigation Plan	Y
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	

Capability	Status Including Date of Document or Policy
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	Y: Brenda Schmitt
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	

Capability	Status Including Date of Document or Policy
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.2.17 City of Granby

Granby is centrally located in Newton County, on Missouri State Highway 60. The governing body of Granby includes the mayor and city council members. Granby's population shrank between the years 2000 and 2019, with an estimated 3.5% decrease in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 2,047. City departments include:

- Mayor, Council
- City Administration
- Municipal Court
- Financial
- Water, Sewer
- Granby Fire Department, Police department

According to 2019 Estimates, the median year built for structures in in Granby is 1970-1979. Additionally, 21.8% of the population has a disability, 19.3% over 65 and with 44.6% of those over 65 having a disability. The median household income was $29,886, 19.7% of families were under the poverty level. Granby participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Granby have been limited since 2016. Mitigation capabilities in Duenweg include:

- Mutual aid agreements with volunteer fire and law enforcement

Table 2.18. City of Granby Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	N
Builder's Plan	N
Capital Improvement Plan	N
Local Emergency Plan	N, USE NEWTON CO. EMERGENCY OP. PLAN
County Emergency Plan	Y
Local Recovery Plan	N
County Recovery Plan	N/A
Local Mitigation Plan	N
County Mitigation Plan	N/A
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	N
Transportation Plan	N
Land-use Plan	N
Flood Mitigation Assistance (FMA) Plan	N
Watershed Plan	N
Firewise or other fire mitigation plan	N
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	N
Policies/Ordinance	
Zoning Ordinance	N
Building Code	N
Floodplain Ordinance	Y
Subdivision Ordinance	N
Tree Trimming Ordinance	N
Nuisance Ordinance	Y
Storm Water Ordinance	N
Drainage Ordinance	N
Seismic Construction Ordinance	N
Capability	
Site Plan Review Requirements	N
Historic Preservation Ordinance	N
Landscape Ordinance	N
Iowa Wetlands and Riparian Areas Conservation Plan	N
Debris Management Plan	N
Program	
Zoning/Land Use Restrictions	N
Codes Building Site/Design	N
National Flood Insurance Program (NFIP) Participant	Y, 9 POLICIES: Jim Channel
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	Y
National Weather Service (NWS) Storm Ready	UNKNOWN
Building Code Effectiveness Grading (BCEGs)	N
ISO Fire Rating	Y
Economic Development Program	N
Land Use Program	N
Public Education/Awareness	N
Property Acquisition	N
Planning/Zoning Boards	N
Stream Maintenance Program	N
Tree Trimming Program	N
Engineering Studies for Streams (Local/County/Regional)	N
Mutual Aid Agreements	Y

Capability	Status Including Date of Document or Policy
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	N
Hazard Analysis/Risk Assessment (County)	Y
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	N/A
Critical Facilities Inventory	N/A
Vulnerable Population Inventory	N/A
Land Use Map	N
Staff/Department	
Building Code Official	N
Building Inspector	N
Mapping Specialist (GIS)	NN
Engineer	N
Development Planner	N
Public Works Official	Y, FULL TIME
Emergency Management Coordinator	Y, COUNTY
NFIP Floodplain Administrator	Y, JIM CHANNEL
Emergency Response Team	N
Hazardous Materials Expert	N
Local Emergency Planning Committee	N
County Emergency Management Commission	N
Sanitation Department	N
Transportation Department	N
Economic Development Department	N
Housing Department	N
Historic Preservation	N
Non-Governmental Organizations (NGOs)	
American Red Cross	N
Salvation Army	N
Veterans Groups	N
Environmental Organization	N
Homeowner Associations	N
Neighborhood Associations	N
Chamber of Commerce	N
Community Organizations (Lions, Kiwanis, etc.	Y, LIONS
Local Funding Availability	
Ability to apply for Community Development Block Grants	Y
Ability to fund projects through Capital Improvements funding	Y
Authority to levy taxes for a specific purpose	Y
Fees for water, sewer, gas, or electric services	Y
Impact fees for new development	N
Ability to incur debt through general obligation bonds	Y
Ability to incur debt through special tax bonds	Y
Ability to incur debt through private activities	Y
Ability to withhold spending in hazard prone areas	N/A

Source: Data Collection Questionnaire, 2020

2.2.18 Village of Leawood

Leawood is located in north west Newton County, near I-44. The governing body of Leawood includes the Chairman and a 5-member Board of Trustees. Leawood's population shrank between the years 2000 and 2019, with an estimated 28.5% decrease in the village's number of residents. The 2019 ACS estimates indicate that the village's current population is 646. City departments include:

- Chairman, Board of Trustees
- Newton County Sheriff's Department

- Redings Mill Fire department

According to 2019 Estimates, the median year built for structures in in Leawood is 1939 or earlier. Additionally, 8.5% of the population has a disability, 10.3% over 65 and with 45.3% of those over 65 having a disability. The median household income was $37,241, 10.3% of families were under the poverty level. Leawood participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Leawood have been limited since 2016. Mitigation capabilities in Leawood include:

- Mutual aid agreements with local fire and law enforcement

Table 2.19. Village of Leawood Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y, 2014 – 1ST EVR PLAN W/ HSTCC HELP
Builder's Plan	N/A
Capital Improvement Plan	N/A
Local Emergency Plan	N/A, RELY ON NEWTON CO.
County Emergency Plan	N/A
Local Recovery Plan	N
County Recovery Plan	N/A
Local Mitigation Plan	N
County Mitigation Plan	N/A
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	N
Transportation Plan	N/A
Land-use Plan	Y, 2014
Flood Mitigation Assistance (FMA) Plan	N
Watershed Plan	Y, 2016
Firewise or other fire mitigation plan	Y, 2016 – REDINGS MILL FIRE DEPT.
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	N
Policies/Ordinance	
Zoning Ordinance	Y
Building Code	Y
Floodplain Ordinance	N
Subdivision Ordinance	N
Tree Trimming Ordinance	N
Nuisance Ordinance	Y
Storm Water Ordinance	Y
Drainage Ordinance	N
Seismic Construction Ordinance	N
Capability	
Site Plan Review Requirements	N
Historic Preservation Ordinance	N
Landscape Ordinance	N
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	N/A
Program	
Zoning/Land Use Restrictions	Y
Codes Building Site/Design	Y
National Flood Insurance Program (NFIP) Participant	
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	Y
National Weather Service (NWS) Storm Ready	

Capability	Status Including Date of Document or Policy
Building Code Effectiveness Grading (BCEGs)	N
ISO Fire Rating	Y
Economic Development Program	N
Land Use Program	Y
Public Education/Awareness	N
Property Acquisition	N
Planning/Zoning Boards	Y
Stream Maintenance Program	N
Tree Trimming Program	Y
Engineering Studies for Streams (Local/County/Regional)	N
Mutual Aid Agreements	N
Studies/ReNports/Maps	
Hazard Analysis/Risk Assessment (Local)	N
Hazard Analysis/Risk Assessment (County)	N
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	N
Critical Facilities Inventory	N
Vulnerable Population Inventory	N
Land Use Map	N
Staff/Department	
Building Code Official	
Building Inspector	Y
Mapping Specialist (GIS)	N
Engineer	Y, CONSULTING AGREEMENT
Development Planner	N
Public Works Official	N
Emergency Management Coordinator	N
NFIP Floodplain Administrator	N
Emergency Response Team	N
Hazardous Materials Expert	N
Local Emergency Planning Committee	N
County Emergency Management Commission	N
Sanitation Department	N
Transportation Department	N
Economic Development Department	N
Housing Department	N
Historic Preservation	N
Non-Governmental Organizations (NGOs)	
American Red Cross	N
Salvation Army	N
Veterans Groups	N
Environmental Organization	N
Homeowner Associations	Y, HIDDEN VALLEY BRIARWOOD
Neighborhood Associations	Y
Chamber of Commerce	N
Community Organizations (Lions, Kiwanis, etc.	N
Local Funding Availability	
Ability to apply for Community Development Block Grants	N
Ability to fund projects through Capital Improvements funding	N
Authority to levy taxes for a specific purpose	Y
Fees for water, sewer, gas, or electric services	N
Impact fees for new development	N
Ability to incur debt through general obligation bonds	N
Ability to incur debt through special tax bonds	N
Ability to incur debt through private activities	N
Ability to withhold spending in hazard prone areas	N

Source: Data Collection Questionnaire, 2020

2.2.19 City of Neosho

Neosho is centrally located in Newton County, along I-49. The governing body of Neosho includes the mayor and 4 city council members. Neosho's population grew between the years 2000 and 2019, with an estimated 14.1% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 11,990. City departments include:

- Mayor, Council
- City Administrator
- City Clerk
- Municipal Courts
- Financial/Accounting
- Parks and Recreation
- Water, Sewer
- Neosho Fire department, Police department

According to 2019 Estimates, the median year built for structures in in Neosho is 1970-1979. Additionally, 2.9% of the population has a disability, 14.9% over 65 and with 36% of those over 65 having a disability. The median household income was $38,214, 18.3% of families were under the poverty level. Neosho participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Neosho have been limited since 2016. Mitigation capabilities in Neosho include:

- Mutual aid agreements with local fire and law enforcement

Table 2.20. City of Neosho Mitigation Capabilities

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	Y, 2017
Builder's Plan	N
Capital Improvement Plan	N
Local Emergency Plan	N
County Emergency Plan	N/A
Local Recovery Plan	N
County Recovery Plan	N/A
Local Mitigation Plan	N
County Mitigation Plan	N/A
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	N
Transportation Plan	N
Land-use Plan	Y
Flood Mitigation Assistance (FMA) Plan	WORKING ON NOW
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	Y
Building Code	Y, 2018
Floodplain Ordinance	Y, 2010
Subdivision Ordinance	Y
Tree Trimming Ordinance	N/A
Nuisance Ordinance	Y
Storm Water Ordinance	Y

Capability	Status Including Date of Document or Policy
Drainage Ordinance	Y
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	Y
Historic Preservation Ordinance	Y
Landscape Ordinance	N
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	N
Program	
Zoning/Land Use Restrictions	Y
Codes Building Site/Design	Y
National Flood Insurance Program (NFIP) Participant	Y, 85 POLICIES: Rachel Holcomb
NFIP Community Rating System (CRS) Participating Community	Y
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	Y, 4
Economic Development Program	N/A
Land Use Program	N/A
Public Education/Awareness	N/A
Property Acquisition	N/A
Planning/Zoning Boards	Y
Stream Maintenance Program	Y
Tree Trimming Program	N
Engineering Studies for Streams (Local/County/Regional)	Y
Mutual Aid Agreements	Y
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	N
Hazard Analysis/Risk Assessment (County)	N
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	N
Critical Facilities Inventory	
Vulnerable Population Inventory	N
Land Use Map	Y
Staff/Department	
Building Code Official	Y, FULLTIME
Building Inspector	Y, FULLTIME
Mapping Specialist (GIS)	N
Engineer	N
Development Planner	Y, FT
Public Works Official	Y, FT
Emergency Management Coordinator	Y, FIRE CHIEF
NFIP Floodplain Administrator	Y, BUILDING INSPECTOR
Emergency Response Team	Y
Hazardous Materials Expert	
Local Emergency Planning Committee	Y, COAD
County Emergency Management Commission	N/A
Sanitation Department	Y, FT
Transportation Department	Y, PUBLIC WORKS
Economic Development Department	Y, GROW NEOSHO
Housing Department	Y, NEOSHO HOUSING AUTH.
Historic Preservation	Y
Non-Governmental Organizations (NGOs)	
American Red Cross	Y
Salvation Army	Y
Veterans Groups	Y
Environmental Organization	

Capability	Status Including Date of Document or Policy
Homeowner Associations	Y
Neighborhood Associations	Y
Chamber of Commerce	Y
Community Organizations (Lions, Kiwanis, etc.	Y
Local Funding Availability	
Ability to apply for Community Development Block Grants	Y
Ability to fund projects through Capital Improvements funding	Y
Authority to levy taxes for a specific purpose	VOTE OF PEOPLE
Fees for water, sewer, gas, or electric services	Y
Impact fees for new development	Y
Ability to incur debt through general obligation bonds	Y
Ability to incur debt through special tax bonds	Y
Ability to incur debt through private activities	Y
Ability to withhold spending in hazard prone areas	N

Source: Data Collection Questionnaire, 2020

2.2.20 City of Seneca

Seneca is centrally located in Newton County, beside Missouri State Highway 43. The governing body of Seneca includes the mayor and city council members. Seneca's population grew between the years 2000 and 2019, with an estimated 16.6% increase in the city's number of residents. The 2019 ACS estimates indicate that the City's current population is 2,336. City departments include:

- Mayor, Council
- City Administration
- Water, Sewer
- Seneca Police Department
- Seneca Fire Department

According to 2019 Estimates, the median year built for structures in in Seneca is 1970-1979. Additionally, 19.1% of the population has a disability, 19.6% over 65 and with 53.6% of those over 65 having a disability. The median household income was $37,117, 13.7% of families were under the poverty level. Seneca participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Seneca have been limited since 2016. Mitigation capabilities in Seneca include:

- Mutual aid agreements with local volunteer fire and law enforcement

Table 2.21. City of Seneca Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	

Capability	Status Including Date of Document or Policy
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	Y, 80 POLICIES : Darren King
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	

Capability	Status Including Date of Document or Policy
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.2.21 Village of Stark City

Stark City is located in eastern Newton County, southeast of Missouri State Highway 86. The governing body of Stark City includes the mayor and city council members. Stark City's population shrank between the years 2000 and 2019, with an estimated 23.7% decrease in the village's number of residents. The 2019 ACS estimates indicate that the village's current population is 119. Village departments include:

- Mayor/Council
- Newton County Sheriff's Department
- Stark City Volunteer Fire Department

According to 2019 Estimates, the median year built for structures in in Stark City is 1939 or earlier. Additionally, 38.7% of the population has a disability, 18.5% over 65 and with 50% of those over 65 having a disability. The median household income was $43,750, 13.9% of families were under the poverty level. Stark City participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Stark City have been limited since 2016. Mitigation capabilities in Stark City include:

- Mutual aid agreements with local fire and law enforcement

Table 2.22. Village of Stark City Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	

Capability	Status Including Date of Document or Policy
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	NP
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	

Capability	Status Including Date of Document or Policy
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.2.22 Village of Wentworth

Wentworth is located in far eastern Newton County, on Missouri State Highway 37. The governing body of Wentworth includes the Chairman and Board of Trustees. Wentworth's population shrank between the years 2000 and 2019, with an estimated 5% decrease in the village's number of residents. The 2019 ACS estimates indicate that the village's current population is 134. Village departments include:

- Chairman, Board of Trustees
- Sewer
- Newton County Sheriff's Department
- Pierce City, Missouri Rural Fire

According to 2019 Estimates, the median year built for structures in in Wentworth is 1939 or earlier. Additionally, 9% of the population has a disability, 11.2% is over 65 and with 13.3% of those over 65 having a disability. The mean household income was $60,589, 7.7% of families were under the poverty level. Wentworth participated in the last update of the county-wide plan; however, specific mitigation activities undertaken by Stark City have been limited since 2016. Mitigation capabilities in Wentworth include:

- Mutual aid agreements with local fire and law enforcement

Table 2.23. Village of Wentworth Mitigation Capabilities– participant did not respond to survey

Capability	Status Including Date of Document or Policy
Planning Capabilities	
Comprehensive Plan	
Builder's Plan	
Capital Improvement Plan	
Local Emergency Plan	
County Emergency Plan	
Local Recovery Plan	
County Recovery Plan	
Local Mitigation Plan	
County Mitigation Plan	
Local Mitigation Plan (PDM)	
County Mitigation Plan (PDM)	
Economic Development Plan	
Transportation Plan	
Land-use Plan	
Flood Mitigation Assistance (FMA) Plan	
Watershed Plan	
Firewise or other fire mitigation plan	
School Mitigation Plan	
Critical Facilities Plan (Mitigation/Response/Recovery)	
Policies/Ordinance	
Zoning Ordinance	
Building Code	
Floodplain Ordinance	
Subdivision Ordinance	
Tree Trimming Ordinance	
Nuisance Ordinance	
Storm Water Ordinance	
Drainage Ordinance	
Seismic Construction Ordinance	
Capability	
Site Plan Review Requirements	
Historic Preservation Ordinance	
Landscape Ordinance	
Iowa Wetlands and Riparian Areas Conservation Plan	
Debris Management Plan	
Program	
Zoning/Land Use Restrictions	
Codes Building Site/Design	
National Flood Insurance Program (NFIP) Participant	Y
NFIP Community Rating System (CRS) Participating Community	
Hazard Awareness Program	
National Weather Service (NWS) Storm Ready	
Building Code Effectiveness Grading (BCEGs)	
ISO Fire Rating	

Capability	Status Including Date of Document or Policy
Economic Development Program	
Land Use Program	
Public Education/Awareness	
Property Acquisition	
Planning/Zoning Boards	
Stream Maintenance Program	
Tree Trimming Program	
Engineering Studies for Streams (Local/County/Regional)	
Mutual Aid Agreements	
Studies/Reports/Maps	
Hazard Analysis/Risk Assessment (Local)	
Hazard Analysis/Risk Assessment (County)	
Flood Insurance Maps	
FEMA Flood Insurance Study (Detailed)	
Evacuation Route Map	
Critical Facilities Inventory	
Vulnerable Population Inventory	
Land Use Map	
Staff/Department	
Building Code Official	
Building Inspector	
Mapping Specialist (GIS)	
Engineer	
Development Planner	
Public Works Official	
Emergency Management Coordinator	
NFIP Floodplain Administrator	
Emergency Response Team	
Hazardous Materials Expert	
Local Emergency Planning Committee	
County Emergency Management Commission	
Sanitation Department	
Transportation Department	
Economic Development Department	
Housing Department	
Historic Preservation	
Non-Governmental Organizations (NGOs)	
American Red Cross	
Salvation Army	
Veterans Groups	
Environmental Organization	
Homeowner Associations	
Neighborhood Associations	
Chamber of Commerce	
Community Organizations (Lions, Kiwanis, etc.	
Local Funding Availability	
Ability to apply for Community Development Block Grants	
Ability to fund projects through Capital Improvements funding	
Authority to levy taxes for a specific purpose	
Fees for water, sewer, gas, or electric services	
Impact fees for new development	
Ability to incur debt through general obligation bonds	
Ability to incur debt through special tax bonds	
Ability to incur debt through private activities	
Ability to withhold spending in hazard prone areas	

Source: Data Collection Questionnaire, 2020

2.2.23 Summary of Newton County Jurisdictional Capabilities

Table 2.24. Mitigation Capabilities Summary Table

CAPABILITIES	Newton County	Diamond	Granby	Leawood	Neosho	Seneca	Stark City	Wentworth
Planning Capabilities	**UNK**	**UNK**				UNK	UNK	UNK
Comprehensive Plan			N	Y	Y			
Builder's Plan			N	N/A	N			
Capital Improvement Plan			N	N/A	N			
Local Emergency Plan			N	N/A	N			
County Emergency Plan			Y	N/A	N/A			
Local Recovery Plan			N	N	N			
County Recovery Plan			N/A	N/A	N/A			
Local Mitigation Plan			N	N	N			
County Mitigation Plan			N/A	N/A	N/A			
Local Mitigation Plan (PDM)								
County Mitigation Plan (PDM)								
Debris Management Plan			N	N	N			
Economic Development Plan			N	N/A	N			
Transportation Plan			N	Y	N			
Land-use Plan			N	N	Y			
Flood Mitigation Assistance (FMA) Plan			N	Y				
Watershed Plan			N	Y				
Firewise or other fire mitigation plan								
School Mitigation Plan			N	N				
Critical Facilities Plan (Mitigation/Response/Recovery)			N	N/A				
Policies/Ordinance	**UNK**	**UNK**				UNK	UNK	UNK
Zoning Ordinance			N	Y	Y			
Building Code			N	Y	Y			
Floodplain Ordinance			Y	N	Y			
Subdivision Ordinance			N	N	Y			
Tree Trimming Ordinance			N	N	N/A			
Nuisance Ordinance			Y	Y	Y			
Storm Water Ordinance			N	Y	Y			
Drainage Ordinance			N	N	Y			

CAPABILITIES	Newton County	Diamond	Granby	Leawood	Neosho	Seneca	Stark City	Wentworth
Site Plan Review Requirements			N	N	Y			
Historic Preservation Ordinance			N	N	Y			
Landscape Ordinance			N	N	Y			
Seismic Construction Ordinance			N	N				
Program	UNK	UNK				UNK	UNK	UNK
Zoning/Land Use Restrictions			N	Y	Y			
Codes Building Site/Design			N	Y	Y			
National Flood Insurance Program (NFIP) Participant			Y		Y			
NFIP Community Rating System (CRS) Participating Community					Y			
Hazard Awareness Program			Y	Y				
National Weather Service (NWS) Storm Ready			UNK					
Building Code Effectiveness Grading (BCEGs)			N	N	Y			
ISO Fire Rating			Y	Y	Y, 4			
Economic Development Program			N	N	N/A			
Land Use Program			N	Y	N/A			
Public Education/Awareness			N	N	N/A			
Property Acquisition			N	N	N/A			
Planning/Zoning Boards			N	Y	Y			
Stream Maintenance Program			N	N	Y			
Tree Trimming Program			N	Y	N			
Engineering Studies for Streams (Local/County/Regional)			N	N	Y			
Mutual Aid Agreements			Y	N	Y			
Studies/Reports/Maps	UNK	UNK				UNK	UNK	UNK
Hazard Analysis/Risk Assessment (Local)			N	N	**N**			
Hazard Analysis/Risk Assessment (County)			Y	N	N			
Flood Insurance Maps								
FEMA Flood Insurance Study (Detailed)								
Evacuation Route Map			N/A	N	N			
Critical Facilities Inventory			N/A	N	N			

CAPABILITIES	Newton County	Diamond	Granby	Leawood	Neosho	Seneca	Stark City	Wentworth
Vulnerable Population Inventory			N/A	N	N			
Land Use Map			N	N	Y			
Staff/Department	UNK	UNK				UNK	UNK	UNK
Building Code Official			N		Y			
Building Inspector			N	Y	Y			
Mapping Specialist (GIS)			N	N	N			
Engineer			N	Y	N			
Development Planner			N	N	Y			
Public Works Official			Y	N	Y			
Emergency Management Coordinator			Y	N	Y			
NFIP Floodplain Administrator			Y	N	Y			
Emergency Response Team			N	N	Y			
Hazardous Materials Expert			N	N				
Local Emergency Planning Committee			N	N	Y			
County Emergency Management Commission			N	N	N			
Sanitation Department			N	N	Y			
Transportation Department			N	N	Y			
Economic Development Department			N	N	Y			
Housing Department			N	N	Y			
Historic Preservation			N	N	Y			
Non-Governmental Organizations (NGOs)	UNK	UNK				UNK	UNK	UNK
American Red Cross			N	N	**Y**			
Salvation Army			N	N	Y			
Veterans Groups			N	N	Y			
Environmental Organization			N	N				
Homeowner Associations			N	Y	Y			
Neighborhood Associations			N	Y	Y			
Chamber of Commerce			N	N	Y			
Community Organizations (Lions, Kiwanis, etc.			Y	N	Y			
Financial Resources	UNK	UNK				UNK	UNK	UNK

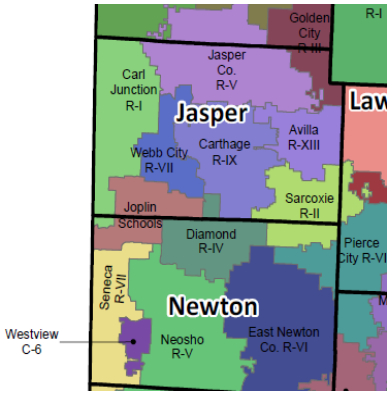
CAPABILITIES	Newton County	Diamond	Granby	Leawood	Neosho	Seneca	Stark City	Wentworth
Apply for Community Development Block Grants			**Y**	**N**	Y			
Fund projects through Capital Improvements funding			Y	N	Y			
Authority to levy taxes for specific purposes			Y	Y				
Fees for water, sewer, gas, or electric services			Y	N	Y			
Impact fees for new development			N	N	Y			
Incur debt through general obligation bonds			Y	N	Y			
Incur debt through special tax bonds			Y	N	Y			
Incur debt through private activities			Y	N	Y			
Withhold spending in hazard prone areas			N/A	N	N			

Source: Data Collection Questionnaire, 2020

2.2.24 Public School District Profiles and Mitigation Capabilities

This section provides general information about participating school districts in the Plan. There are 7 school districts based in Jasper County and 5 school districts based in Newton County. Other school district boundaries include areas of Jasper and Newton County but are not headquartered and do not have facilities within the county (Golden City, Pierce City). Figure 2.3.1 is a map of school district boundaries in Jasper and Newton County.

Figure 2.3.1 **Jasper and Newton County School Districts**
Source: DESE MO School District Map



Participating Districts

- Joplin R-VIII
- Westview C-6
- Avilla R-XIII

Nonparticipating Districts

- Carthage R-IX
- Crowder College
- Diamond R-IV
- Jasper Co. R-V
- Joplin Schools
- Neosho R-V
- Ozark Christian College
- Seneca R-VII
- East Newton Co. R-VI
- Missouri Southern State University
- Carl Junction R-I
- Sarcoxie R-II
- Webb City R-VI

2.2.25 Joplin R-VIII School District

All of Joplin R-VIII School District facilities are in the City of Joplin in southwest Jasper County. Table 2.34 provides building and enrollment information.

Table 2.25. Joplin R-VIII Buildings and Enrollment Data, 2020

Building Name	Address	Building Enrollment
Cecil Floyd Elementary	2201 W 24th, Joplin	555
Columbia Elementary	610 W F St, Joplin	210
East Middle School	4594 East 20th St, Joplin	599
Eastmorland Elementary	1131 Highview, Joplin	242
Irving Elementary	2901 McClelland Blvd, Joplin	469
Jefferson Elementary	130 McKinley, Joplin	196
Joplin Early Childhood	2825 S McClelland Blvd, Joplin	210
Joplin Highschool	2104 Indiana Ave, Joplin	2,143
Kelsey Norman Elementary	1323 E 28th St, Joplin	286
McKinley Elementary	610 S Forest, Joplin	346
North Middle School	102 Gray, Joplin	605
Royal Heights Elementary	2100 Rolla St, Joplin	234
Soaring Heights Elementary	4604 East 2oth St, Joplin	469
South Middle School	900 E 50th, Joplin	542
Stapleton elementary	101 E 41st St, Joplin	414
West Central Elementary	1001 W 7th St, Joplin	192

Source: Source: National Center for Education Statistics

Joplin R-VIII Schools are governed by a Board of Education consisting of the Board President and 7 board members. Within the entire district, 7,568 students enrolled 2020-2021.There are 69.69 square miles covered by district boundaries with11 elementary schools, 3 middle schools, 1 high school, 1 career & technical center, 1 early childhood center, 1 flexible program that provides day and night school for at-risk high school students, 1 facility for students with behavioral challenges serving Joplin and 16 sending school districts. District departments include:

- Administration
- Athletics
- Board of Education
- Communications
- Curriculum, instruction, & Assessment
- Facilities
- Finance
- Maintenance
- Food and Nutrition services
- Human Resources
- Nurse & Health Services
- Student Services
- Technology
- Transportation

Joplin R-VIII completed Severe Weather Drills and Building Evacuation Drills for students and staff and created an emergency response team. Many of the schools also have community safe rooms:

- Cecil Floyd Elementary
- Columbia Elementary
- Beacon School
- Eastmorland Elementary
- Irving Elementary
- Jefferson Elementary
- Joplin High School
- Junge Stadium
- Kelsey Norman Elementary
- McKinley Elementary
- Royal Heights Elementary
- Soaring Heights Elementary
- Stapleton Elementary
- West Central Elementary

2.2.26 Westview C-6 School District

All Westview C-6 School District Facilities are in the City of Neosho, in the central portion of Newton County. Table 2.35 provides building and enrollment information.

Table 2.26. Westview C-6 Buildings and Enrollment Data, 2020

Building Name	Address	Building Enrollment
Westview Elementary	7441 Westview Rd, Neosho	126

Source: National Center for Education Statistics

Westview C-6 School, District is governed by a Board of Education consisting of the Board President and 6 board members. The District serves over 195 students and employees approximately 24 teachers and staff. District departments include:

- Administration
- Athletics
- Board of Education
- Communications
- Maintenance
- Nurse & Health Services
- Student Services

Westview C-6 created an emergency response team and building evacuation drills.

2.2.27 Avilla R-XIII School District

All Avilla School District Facilities are located in the City of Avilla, in the eastern portion of Jasper County. Table 2.36 provides building and enrollment.

Table 2.27. Avilla R-XIII Buildings and Enrollment Data, 2020

Building Name	Address	Building Enrollment
Avilla Elementary	400 Sarcoxie St., Avilla	136

Source: National Center for Education Statistics

Avilla Schools are governed by a Board of Education consisting of the Board President and 6 board members. The District serves over 154students. District departments include:

- Administration
- Athletics
- Board of Education
- Transportation
- Maintenance
- Nurse & Health Services
- Student Services

Avilla R-XIII completed evacuation drills for staff and students and created an emergency response team.

*__Participant did not respond to survey__

Table 2.28. Summary of Mitigation Capabilities-School Districts Joplin R-VIII, Westview C-6, and Avilla R-XIII

Capability	Joplin R-VIII	Westview C-6	Avilla R-XIII
Planning Elements			*UNKNOWN
Master Plan/ Date	Y, JAN 2016		
Capital Improvement Plan/Date	Y, MARCH 2020		
School Emergency Plan / Date	Y, SEPT. 2020		
Weapons Policy/Date	Y, OCT. 30, 2012		
Personnel Resources			*UNKNOWN
Full-Time Building Official (Principal)	Y		
Emergency Manager	Y, SUPERINTENDENT		
Grant Writer	N		
Public Information Officer	Y, HR + COMMUNICATIONS		
Financial Resources			*UNKNOWN
Capital Improvements Project Funding	Y		
Local Funds	Y		
General Obligation Bonds	Y		
Special Tax Bonds	N		
Private Activities/Donations	Y		
State and Federal Funds/Grants	Y		
Other			*UNKNOWN
Public Education Programs			
Privately or Self- Insured?			
Fire Evacuation Training	Y		
Tornado Sheltering Exercises	Y		
Public Address/Emergency Alert System	Y		
NOAA Weather Radios	Y		
Lock-Down Security Training			
Mitigation Programs			
Tornado Shelter/Saferoom	Y		
Campus Police	Y		

Source: Data Collection Questionnaire, 2020

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 development that has occurred since the last plan update and any increased or decreased risk that resulted. This section also discusses areas of planned future development and any implications on risk/vulnerability;
- **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 Strength/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.

Natural disasters to which pose a risk and are analyzed on a county-wide level include: tornados, severe thunderstorms and hail/high winds, severe winter weather, droughts, heat waves, earthquakes.

Natural disasters that have a more defined risk area, thus posing a risk unique to each participating jurisdiction, are: flooding, wildfires, sinkholes, dam failure.

3.1.1 Review of Existing Mitigation Plans

Natural disaster data from the previous Jasper and Newton County Hazard Mitigation Plan, 2018 Missouri State Hazard Mitigation Plan, the National Center for Environmental Information (NCEI), the National Oceanic and Atmospheric Administration (NOAA), the South Central Missouri Stormwater Management Planning Project, FEMA Flood Insurance Studies (FIS), South Central Threat Hazard Identification and Risk Assessment (THIRA), HAZUS-MH software, information from local officials and stakeholders were reviewed and incorporated, where appropriate, into this update of the Jasper-Newton County Hazard Mitigation Plan.

Due to its location in middle-America, the Hazard Mitigation Planning Committee has eliminated coastal flooding from the list of disasters considered in this mitigation plan. Other natural disasters eliminated from the Risk Assessment due to geographic factors include: levee failure (none exist), landslides (slopes are not conducive to landslides), tsunamis (not coastal), hurricanes (not coastal) and tropical storms (not coastal), avalanches (no snow pack), volcanic activity (not in proximity to active volcanoes).

In Missouri, local hazard mitigation plans customarily include only natural hazards, as only natural hazards are required by federal regulations to be included. As a result, the Jasper/Newton County Mitigation Planning Committee chose to include only natural hazards. Additionally, man-made disaster threats and events are covered in detail in the South Central Threat Hazard Identification and Risk Assessment and the MPC did not want to duplicate those efforts.

3.1.2 Review Disaster Declaration History

Federal and/or state declarations may be granted when the severity and magnitude of an event surpasses the ability of the 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.

Table 3.1 lists the federal FEMA disaster declarations that included the planning area from 1965 to present.

Table 3.1. FEMA Disaster Declarations that included Jasper County and Newton County, Missouri, 1965-Present

Disaster Number	Description	Declaration Date Incident Period	Individual Assistance (IA) Public Assistance (PA)

Source: Federal Emergency Management Agency, https://www.fema.gov/data-visualization-summary-disaster-declarations-and-grants

3.1.3 Research Additional Sources

Sources for data contained within this risk assessment was gathered from the following sources:

- Missouri Hazard Mitigation Plans (2013 and 2018)
- 2016 Jasper-Newton County Hazard Mitigation Plan
- Federal Emergency Management Agency (FEMA)
- Missouri Department of Natural Resources (MDNR)
- National Drought Mitigation Center Drought Reporter
- Data Collection Questionnaires completed by each participating jurisdiction
- Environmental Protection Agency
- Flood Insurance Administration
- Hazards US (HAZUS)
- Missouri Department of Transportation
- Missouri Division of Fire Marshal Safety
- National Fire Incident Reporting System (NFIRS)
- National Oceanic and Atmospheric Administration's (NOAA) National Center for Environmental Information (NCEI);
- 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
- United States Geological Survey (USGS)
- Various articles and publications available on the internet (citations will be given to sources throughout the assessment

Note that 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 December 2018, 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.

Note that 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

The natural hazards that can possibly or have affected the planning area are profiled in alphabetical order. All hazards do not affect every jurisdiction participating in the plan. Table 3.2 provides a summary of the jurisdictions that may be affected by each hazard. An "X" in the table indicates that jurisdictions are affected by the hazard, and a "-" indicates the hazard is not applicable to that jurisdiction.

Table 3.2. Hazards Identified for Each Jurisdiction

Jurisdiction	Dam Failure	Drought	Earthquake	Extreme Temperatures	Flooding (River and Flash)	Land Subsidence/Sinkholes	Levee Failure	Severe Winter Weather	Thunderstorm/Lightning/Hail/ High Wind	Tornado	Wildfire	
Jasper County	-	x	x	x	x	x	x	x	x	x	x	
City of Alba	-	x	x	x	x	x	x	x	x	x	x	
City of Asbury	-	x	x	x	x	x	x	x	x	x	x	
City of Carl Junction	-	x	x	x	x	x	x	x	x	x	x	
City of Carterville	-	x	x	x	x	x	x	x	x	x	x	
City of Carthage	-	x	x	x	x	x	x	x	x	x	x	
City of Duenweg	-	x	x	x	x	x	x	x	x	x	x	
City of Duquesne	-	x	x	x	x	x	x	x	x	x	x	
Village of Fidelity	-	x	x	x	x	x	x	x	x	x	x	
City of Jasper	-	x	x	x	x	x	x	x	x	x	x	
City of Neck City	-	x	x	x	x	x	x	x	x	x	x	
City of Oronogo	-	x	x	x	x	x	x	x	x	x	x	
City of Sarcoxie	-	x	x	x	x	x	x	x	x	x	x	
City of Waco	-	x	x	x	x	x	x	x	x	x	x	
Newton County	-	x	x	x	x	x	x	x	x	x	x	
City of Diamond	-	x	x	x	x	x	x	x	-	x	x	
City of Granby	-	x	x	x	x	x	-	x	-	x	x	
Village of Leawood	-	x	x	x	x	x	x	x	x	x	x	
City of Neosho	-	x	x	x	x	x	x	x	x	x	x	
City of Seneca	-	x	x	x	x	x	x	x	x	x	x	
Village of Stark City	-	x	x	x	x	x	x	x	x	x	x	
Village of Wentworth	-	x	x	x	x	x	x	x	x	x	x	
Schools and Special Districts												

Joplin R-VIII	-	x	x	x	x	x	x	x	x	x	x	
Westview C-6	-	x	x	x	x	x	x	x	x	x	x	
Avilla R-XIII	-	x	x	x	x	x	x	x	x	x	x	

3.1.5 Multi-Jurisdictional Risk Assessment

This planning document is the third quinquennial update of the Jasper and Newton Bi-County Hazard Mitigation Plan. The Plan is multi-jurisdictional in nature, encompassing the counties themselves, twenty-one incorporated communities, and three school districts. Each hazard detailed in this risk assessment is addressed on a planning area-wide basis. Some hazards, like flooding, vary in risk across the landscape of Jasper and Newton County. These jurisdictional variations are included in the relevant hazard profiles.

The planning area is fairly uniform in terms of climate, topography, and building construction characteristics apart from Jasper County's largest city, Joplin, and Newton County's largest city, Neosho. Municipalities in Jasper County are: Airport Drive, Alba, Asbury, Carl Junction, Carterville, Carthage, Duenweg, Duquesne, Fidelity, Neck City, Oronogo, Sarcoxie, and Waco. Municipalities in Newton County are: Diamond, Granby, Leawood, Neosho, Seneca, Stark City, and Wentworth. The remainder of the county is comprised of pastures and old mining areas, along with a few wooded areas. While sparsely developed, agricultural areas do have assets—primarily livestock—that are vulnerable to the effects of natural hazards. The differences in vulnerability will be discussed in greater detail in the following pages.

3.2 Assets at Risk

This section assesses the planning area population, structures, critical facilities and infrastructure, and other important assets that may be at risk to natural hazards. The inventory of assets for each jurisdiction were derived from parcel data from the Jasper and Newton County Assessor and the local jurisdiction data collection questionnaires to the greatest extent possible dependent on local staff expertise and capacity.

3.2.1 Total Exposure of Population and Structures

Table 3.3 shows the total population, building count, estimated value of buildings, estimated value of contents and estimated total exposure to parcels for the unincorporated county and each incorporated city. For multi-county communities, the population and building data may include data on assets located outside the planning area. Table 3.4 that follows provides the building value exposures for the county and each city in the planning area broken down by usage type. Finally, Table 3.5 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 3.3. Maximum Population and Building Exposure by Jurisdiction

Jurisdiction	2019 Annual Population Estimate	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)
Unincorp. Jasper County	121,328	26115	$1,886,883	$1,132,196	$3,019,079
City of Alba	681	252	$35,660	$19,556	$55,216
City of Asbury	279	150	$17,378	$10,573	$27,951
City of Carl Junction	8,072	2873	$405,917	$215,017	$620,934
City of Carterville	2,253	933	$126,210	$70,967	$197,176
City of Carthage	14,708	5736	$830,811	$497,162	$1,327,973
City of Duenweg	1,384	547	$76,803	$47,657	$124,460
City of Duquesne	1,185	930	$135,381	$82,579	$217,960
Village of Fidelity	269	185	$22,859	$15,738	$38,597
City of Jasper					
City of Neck City	161	26115	$9,022	$4,662	$13,684

City of Oronogo	2,609	84	$109,514	$56,170	$165,684
City of Sarcoxie	1,682	849	$96,106	$58,970	$155,076
City of Waco	67	668	$4,590	$2,239	$6,829
Jasper County Totals	**1,489,286**	**39380**	**$2,800,115**	**$2,135,617**	**$4,935,731**
Unicorp. Newton County	58,236	23830	$1,760,184	$971,945	$2,732,129
City of Diamond	874	406	$56,507	$28,073	$84,580
City of Granby	2,047	1099	$138,320	$77,124	$215,444
Village of Leawood	646	289	$36,512	$18,869	$55,382
City of Neosho	11,990	5019	$738,432	$462,340	$1,200,772
City of Seneca	2,490	1044	$153,387	$84,333	$237,719
Village of Stark City	119	83	$9,685	$5,365	$15,050
Village of Wentworth	134	74	$9,232	$5,050	$14,282
Newton County Totals	**76,536**	**31844**	**$2,902,259**	**$1,648,050**	**$4,555,359**

Source: U.S. Bureau of the Census, Annual population estimates/ 5-Year American Community Survey 2019; 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 3.4. Building Values/Exposure by Usage Type

Jurisdiction	Residential	Commercial	Industrial	Agricultural	Total
Unincorp. Jasper County	$60,528	$180,148	$13,079	$9,685	$130,640
City of Alba	$65	$5,392	$2,012	$136	$0
City of Asbury	$154	$3,922	$0	$0	$0
City of Carl Junction	$84	$34,069	$16,097	$1,773	$2,228
City of Carterville	$98	$11,029	$1,006	$818	$2,490
City of Carthage	$294	$138,481	$22,134	$3,956	$21,752
City of Duenweg	$79	$12,990	$1,006	$1,364	$2,621
City of Duquesne	$149	$21,569	$8,049	$682	$7,862
Village of Fidelity	$205	$8,824	$0	$0	$0
City of Jasper					
City of Neck City	$79	$245	$0	$136	$0
City of Oronogo	$229	$4,657	$2,012	$409	$0
City of Sarcoxie	$154	$22,794	$2,012	$682	$262
City of Waco	$112	$0	$0	$0	$0
Jasper County Totals	$62,232	$444,121	$67,407	$19,644	$167,854
Unicorp. Newton County	$30,684	$136,189	$23,113	$5,224	$48,045
City of Diamond	$6	$5,230	$5,778	$193	$0
City of Granby	$237	$20,483	$5,778	$774	$343
Village of Leawood	$15	$2,397	$1,156	$0	$0
City of Neosho	$266	$143,380	$52,003	$5,224	$44,957
City of Seneca	$96	$27,020	$18,490	$1,354	$2,745
Village of Stark City	$20	$872	$0	$193	$0
Village of Wentworth	$3	$872	$0	$0	$0
Newton County Totals	$31,327	$336,442	$106,318	$12,964	$96,091

Source: Missouri GIS Database, SEMA Mitigation Management Section

Table 3.5. Building Counts by Usage Type

Jurisdiction	Residential Counts	Commercial Counts	Industrial Counts	Agricultural Counts	Total
Unincorp. Jasper County	12965	735	13	71	997
City of Alba	14	22	2	1	-
City of Asbury	33	16	-	-	-
City of Carl Junction	18	139	16	13	17
City of Carterville	21	45	1	6	19
City of Carthage	63	565	22	29	166
City of Duenweg	17	53	1	10	20
City of Duquesne	32	88	8	5	60
Village of Fidelity	44	36	-	-	-
City of Jasper					
City of Neck City	17	1	-	1	-
City of Oronogo	49	19	2	3	-
City of Sarcoxie	33	93	2	5	2
City of Waco	24	-	-	-	-
Jasper County Totals	13942	4217	193	254	1958
Unicorp. Newton County	10494	625	20	27	140
City of Diamond	2	24	5	1	-
City of Granby	81	94	5	4	1
Village of Leawood	5	11	1	-	-
City of Neosho	1	-	-	-	-
City of Seneca	33	124	16	7	8
Village of Stark City	7	4	-	1	-
Village of Wentworth	1	4	-	-	-
Newton County Totals	10715	1544	92	67	280

Source: Missouri GIS Database, SEMA Mitigation Management Section; Public School Districts and Special Districts

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

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

Public School District	Enrolment	Building Count	Building Exposure ($)	Contents Exposure ($)	Total Exposure ($)

Source: http://mcds.dese.mo.gov/quickfacts/Pages/District-and-School-Information.aspx., select the file for the most recent year called "20xx Building Enrollment PK-12", filter the spreadsheet by selecting only the public school districts in the planning area. The Building Exposure, Contents Exposure, and Total Exposure amounts come from the completed Data Collection Questionnaires from Public School Districts. In general, the school districts obtain this information from their insurance coverage amounts.

3.2.2 Critical and Essential Facilities and Infrastructure

This section will include information from the Data Collection Questionnaire and other sources concerning the vulnerability of participating jurisdictions' critical, essential, high potential loss, and

transportation/lifeline facilities to identified hazards. Definitions of each of these types of facilities are provided below.

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

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

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

Jurisdiction	Airport Facility	Bus Facility	Childcare Facility	Communications Tower	Electric Power Facility	Emergency Operations	Fire Service	Government	Housing	Shelters	Highway Bridge	Hospital/Health Care	Military	Natural Gas Facility	Nursing Homes	Police Station	Potable Water Facility	Rail	Sanitary Pump Stations	School Facilities	Stormwater Pump Stations	Tier II Chemical Facility	Wastewater Facility	TOTAL
City of Alba	0	0					0																	
City of Asbury	0	0					1																	
City of Carl Junction	0	1					1																	
City of Carterville	0	1					1																	
City of Carthage	0	0					1																	
City of Duenweg	0	1					1																	
City of Duquesne	0	0					0																	
Village of Fidelity	0	0					0																	
City of Neck City	0	0					0																	
City of Oronogo	0	0					1																	
City of Sarcoxie	0	0					1																	
City of Waco	0	0					0																	
Jasper County	1	2					11				219													
City of Diamond	0	0					1																	
City of Granby	0	0					1																	
Village of Leawood	0	0					0																	
City of Neosho	0	0					1																	
City of Seneca	0	0					1																	
Village of Stark City	0	0					1																	
Village of Wentworth	0	0					0																	
Newton County	0	0					9				130													

Source: Missouri 2018 State Hazard Mitigation Plan and Hazard Mitigation Viewer; Data Collection Questionnaires; Hazus, etc.

Bridges: The term “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.

Jasper and Newton County Bridges

Jasper and Newton County Structurally Deficient Bridges

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.

Table 3.8. Threatened and Endangered Species in Jasper County and Newton County

Common Name	Scientific Name	Status
Gray Bat	*Myotis grisescens*	Endangered
Running Buffalo Clover	*Trifolium stoloniferum*	Endangered
Northern long-eared bat	*Myotis septentrionalis*	Threatened
Neosho madtom	*Noturus placidus*	Threatened
Ozark cavefish	*Amblyopsis rosae*	Threatened
Geocarpon	*Geocarpon minimum*	Threatened
Western Prairie Fringed Orchid	*Platanthera praeclara*	Threatened

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

Natural Resources: **Table 3.9** provides the names and locations of parks and conservation areas in the planning area.

Table 3.9. Parks in Jasper County and Newton County

Park / Conservation Area	Address	City
Kellogg Lake	Highway 96	Carthage
Wah-Sha-She Prairie	County Rd 300	Asbury
Bicentennial Conservation Area	Landis Rd	Neosho
Capps Creek Conservation Area	Wallaby Rd	Stark City
Diamond Grove prairie Conservation	Lark Rd	Diamond
Fort Crowder Conservation Area	HH Highway	Neosho
Morse Park	Dean Keeling Dr	Neosho
Walter Woods Conservation Area	Douglas Fir Rd	Redings Mill
Wildcat Glade Natural Area	Castle Drive	Joplin

Source: http://mdc7.mdc.mo.gov/applications/moatlas/AreaList.aspx?txtUserID=guest&txtAreaNm=s
The best source for park information is usually county and community websites.

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 3.10. Jasper and Newton County Properties on the National Register of Historic Places

Property	Address	City	Date Listed

Jasper County			
66 Drive-In	17231 Old 66 Boulevard	Carthage	4/2/2003
Buchanan, Lucius P., House	3708 E. University Pkwy.	Joplin	08/22/2016
Carthage Courthouse Square Historic	Bounded by E. Central Ave, S. Maple,	Carthage	5/15/1980
Carthage South Historic District	City limits	Carthage	5/6/1982
Cassill Place Historic District	First half-block of W. Central east of	Carthage	½/1986
Cave Spring School and Cemetery	4323 Cty. Rd. 4	Sarcoxie	7/17/2012
Colonial Apartments	406 Walnut St.	Carthage	8/14/2001
Elks Club Lodge No. 501	318 – 320 W. 4th St.	Joplin	6/3/1985
Fifth and Main Historic District	501 – 513 S. Main St.; 502 – 508	Joplin	7/5/2006
Fox Theater	415 S. Main St.	Joplin	7/30/1990
Gentry Apartments	318 S. Wall St.	Joplin	8/8/2006
Inter-State Grocer Company Building	1027 – 1035 S. Main St.	Joplin	10/24/2008
Jasper County Courthouse	Courthouse Square	Carthage	2/8/1973
Joplin and Wall Avenues Historic District	Portions of S. Joplin and Wall Aves.,	Joplin	10/12/2010
Joplin Carnegie Library	9th and Wall Sts.	Joplin	7/10/1979
Joplin Connor Hotel (demolished)	324 Main St.	Joplin	2/28/1973
Joplin Downtown Historic District	S. Main St., between E. 4th and E.	Joplin	7/16/2008
Joplin Furniture Company Building	702 – 708 Main St.	Joplin	8/7/2012
Joplin Supply Company	228 S. Joplin Ave.	Joplin	7/3/2007
Joplin Union Depot	Broadway and Main St.	Joplin	3/14/1973
Main and Eighth Streets Historic District	Portions of the 800 and 900 block of	Joplin	4/15/2011
Middle West Hotel	1 S. Main St.	Webb City	9/16/1982
Murphysburg Historic District	Roughly bounded by S. Sergeant, S.	Joplin	5/18/15
Newman Brothers Building	602 – 608 S. Main St.	Joplin	7/23/1990
Olivia Apartments	320 Moffet Ave.	Joplin	6/20/2008
Pennington Drug Company	512-520 Virginia Ave.	Joplin	10/10/17
Phelps Country Estate	RR 1, Newcastle Rd. just west of CR	Carthage	8/29/1983
Rains Brothers Building (destroyed by fire	906 – 908 S. Main St.	Joplin	7/19/1990
Ridgway Apartments	402 and 404 S. Byers Ave.	Joplin	8/8/2006
St. Louis and San Francisco Railroad	605 Main St.	Joplin	10/22/2002
St. Peter the Apostle Catholic Church	812 Pearl St.	Joplin	6/28/1991
Sarcoxie	Along 5th, 6th, Center, and Cross Sts.	Sarcoxie	10/20/2014
Scottish Rite Cathedral	505 Byers Ave.	Joplin	6/21/1990
South Main Street Historic District	Western side of S. Main St., between	Joplin	10/12/2010
Downtown Webb City Historic District	Roughly N. & S. Main, E. & W.		7/18/2014
Newton County			
First Battle of Newtonia Historic District	Junction of Routes 86 and O	Newtonia	12/23/2004
Bonnie & Clyde Garage	3 miles south of Monument	Joplin	5/15/2009
George Washington Carver	3 miles south of Monument	Diamond	10/15/1966
Jolly Mill	Southwest of Pierce City	Pierce City	10/13/1983
Lentz-Carter Merchandise Store	744 Ozark St.	Stella	8/19/2008
Neosho Colored School	639 Young St.	Neosho	4/17/2017
Neosho Commercial	Along	sections	8/12/1993
Neosho High School	Washington, and Wood Sts.; also	Neosho	8/30/2002
Neosho Wholesale	W. McCord and N. Wood Sts.	Neosho	4/16/2013
Matthew H. Ritchey House	224 N. Washington St.	Neosho	12/5/1978
Second Baptist Church	Mill St.	Newtonia	1/4/1996
Second Battle of Newtonia Site	430 W. Grant St.	Neosho	12/23/2004

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

Table 3.11. Major Non-Government Employers in Jasper and Newton County

Employer Name	Main Locations	Product or Service	Employees

Source: Data Collection Questionnaires; local Economic Development Commissions

Table 3.12. Agriculture-Related Sales in Jasper and Newton County

Value of Sales by Commodity Group	State Rank (out of 114)
Jasper County	
Horses, ponies, mules, burros and donkeys	8
Poultry from eggs	11
Other crops and hay	26
Newton County	
Vegetables, melons, potatoes, and sweet potatoes	7
Milk from cows	1
Poultry and eggs	2

Source: 2012 Missouri Agricultural Census

Table 3.13. Top Livestock Inventory Items

Livestock Inventory	State Rank (out of 114) Product or Service Employees
Jasper County	
Turkeys	8
Pullets for laying flock replacement	11
Cattle and calves	27
Newton County	
Layers	1
Pullets for laying flock replacement	1
Brollers and other meat-type chickens	2
Turkeys	7
Cattle and calves	3

Source: 2012 Missouri Agricultural Census

3.3 Land Use and Development

3.3.1 Development Since Previous Plan Update

Table 3.14. County Population Growth, 2010-2019

Jurisdiction	Total Population 2010	Total Population 2019	2010-2019 # Change	2010-2019 % Change
Jasper County	117,404	121,328	+16,642	15.9%
City of Alba	530	681	+93	15.8%
City of Asbury	207	279	+61	28%
City of Carl Junction	7,445	8,072	+2,778	52.5%
City of Carterville	1,891	2,253	+403	21.8%
City of Carthage	14,502	14,708	+2,040	16.1%
City of Duenweg	1,121	1,384	+350	33.8%
City of Duquesne	1,763	1,185	-455	-27.7%
Village of Fidelity	257	269	+16	6.7%
City of Neck City	186	161	+42	35.3%
City of Oronogo	2,381	2,609	+1,633	167.3%
City of Sarcoxie	1,341	1,682	+328	24.2%
City of Waco	87	67	-19	-22.1%
Newton County	58,114	58,236	+5,600	10.6%
City of Diamond	902	874	+66	8.2%
City of Granby	2,134	2,047	-74	-3.5%
Village of Leawood	682	646	-258	-28.5%
City of Neosho	11,835	11,990	+1,485	14.1%
City of Seneca	2,336	2,490	+355	16.6%
Village of Stark City	139	119	-37	-23.7%
Village of Wentworth	151	134	-7	-5%

Source: U.S. Bureau of the Census, Decennial Census, Annual Population Estimates, American Community Survey 5-year Estimates; Population Statistics are for entire incorporated areas as reported by the Census bureau

Explain that population growth or decline is generally accompanied by increases or decreases in the number of housing units. **Table 3.14** provides the change in numbers of housing units in the planning area from 2010 to 2019.

Table 3.15. Change in Housing Units, 2010-2019

Jurisdiction	Housing Units 2010	Housing Units 2019	2010-2019 # Change	2000-2019 % Change
Jasper County	**50,259**	**51,322**	**-1,063**	**2.07**
City of Alba	244	286	-42	14.69
City of Asbury	84	122	-38	31.15
City of Carl Junction	2682	2,914	-232	7.96
City of Carterville	792	832	-40	4.81
City of Carthage	5,807	5,610	197	-3.51
City of Duenweg	450	627	-177	28.23
City of Duquesne	751	994	-243	24.45
Village of Fidelity	120	127	-7	5.51
City of Jasper	470	476	-6	1.26

City of Neck City	54	69	-15	21.74
City of Oronogo	913	869	44	-5.06
City of Sarcoxie	619	731	-112	15.32
City of Waco	31	37	-6	16.22
Newton County	**24,076**	**24,753**	**-677**	**2.74**
City of Diamond	405	413	-8	1.94
City of Granby	966	956	10	-1.05
Village of Leawood	309	327	-18	5.50
City of Neosho	4,954	4,897	57	-1.16
City of Seneca	927	1,013	-86	8.49
Village of Stark City	76	64	12	-18.75
Village of Wentworth	140	134	6	-4.48

Source: U.S. Bureau of the Census, Decennial Census, American Community Survey 5-year Estimates; Population Statistics are for entire incorporated areas as reported by the U.S. Census Bureau

No changes in development have impacted the community's vulnerability.

3.3.2 Future Land Use and Development

Future growth, land use, and development of the planning area.

School District's Future Development

Special District's Future Development

3.4 Hazard Profiles, Vulnerability, and Problem Statements

Each hazard will be analyzed individually in a hazard profile. The profile will consist of a general hazard description, location, strength/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.

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 areas in the planning area that are affected by the hazard. 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. This section should also include information on the typical or expected strength/magnitude/extent of the hazard in the planning area. 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 can be determined by dividing the number of recorded events by the number of years of available data 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 should be reported as 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.

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.

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). The county-level assessments in the State Plan were based on the following sources:

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

The vulnerability assessments in the Jasper-Newton Bi 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.

Vulnerability Overview provided for each hazard consists of:

Potential Losses to Existing Development: Includes types and numbers, of buildings, critical facilities.

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

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

Problem Statements

Each hazard analysis **must** conclude with a brief summary of the problems created by the hazard in the planning area, and possible ways to resolve those problems.

3.1.2 Flooding (Riverine and Flash)

Hazard Profile

Hazard Description

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

Flooding caused by dam and levee failure is discussed in Section 3.4.2 and Section 3.4.3 respectively. 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.

Table 3.16. Jasper and Newton County NCEI Flood Events by Location, 1999-2020

Location	# of Events
Jasper County	51
-Alba	8
-Avilla	1
-Belleville	1
-Brooklyn Heights	2
-Carterville	1
-Carthage	5
-Chitwood	1
-Dudenville	1
-Duquesne	1
-Fidelity	1
-Jasper	6
-Joplin	6
-Kendricktown	1
-Lakeside	2
-Maple Grove	1
-Medoc	1
-Morgan Heights	1
-Oronogo	3
-Reeds	7
-Russell	1
-Sarcoxie	3
-Waco	1
Newton County	33
-Diamond	1
-Fairview	1
-Granby	2
-Hornet	2
-McElhany	1
-Neosho	9
-Newtonia	2
-Pepsin	1
-Racine	3
-Redings Mill	3
-Ritchey	2
-Seneca	1
-Stark City	3
-Stella	1
-Tipton Ford	1

Source: National Centers for Environmental Information, 2021

The NCEI storm event data lists flash flood events according to the nearest community or place name. Most of these events cover larger areas than the small geographic areas reported in the data. Some specific locates are listed within the narratives for flash flood events. Although some events may not be inside the corporate limits of the community identified in the narrative, they are in such proximity that the community names would be the most affected by impassible roads. It is safe to assume that numerous low water crossings were inundated by heavy rains and in turn, exacerbated flash flooding across the entire county. In addition, multiple records are related to the same event and vice versa.

Table 3.17. Jasper and Newton County NCEI Flash Flood Events by Location, 1999-2020

Location	# of Events
Jasper County	47
-Alba	3
-Asbury	6
-Atlas	1
-Avilla	4
-Belleville	1
-Carl Junction	3
-Carterville	2
-Carthage	14
-Carytown	2
-Central City	2
-Chitwood	4
-Joplin	5
Newton County	100
-Dessa	3
-Diamond	4
-East Portion	2
-Fairview	1
-Granby	2
-Hornet	7
-McElhany	1
-Monark Springs	1
-Neosho	72
-Newtonia	7

Source: National Centers for Environmental Information, 2021

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.

According to the U.S. Geological Survey, two critical factors affect flooding due to rainfall: rainfall duration and rainfall intensity – the rate at which it rains. These factors contribute to a flood's height, water velocity and other properties that reveal its magnitude.

National Flood Insurance Program (NFIP) Participation

Table 3.18. NFIP Participation in Jasper and Newton County

Community ID #	Community Name	NFIP Participant (Y/N/Sanctioned)	Current Effective Map Date	Regular-Emergency Program Entry Date
290749	Airport Drive, Village of	Y	11/2/2012	3/4/2002
290765	Asbury, City of	N	11/2/2012	
290334	Brooklyn Heights, Town of	N	11/2/2012	
290179	Carl Junction, Coty of	Y	11/2/2012	6/1/1982
290180	Carterville, City of	Y	11/2/2012	7/16/1984

290181	Carthage, City of	Y	11/2/2012	6/15/1983
290367	Carytown, City of	N	11/2/2012	
290182	Duenweg, City of	Y	11/2/2012	4/1/2004
290728	Duquesne, City of	Y	11/2/2012	1/2/2013
290426	Fidelity, Town of	Y	11/2/2012	
290722	Jasper, City of	N	11/2/2022	
290807	Jasper County	Y	11/2/2012	5/15/1987
290183	Joplin, City of	Y	11/2/2012	12/8/1976
290184	LaRussell, City of	N	11/2/2012	
290376	Neck City, City of	N	11/2/2012	
290185	Oronogo, City of	Y	11/2/2012	3/4/1985
290186	Sarcoxie, City of	Y	11/2/2012	7/16/1979
290187	Webb City, City of	Y	11/2/2012	6/1/1982
295408	Cliff Village, City of	N	11/26/2010	
290725	Diamond, City of	Y	FSFHA	
290263	Granby, City of	Y	11/26/2010	7/3/1985
290904	Grand Falls Plaza, Town of	Y	11/26/2010	8/26/1993
295411	Loma Linda, City of	Y	11/26/2010	2/19/2013
290265	Neosho, City of	Y	11/26/2010	7/5/1982
290820	Newton County	Y	11/26/2010	6/30/1999
295412	Newtonia, City of	Y	11/26/2010	1/2/2013
290484	Redings Mill, Village of	Y	11/26/2010	3/4/1985
290485	Ritchey, Town of	N	11/26/2010	
290486	Saginaw, Village of	Y	11/26/2010	9/4/1985
290269	Seneca, City of	Y	11/26/2010	3/15/1977
290487	Shoal Creek Drive, Village of	Y	11/26/2010	10/12/2016
295413	Shoal Creek Estates, Village of	N	11/26/2010	11/26/2011
290488	Stella, Village of	N	11/26/2010	
290483	Wentworth, Town of	Y	11/26/2010	11/26/2010

Source: NFIP Community Status Book, 2021; BureauNet, http://www.fema.gov/national-flood-insurance-program/national- flood-insurance-program-community-status-book; M= No elevation determined – all Zone A, C, and X: NSFHA = No Special Flood Hazard Area; E=Emergency Program.

Table 3.19. NFIP Policy and Claim Statistics as of Date

Community Name	Policies in Force	Insurance in Force	Closed Losses	Total Payments

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

The City of _____shows the most insurance payments with four closed losses with total payments of $_____

Repetitive Loss/Severe Repetitive Loss Property

Repetitive Loss Properties are those properties with at least two flood insurance payments of $1,000 or more in a 10-year period. According to the Flood Insurance Administration, jurisdictions included in the planning area have a combined total of __ repetitive loss properties. As of [insert date], ___ properties have been mitigated, leaving __ un-mitigated repetitive loss properties.

Table 3.20. Jasper and Newton County Repetitive Loss Properties

County	Number of Losses	Total Properties	Number of Commercial	Number of Residential	Building Total	Content Total

			Properties	Properties		
Jasper	16	7	0	7	$405,952.14	$116,293.20
Newton	35	12	1	11	$1,404,129.18	$303,546.50

Source: Flood Insurance Administration as of 2021

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

There is one non-mitigated repetitive loss property in _____County, Missouri. One residential property in the City of _____ shows two losses totaling $103,583 in building and contents payments.

Previous Occurrences

Historically, both Jasper County and Newton County have been subject to damage from floods and flood-related events. Loss of agricultural lands, homes, businesses, and infrastructures, as well as the temporary closing of some local businesses, contribute to economic losses. Flooding that does occur in the county is predominantly caused by intense rainfall associated with passing thunderstorms. Because there are no major waterways, such as the Missouri River, in southwest Missouri, the most prevalent flooding activity occurs in the form of flash floods. This does not hinder the severity of flooding within the counties, however. Flooding does occur along streams and rivers throughout the county. These rainfall events can cause minor localized flooding in urban areas and over low-water crossings. Figures 2.1 and 2.2 illustrate the 100-year floodplain for Jasper and Newton counties and all communities that are located within or border the 100-year floodplain.

In the two county regions, 316 flood events have been recorded since 1996. Of these 316 events, 243 were flash flooding events. The largest disaster to impact Jasper and Newton counties in recent years was the flooding event of 2002 which caused $10,000 in damages in both counties. Most instances of riverine flooding in the two-county region are limited in scope and impact due to the size of local rivers and streams. Flash flooding potentially impacts every jurisdiction and has caused the most significant losses. The 2008 flash flood event in Hornet, for example, caused $2 million in damages.

The FEMA repetitive loss list shows a number of repetitive losses in both counties as of June 1, 2019. Table 3.21 summarizes these losses.

Table 3.21. NCEI Jasper and Newton County Flash Flood Events Summary, 1999 to 2020

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
JASPER					
1999	5	0	0	1	0
2000	5	0	0	0	0
2001	2	0	0	2	0
2002	3	0	0	0	0
2003	0	0	0	0	0
2004	7	0	0	0	0
2005	2	0	0	0	0
2006	5	0	0	0	0
2007	12	0	0	1	0

2008	10	0	0	2	0
2009	8	0	0	0	0
2010	4	0	0	1	0
2011	2	0	0	1	0
2012	1	0	0	0	0
2013	11	0	0	1	0
2014	2	0	0	0	0
2015	6	0	0	0	0
2016	3	0	0	0	0
2017	6	0	0	1	0
2018	1	0	0	0	0
2019	16	0	0	4	0
2020	2	0	0	0	0
NEWTON					
1999	5	0	0	0	0
2000	3	0	0	1	0
2001	5	0	0	0	0
2002	4	0	0	0	0
2003	5	0	0	1	0
2004	8	0	0	0	0
2005	9	0	0	0	0
2006	9	0	0	0	0
2007	11	0	0	0	0
2008	10	0	0	1	0
2009	8	0	0	0	0
2010	6	0	0	1	0
2011	3	0	0	3	0
2012	1	0	0	0	0
2013	2	0	0	0	0
2014	2	0	0	0	0
2015	4	0	0	0	0
2016	1	0	0	0	0
2017	6	0	0	1	0
2018	0	0	0	0	0
2019	7	0	0	1	0
2020	4	0	0	1	0

Source: NCEI, data accessed February 17, 2021

Table 3.22 on the following page summarizes riverine flood events listed in the NCEI in Jasper and Newton County by year. The data contains record of 35 events from January 1996 to January 2019. The greatest amount of losses occurred in 2002.

Table 3.22. NCEI Jasper and Newton County Riverine Flood Events Summary, 1996 to 2019

Year	# of Events	# of Deaths	# of Injuries	Property Damages	Crop Damages
JASPER					
1996					
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Source: NCEI, February 17, 2021

Figure 3.1 Jasper County Riverine Flood Events 1996 - 2019

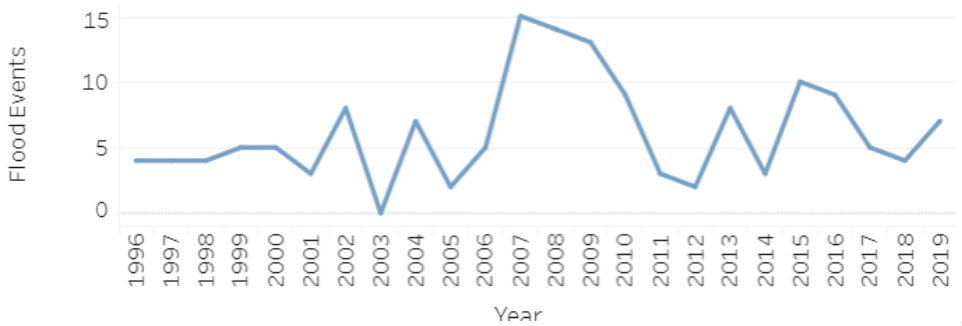
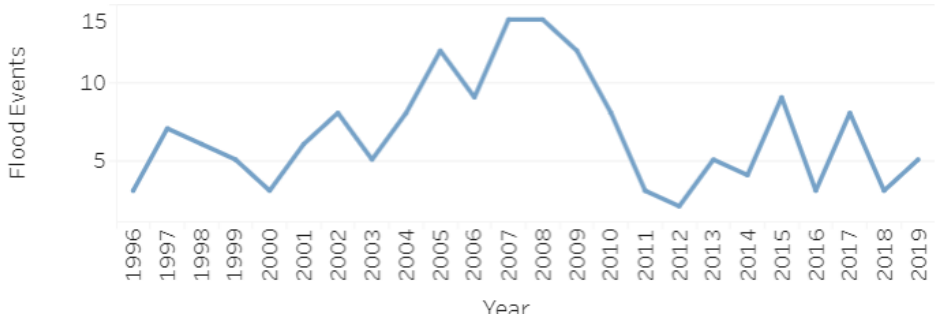


Figure 3.2 Newton County Riverine Flood Events 1996 - 2019



Probability of Future Occurrence

Most flood events in Jasper and Newton counties have minimal impact on quality of life. Historically, no critical facilities or services were shut down for more than a few hours, and property damage was less than 10%. During this period of time, a total of 316 events occurred in 22 years. Therefore, the probability for any flood event in any given year for Jasper and Newton counties given historic events is 100%. (316 events / 22 years * 100 = 1,436%.)

Changing Future Conditions Considerations

Vulnerability

Vulnerability Overview

HAZUS estimates the number of structures within the floodplains for both counties. Jasper County has approximately 670 buildings in the floodplain, while Newton County has approximately 496. Those jurisdictions which at least partially lie in the 100-year floodplain are most susceptible to the potential damage from a flooding event. A total of five school districts, two fire stations, and 2 police stations may also be impacted with minor damages and loss of use. To date, HAZUS data is only available on a countywide basis. No data is presently available for individual jurisdictions.

Potential Losses to Existing Development

Flood loss estimates were developed using a GIS methodology. A county-wide structures layer development by the University of Missouri in partnership with regional planning commissions (RPCs) across the state was overlaid on FEMA HAZUS Flood Risk area maps to show the number of structures and structure types situated inside Special Flood Hazard Areas.

Impact of Previous and Future Development

Future development could impact flash flooding and riverine flooding in the planning area. Development in low-lying areas near rivers and streams or where interior drainage systems are not adequate to provide drainage during heavy rainfall events will be at risk to flash flooding. Future development would also increase impervious surfaces causing additional water run-off and drainage problems during heavy rainfall events. Not all jurisdictions in the county participate in the NFIP. Not all jurisdictions in the county have identified SFHAs. Zoning regulations that prohibit development in SFHAs and violations of floodplain management regulations are effective mitigation strategies in participating municipalities.

Problem Statement

As previously stated, jurisdictions with 100-year floodplains have the highest risk of flood-

related damage. In the case of a flood event, significant portions of the previously identified jurisdictions and unincorporated portions of the county may be at risk for flood-related damage in a 100-year event based upon existing floodplains throughout the county. HAZUS data suggests that 26% of buildings in Jasper County and 28% of buildings in Newton County within the floodplain may sustain damage of some variety during a 100-year event.

Since the adoption of the 2010 plan, significant changes in building development and population shifts have taken place in nearly every jurisdiction. However, because of the existence of floodplain regulations, no new development has taken place in the floodplains without elevation certificates and building permits. As such, damages to future structures have been eliminated from consideration. It is important to continue to engage the public in flood mitigation and for jurisdictions to actively seek flood plain buyouts.

Hazard Summary by Jurisdiction

All local governments in the county are not equally at risk to flood hazards. Many parts of the county are vulnerable to street and road flooding during periods of heavy rainfall. Newton County is particularly vulnerable to closure during flooding events. Due to the topography and many creeks and streams in the county, numerous low water crossings are damaged and create a significant hazard to public safety during flood events. This heightens the risk and exposure to infrastructure maintained by the Jasper or Newton County Commission. There is no heightened risk to school district facilities due to flood as no facilities are located inside identified flood risk areas. No previous damage to school facilities by flooding was reported on the Data Collection Questionnaires used in the planning process.

3.1.3 Levee Failure

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://mrcc.isws.illinois.edu/1913Flood/awareness/materials/SoYouLiveBehindLevee.pdf).

Following are the FEMA publication descriptions of different kinds of levee failure.

> **Overtopping: When a Flood Is Too Big**
>
> Overtopping occurs when floodwaters exceed the height of a levee and flow over its crown. As the water passes over the top, it may erode the levee, worsening the flooding and potentially causing an opening, or breach, in the levee.
>
> **Breaching: When a Levee Gives Way**
>
> A levee breach occurs when part of a levee gives way, creating an opening through which

floodwaters may pass. A breach may occur gradually or suddenly. The most dangerous breaches happen quickly during periods of high water. The resulting torrent can quickly swamp a large area behind the failed levee with little or no warning.

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

Geographic Location

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

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

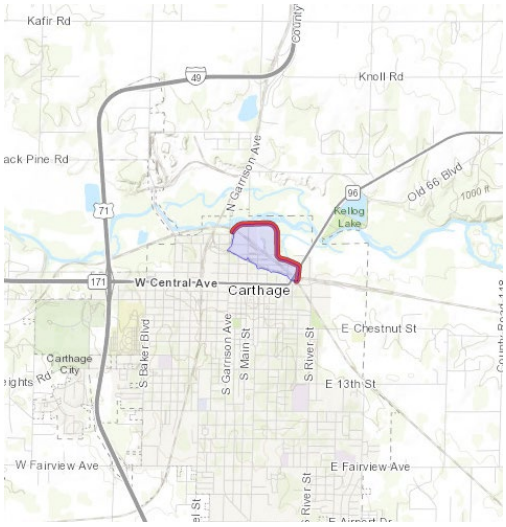
It is likely that agricultural levees and other non-regulated levees within the planning area exist that are not inventoried or inspected. These levees that are not designed to provide protection from the 1-percent annual chance flood would overtop or fail in the 1-percent annual chance flood scenario.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

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.

The National Levee Database shows only 1 known levee in Jasper County and 0 in Newton County. The Jasper County Levee District No. 1 system is located along the left or south bank of the Spring River within the City limits of Carthage, Jasper County, Missouri. Primarily services as flood damage reduction for 90 acres of highly developed, commercial businesses, and industrial properties. Fiscal properties were valued at $6.5M in 1951 according to the O&M Manual. The levee is approximately 1.1 miles in length and consists only of earthen levee. Top elevation varies from 952 to 958 from Sta. 57+60 (Garrison Ave) to Sta. 0+00 (near the Burlington Northern and Santa Fe Railway). The design flood was unable to be obtained. The levee system was constructed in between Jan. 30, 1956 to Oct. 15, 1956. The levee contains four (4) drainage structures, no floodwalls, one pump station, no street closures, two (2) railroad closures, and one storage house for storing sandbags used as closure of the railroads. Twenty (20) relief wells on 100-foot centers are present along the landside toe of the levee embankment. The levee was constructed of nearby soils from the bank of the Spring River up to 30 feet from the toe of the riverside of the levee. Soil type(s) are unknown. The levee contains a 6 to 4 feet wide inspection trench that was extended 4 feet below the existing surface. The design consisted of 8-foot-wide crown with 3:1 side slopes on the land- and riverside, except for top ten (10) along the landside

which is 2:1.

Figure 3.1 County Levees Shown on DFIRM as Providing Protection from the 1-Percent Annual Chance Flood



Source: FEMA Flood Insurance Rate Map, 2021

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

There have been no occurrences of breaches of levees in Jasper or Newton County.

Probability of Future Occurrence

Although the levee is anticipated to perform poorly if fully loaded, the risk associated with Jasper County levee system is considered to be low because the associated consequences (life loss and property damages) are expected to be low to moderate. Although there have not been any issues

noted for this segment, the levee has only been loaded to 18%. The concerns driving the risk are seepage and closure structures.

The sponsor mows the levee regularly, there are no trees on the embankment. The culvert gates stems were broken, and the sponsor has made those repairs and the gates are now operational. The railroad swing gates are regularly operated, and maintenance performed to ensure they are operational when needed.

Seepage concerns are due to unknown condition of the relief wells and the numerous animal burrows. The majority of the relief wells appear to be destroyed or inoperable. The O&M manual indicated the construction of 46 wells on approximately 100-foot centers were part of the levee system. The NLD data provided locations of 20 relief wells. The levee embankment is clay with about 10 feet impervious blanket which is subsequently underlain with permeable gravels. The relief wells were designed to relieve uplift pressure, if the wells are clogged water pressure could build up and blow-out the landside toe.

Changing Future Conditions Considerations
Changing the climate is likely to increase the frequency of floods in Missouri. Over the last half century, average annual precipitation in most of the Midwest has increased by 5 to 10 percent. But rainfall during the four wettest days of the year has increased about 35 percent, and the amount of water flowing in most streams during the worst flood of the year has increased by more than 20 percent. During the next century, spring rainfall and average precipitation are likely to increase, and severe rainstorms are likely to intensify. Each of these factors will tend to further increase the risk of flooding.

Mississippi and Missouri Rivers
Flooding occasionally threatens navigation and riverfront communities, and greater river flows could increase these threats. In April and May 2011, a combination of heavy rainfall and melting snow caused a flood that closed the Mississippi River to navigation, threatened Caruthersville, and prompted evacuation of Cairo, Illinois, due to concerns that its flood protection levees might fail.

https://19january2017snapshot.epa.gov/sites/production/files/2016-09/documents/climate-change-mo.pdf

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. 84-99), and provide information about the levees on which the public relies. Inspection information also contributes to effective risk assessments and supports levee accreditation decisions for the National Flood Insurance Program administered by the Federal Emergency Management Agency (FEMA).

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

Both Routine and Periodic Inspections result in a rating for operation and maintenance. Each levee segment receives an overall segment inspection rating of Acceptable, Minimally Acceptable,

or Unacceptable. **Figure 3.4** below defines the three ratings.

Figure 3.4 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.

Potential Losses to Existing Development

According to the National Levee Database, the likelihood of inundation due to breach and/or system component malfunction in combination with loss of life, economic, or environmental consequences results in low risk

Impact of Previous and Future Development

There is no current development planned in levee areas.

Hazard Summary by Jurisdiction

The Jasper County Levee District No. 1 system is located along the left or south bank of the Spring River within the City limits of Carthage, Jasper County, Missouri. Primarily services as flood damage reduction for 90 acres of highly developed, commercial businesses, and industrial properties. Fiscal properties were valued at $6.5M in 1951 according to the O&M Manual. The levee is approximately 1.1 miles in length and consists only of earthen levee. Top elevation varies from 952 to 958 from Sta. 57+60 (Garrison Ave) to Sta. 0+00 (near the Burlington Northern and Santa Fe Railway). The design flood was unable to be obtained. The levee system was constructed in-between Jan. 30, 1956 to Oct. 15, 1956. The levee contains four (4) drainage structures, no floodwalls, one pump station, no street closures, two (2) railroad closures, and one storage house for storing sandbags used as closure of the railroads. Twenty (20) relief wells on 100-foot centers are present along the landside toe of the levee embankment. The levee was constructed of nearby soils from the bank of the Spring River up to 30 feet from the toe of the riverside of the levee. Soil type(s) are unknown. The levee contains a 6 to 4 feet wide inspection trench that was extended 4 feet below the existing surface. The design consisted of 8-foot-wide crown with 3:1 side slopes on the land- and riverside, except for top ten (10) along the landside which is 2:1

Problem Statement

The probability of a catastrophic levee failure event happening is low; however, if there was such an event, the breach would affect 32 structures, 26 residents, and likely cause $38.2 million in

damages

3.1.4 Dam Failure

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.

According to the State Plan, Missouri had some 5,423 recorded dams in 2013, the largest number of man-made dams of any state in the country. Missouri topography allows lakes to be built easily and inexpensively, which accounts for the high number of dams. Despite the large number of dams, there are only 682 (about 13 percent) state regulated dams, with an additional 66 federally regulated dams. Federal dams in Missouri are primarily regulated by two federal agencies: the US Army Corps of Engineers (USACE) and the US Department of Agriculture Forest Service. The remaining 4,495 dams are unregulated.

Dams that fall under state regulation are non-federally regulated dams that are more than 35 feet in height. Most nonfederal dams are privately owned structures built either for agricultural, water supply or recreational use. The Department of Natural Resources (MDNR) Water Resources Center maintains the Dam and Reservoir Safety Program in Missouri. The program ensures that dams over 35 feet in height are safely constructed, operated, and maintained pursuant to Chapter 236 of the Revised Statutes of Missouri.

The Department of Natural Resources provided information about regulated and unregulated dams in Missouri. The information includes details of the dam dimensions, date of construction, approximate reservoir volume, contributing drainage basin area and hazard classification. In addition, USACE maintains the National Inventory of Dams (NID). The information in the NID database matches the list from the MDNR website with some additional details for dams in Jasper and Newton County. Although both agencies proved a hazard classification for dams, the dam classification systems differ.

The Missouri Dam and Reservoir Safety Council Rules and Regulations uses three classes of downstream environmental zones used when considering permits. The downstream environment zone is the area below the damn that would become inundated should the dam fail. Inundation is defined as water two feet or more over the submerged ground outside of the stream channel. These classes are based on the number of structures and types of development contained within the inundation area as presented in Table 3.16. The downstream environment zone classification is also used to prescribe the frequency of inspection.

Table 3.23 MoDNR Dam Hazard Classification Definitions

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

Source: Missouri Department of Natural Resources, http://dnr.mo.gov/env/wrc/docs/rules_reg_94.pdf

Table 3.24 NID Dam Hazard Classification Definitions

Commented [GB1]: FIX FREAKING TABLE #

Hazard Class	Definition
Low Hazard	Failure results only in minimal property damage
Significant Hazard	Failure could possibly result in the loss of life and appreciable property damage
High Hazard	If the dam were to fail, lives would likely be lost and extensive property damage would

Source: National Inventory of Dams

There is not a direct correlation between the State Hazard classification and the NID classifications. However, most dams that are in the States Classes I and II are considered NID High Hazard Dams.

Geographic Location

Dams Located Within the Planning Area

According to Missouri DNR's Dam Safety Division, Jasper County currently has 14 dams according listed in the National Inventory of Dams, none of which are presently regulated by the state. Newton County now has 20 dams according to the same data, seven of which are presently regulated by the state. The mean dam height is 30.7 feet in Newton County and 17 feet in Jasper County. All unregulated dams in the two-county region are less than 35 feet high. Because there are no base requirements for unregulated dams, people living downstream of these smaller unregulated dams are virtually at the mercy of the dam owner's construction and maintenance practices.

Table 3.25 Regulated Dams in the Newton County Planning Area

Dam Name	ID Number	Year Completed	Height (ft)	Dam Rating* *H(High), Significant (S), and Low (L)	Hazard Class

Limberlost Dam	MO20219	1957	42	H	2
Lost Creek B-2	MO20730	1980	35	L	3
Lost Creek D-1	MO20731	1980	37	H	2
Lost Creek E-1	MO20511	1977	46	H	1
Lost Creek F-3	MO20514	1977	39	H	1
Lost Creek Watershed Site A-1	MO20781	1992	49	H	1
Lost Creek Watershed Site C-2	MO20782	1992	55	H	1

Sources: HSTCC

Table 3.26 Non-Regulated Dams in the Jasper and Newton County Planning Areas

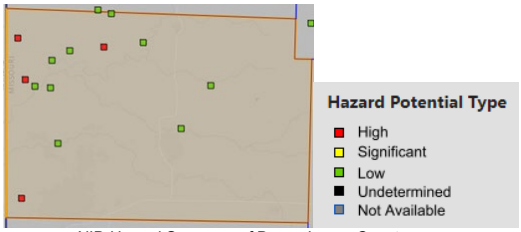
Dam Name	County	ID Number	Year Completed	Height (ft)	Dam Rating*	Hazard Class
Asbury Fams Dam	Jasper	MO20088	1965	12	L	3
Barker Lake Dam	Jasper	MO20441	1800	15	H	2
Blackberry Hay Farm Dam	Jasper	MO20196	1965	20	H	1
Doran Lake Dam	Jasper	MO20272	1954	15	L	3
Elliot Lake Dam	Jasper	MO20202	1968	22	H	2
Grand Falls Dam	Newton	MO20006	1920	15	L	3
Hargis Lake Dam	Newton	MO11820	1977	20	L	3
Herr Lake Dam	Jasper	MO20278	1967	15	H	2
Hickory Creek Structure H-1A	Newton	MO51152	2003	21	N/A	N/A
Hickory Creek Structure H-2A	Newton	MO51159	2003	25	H	2
Hickory Creek Structure H-9A	Newton	MO51148	2000	34	H	2
Hickory Creek Structure H-10D	Newton	MO51150	2002	26	N/A	N/A
Hickory Creek Structure H-11	Newton	MO51149	2000	34	H	2
Kellogg Lake Dam	Jasper	MO20009	1953	10	L	3
Lake Mintahama Dam	Newton	MO20280	1971	25	H	1
Maple Lane Farms Lake Dam	Jasper	MO20268	1972	20	L	3
MONoName40	Newton	MO20108	1950	15	L	3
MONoName 654	Jasper	MO20277	1958	5	L	3

Newton County Structure F-1 Dam	Newton	MO20512	1977	30	H	1
Newton County Structure F-2 Dam	Newton	MO20513	1977	30	H	1
Oscie Ora Acres Lake Dam	Jasper	MO20276	1968	15	L	3
Pepper Lake Dam	Newton	MO20223	1965	20	L	3
Rainey Lake Dam	Jasper	MO20267	1952	14	H	1
Scroggs Lake Dam	Jasper	MO20087	1955	30	L	3
Shelton Lake Dam	Jasper	MO20017	1956	25	L	3
Smith, Raymond Dam	Jasper	MO20269	1965	20	L	3
Stuffle Dam	Newton	MO20107	1969	18	L	3

Sources: HSTCC

Jasper County: According to the MDNR there are 13 total dams in Jasper County. The National Inventory of Dams list 0 dam % of High Hazard Potential with an Emergency Action Plan with 9 listed as low hazard potential, 4 listed as high hazard potential, and 0 listed as significant hazard potential.

Figure 3.5 provides the locations of NID high hazard dams located in the planning area.

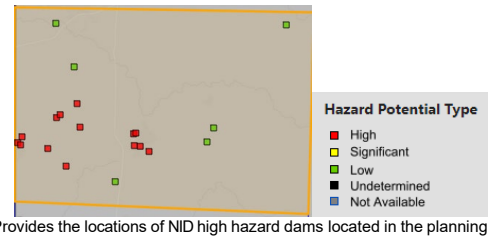


NID Hazard Summary of Dams Jasper County

Source: https://nid.sec.usace.army.mil/ords/f?p=105:113:16354208371621::NO

Newton County: According to the MDNR there are 20 total dams in Jasper County. The National Inventory of Dams list100 dam % of High Hazard Potential with an Emergency Action Plan with 7 listed as low hazard potential, 13 listed as high hazard potential, and 0 listed as significant hazard potential.

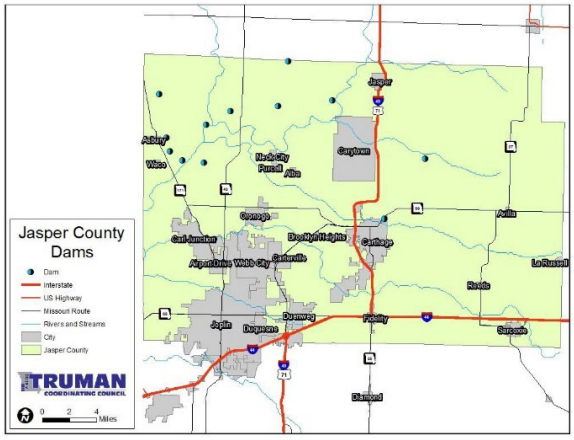
Figure 3.6 NID Hazard Summary of Dams Newton County



Provides the locations of NID high hazard dams located in the planning area.

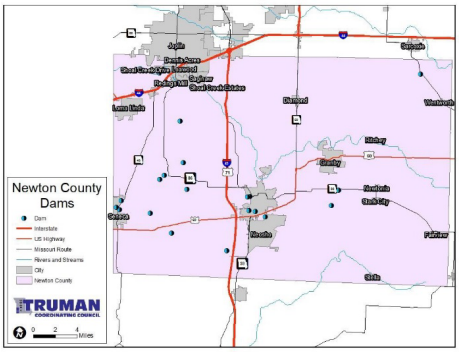
Source: https://nid.sec.usace.army.mil/ords/f?p=105:113:16354208371621::NO:::

Table 3.7 NID Hazard Summary of Dams Jasper County



Provides the locations dams located in the planning area.

Table 3.8 NID Hazard Summary of Dams Newton County



Provides the locations of dams located in the planning area.

Upstream Dams Outside the Planning Area

There are no upstream dams outside of the planning area that pose an inundation threat to Jasper County in the event of failure

Strength/Magnitude/Extent

Based on historical data, the likely adverse impact of disaster occurring due to dam fault in Jasper or Newton County is shown below. The cities of Carl Junction, Carthage, Grand Falls Plaza, Neosho, and Seneca have the greatest potential threat from dam failure, although that statement remains conjecture until proven with inundation data. The majority of dams in the two-county region are located in rural portions of the county. The locations of dams when compared to

residential areas and cities do not lend themselves to creation of a significant hazard for most local jurisdictions. The 2018 Missouri State Hazard Mitigation Plan estimates that 846 people and 466 buildings in Newton County are presently at risk from dam failure with regulated dams with an estimated loss of $27,073,190, or 20% of the total structure value in dam inundation areas. . For the purposes of this plan, it has been estimated that 2/3 of the structures affected will be residential, and 1/3 will be agricultural. Jasper County has an estimated of 0 people and 0 buildings due to its lack of unregulated dams, though this does not take into account the failure of unregulated dams.16 As such, the extent of this type of hazard event would include only light damages of less than 1%.

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

Actual dam failure can result not only in loss of life, but also considerable loss of capital investment, loss of income, and property damage. Loss of the reservoir itself can cause hardship for those dependent on it for their livelihood or water supply.

Previous Occurrences

There are no records of dam failure in Jasper or Newton County. Since there are zero recorded events in the planning area, a calculation of a probability percent is not possible. According to information from the 2018 State Plan, Missouri's percentage of high hazard dams in the MDNR inventory puts the State at about the national average for that category. However, if development occurs downstream of dams the percentage of high hazard dams will increase. Additionally, the probability of dam failure increases as many of the smaller and privately owned dams continue to deteriorate without the benefit of further regulation or improvements. Regular inspection and maintenance schedules for dams greatly reduces the probability of dam failure.

Probability of Future Occurrence

Of 34 dams in the two-county region, ten are rated by Missouri DNR and the NID as "high" risk. Three of these dams are regulated by the State. High-hazard dams exhibit one or more characteristics: more than 30 years old, high ratio of maximum storage to dam height, and/or high population density downstream. The cities of Carl Junction and Carthage in Jasper County have unregulated dams located near their boundaries. In Newton County, the cities of Grand Falls Plaza, Seneca, and Neosho each have dams within or near their borders as well. The Inundation data, however, is not currently available for any of these dams or the surrounding areas as it still being developed.

The risk of dam failure is shown below according to DNR's classifications.

Hazard Level	**Probable Risk**
Low:	*unlikely*
Significant:	*unlikely*
High:	*possible*

26 dam failures have occurred within the state of Missouri over the past 100 years. However, the two-county region has experienced no such event. Therefore, the probability of a dam failure within Jasper and Newton counties' boundaries remains at 0%. (0 events/100 years= 0% probability). However, for the purposes of this assessment, dam failure and its associated impacts

cannot be eliminated from the realm of possibility. In order to allow for a risk assessment, the probability of this event has been included as less than 10%. There is no record of dam failure within Jasper of Newton County. For the 26-year period from 1975 to 2001 for which dam failure statistics are available, 17 dam failures were recorded. This does not include the devastating Taum Sauk failure in 2005 or the Moon Valley Lake Dam failure in 2008 since the comprehensive data collected by Stanford University was not updated past 2001. According to this data, the annual probability calculated to and 65% (17/26 = 0.65 or 65%) probability in any given year for at least one dam failure event in the State of Missouri. However, with over 5,000 dams in the State, this translates to an overall low probability per dam structure.

Changing Future Conditions Considerations

Today's Missouri River is one of the most controlled waterways in our nation. Artificial channels, levees and dams vainly attempt to control flood damages. The result is a river with narrow pinch points 1,200 feet wide that give rising water no place to go. Consequently, major floods regularly overtop and breach the levee system. During the March 2019 flood, for example, 850 miles of levees in Iowa, Kansas, Missouri and Nebraska were damaged. Repair costs will exceed $1 billion, according to the U.S. Army Corps of Engineers. The situation will grow increasingly dire as the impacts of climate change take hold. A 2012 Bureau of Reclamation report predicted a 10 percent increase in runoff in the Lower Missouri River.

Vulnerability

Newton County is the only participating jurisdiction in this Plan that has indicated a vulnerability to dam failure. There are no mapped inundation areas or potential inundation areas within cities. No school district facilities are located within potential inundation areas or downstream environments from existing dams

Table 3.27 Dam Failure: Jasper and Newton County Vulnerability Assessment

	# of People	# of Buildings	Approximate Value	# of People	# of buildings	Estimated Value*
	Current Data			Future	Growth	
JASPER						
Residential	0	0	$0	0	0	$0
Commercial	0	0	$0	0	0	$0
Industrial	0	0	$0	0	0	$0
Agricultural	0	0	$0	0	0	$0
Government	0	0	$0	0	0	$0
Education	0	0	$0	0	0	$0
Religious /	0	0	$0	0	0	$0
Other	0	0	$0	0	0	$0
Total Planning Area	**0**	**0**	**$0**	**0**	**0**	**$0**
NEWTON						

Residential	487	40	$3,029,707	0	0	$0
Commercial	0	0	$0	0	0	$0
Industrial	0	0	$0	0	0	$0
Agricultural	0	20	$1,514,854	0	0	$0
Government	0	0	$0	0	0	$0
Education	0	0	$0	0	0	$0
Religious /	0	0	$0	0	0	$0
Other	0	0	$0	0	0	$0
Total Planning Area	**487**	**60**	**$4,544,561**	**0**	**0**	**$0**

Sources: HSTCC

Problem Statement

There is no significant development that will be impacted by dam failure. In the absence of MDNR inundation zone maps and Emergency Action Plans, it is difficult to determine the exact areas where inundation would occur, but in reviewing aerial photography, it can be stated that the risk to human life, and the risk for property damage in the event of a failure of one of the high hazard dams in Newton or Jasper County would be minimal.

The planning area, specifically, the areas downstream of Jasper and Newton County's high hazard dams are rural in nature. Additionally, the growth in the county is stagnant therefore the vulnerability to dam failure will not substantially increase in the near future. Due to the amount and affordability of developable land, it is unlikely that residential structures will be developed in a location that is inside an inundation zone.

A lack of regular inspection/maintenance of un-regulated high hazard dams was noted by the Mitigation Planning Committee. Possible solutions include the development of a regular maintenance schedule, identification of qualified staff and/or consultant to assist, and maintenance report submittal requirements.

3.4.4 Earthquakes

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 subterranean faults were formed many millions of years ago on or near the surface of the earth. Subsequent to that time, these ancient faults subsided, while the areas adjacent were pushed up. As this fault zone (also known as a rift) lowered, sediments filled in the lower areas. Under pressure, the sediments hardened into limestones, sandstones, and shales – thus

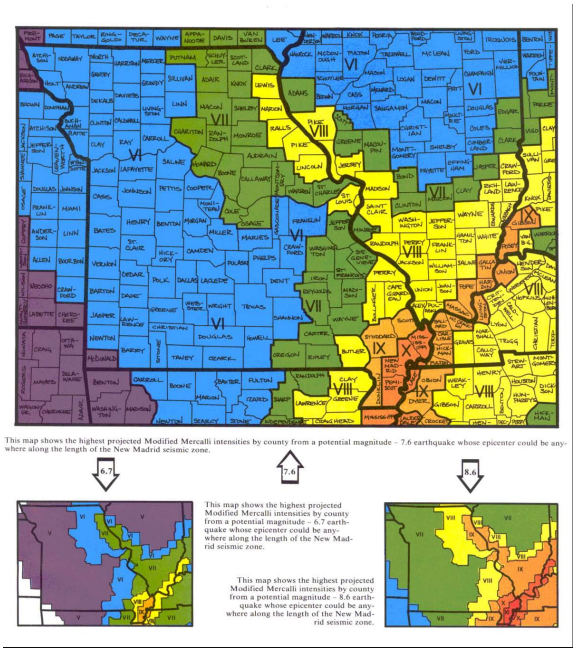
burying the rifts. The pressures on the North American plan and the movements along the San Andreas Fault by the Pacific plate have reactivated the buried rift(s) in the Mississippi embayment. This rift system is called the Reelfoot Rift and underlies the New Madrid Seismic Zone. (Braile et al., 1986).

Geographic Location

the greatest hazard earthquakes in Jasper and Newton County comes from the New Madrid Seismic Zone situated in the boot heel area of southeast Missouri. The potential of high magnitude earthquakes occurring along the New Madrid fault presents risk that does not vary across the planning area. The Nemaha uplift is central Kansas is also prone to seismic activity.

The 2014 USGS National Seismic Hazard Maps display earthquake ground motions for various probability levels across the United States and are applied in seismic provisions of building codes, insurance rate structures, risk assessments and other public policy. The updated maps represent an assessment of the best available science in earthquake hazards and incorporate new findings on earthquake ground shaking, faults, seismicity, and geodesy. The USGS National Seismic Hazard Mapping Project developed these maps by incorporating information on potential earthquakes and associated ground shaking obtained from interaction in science and engineering workshops involving hundreds of participants, review by several science organizations and State surveys, and advice from expert panels and a Steering Committee. Figure 3.9. is a USGS map illustrating seismicity in the United States.

Table 3.9 Impact Zones for Earthquake Along the New Madrid Fault



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

Table 3.10 Projected Earthquake Intensities

MODIFIED MERCALLI INTENSITY SCALE

I People do not feel any Earth movement.

II A few people might notice movement.

III Many people indoors feel movement. Hanging objects swing.

IV Most people indoors feel movement. Dishes, windows, and doors rattle. Walls and frames of structures creak. Liquids in open vessels are slightly disturbed. Parked cars rock.

V Almost everyone feels movement. Most people are awakened. Doors swing open or closed. Dishes are broken. Pictures on the wall move. Windows crack in some cases. Small objects move or are turned over. Liquids might spill out of open containers.

VI Everyone feels movement. Poorly built buildings are damaged slightly. Considerable quantities of dishes and glassware, and some windows are broken. People have trouble walking. Pictures fall off walls. Objects fall from shelves. Plaster in walls might crack. Some furniture is overturned. Small bells in churches, chapels and schools ring.

VII People have difficulty standing. Considerable damage in poorly built or badly designed buildings, adobe houses, old walls, spires and others. Damage is slight to moderate in well-built buildings. Numerous windows are broken. Weak chimneys break at roof lines. Cornices from towers and high buildings fall. Loose bricks fall from buildings. Heavy furniture is overturned and damaged. Some sand and gravel stream banks cave in.

VIII Drivers have trouble steering. Poorly built structures suffer severe damage. Ordinary substantial buildings partially collapse. Damage slight in structures especially built to withstand earthquakes. Tree branches break. Houses not bolted down might shift on their foundations. Tall structures such as towers and chimneys might twist and fall. Temporary or permanent changes in springs and wells. Sand and mud is ejected in small amounts.

IX Most buildings suffer damage. Houses that are not bolted down move off their foundations. Some underground pipes are broken. The ground cracks conspicuously. Reservoirs suffer severe damage.

X Well-built wooden structures are severely damaged and some destroyed. Most masonry and frame structures are destroyed, including their foundations. Some bridges are destroyed. Dams are seriously damaged. Large landslides occur. Water is thrown on the banks of canals, rivers, and lakes. Railroad tracks are bent slightly. Cracks are opened in cement pavements and asphalt road surfaces.

XI Few if any masonry structures remain standing. Large, well-built bridges are destroyed. Wood frame structures are severely damaged, especially near epicenters. Buried pipelines are rendered completely useless. Railroad tracks are badly bent. Water mixed with sand, and mud is ejected in large amounts.

XII Damage is total, and nearly all works of construction are damaged greatly or destroyed. Objects are thrown into the air. The ground moves in waves or ripples. Large amounts of rock may move. Lakes are dammed, waterfalls formed and rivers are deflected.

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

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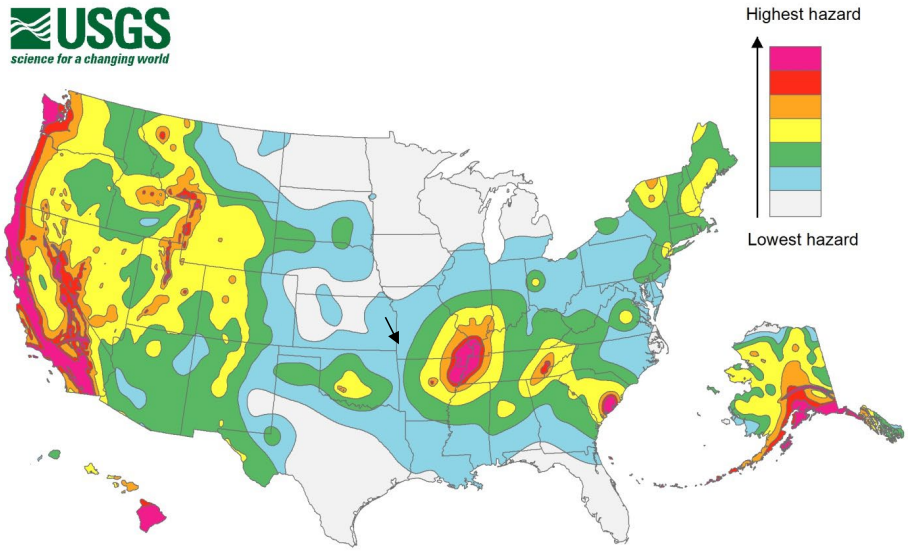
Table 3.11 United States Seismic Hazard Map



Source: United States Geological Survey at
https://earthquake.usgs.gov/hazards/hazmaps/conterminous/2014/images/HazardMap2014_lg.jpg

Strength/Magnitude/Extent

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

Richter Magnitude Scale

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

Modified Mercalli Intensity Scale

The intensity of an earthquake is measured by the effect of the earthquake on the earth's surface. The intensity scale is based on the responses to the quake, such as people awakening, movement

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

Previous Occurrences

According to the USGS database there have been no reported earthquakes in Jasper or Newton County since 1931. The USGS database shows that there is a 0.15% chance of a major earthquake within 50km of Jasper County within the next 50 years and .16% in Newton County.

Probability of Future Occurrence

Without a historical record for earthquakes in Jasper and Newton County it is not possible to calculate a precise probability of earthquake occurrence. The Center for Earthquake Research and Information (CERI) at the University of Memphis has computed conditional probabilities of a magnitude 6.0 earthquake in the New Madrid Seismic Zone which is located in Southeast Missouri. According to a fact sheet prepared by SEMA in 2003, the probability for a magnitude 6.0 to 7.5 earthquake along the New Madrid Fault is 25 to 40 percent chance of occurrence over the next 50 years. At the 25% level, the likelihood of an earthquake happening in a given year is 1.0%. At the 40% level, the likelihood of an earthquake happening in a given year is 1.6%. The previous map (Figure 3.13. indicates the potential severity of a 6.7, 7.6, and 8.6 magnitude earthquake anywhere along the New Madrid Fault located in Southeast Missouri).

Changing Future Conditions Considerations

According to U.S. Geological Survey, the only correlation that's been noted between earthquakes and weather is that large changes in atmospheric pressure caused by major storms like hurricanes have been shown to occasionally trigger what are known as "slow earthquakes," which release energy over comparatively long periods of time and don't result in ground shaking like traditional earthquakes do. They note that while such large low-pressure changes could potentially be a contributor to triggering a damaging earthquake, "the numbers are small and are not statistically significant." https://climate.nasa.gov/

Vulnerability

Vulnerability Overview

Ground shaking is the most damaging effect from earthquakes. Ground shaking will impact all structures and critical infrastructure such as roads and electrical transmission systems. There have been no documented damages associated with the rare low magnitude events. The greatest earthquake risk to the New Madrid Fault in the bootheel region of Missouri. A 7.6 magnitude earthquake would result in people have difficulty standing; Considerable damage in poorly built or badly designed buildings, adobe houses, old walls, and spires; Damage is slight to moderate in well-built buildings; Numerous windows are broken; Weak chimneys break at rooflines; Cornices from towers and high buildings fall; Loose bricks fall from buildings; Heavy furniture is overturned and damaged; Some sand and gravel stream banks cave in. In addition, some underground utilities would likely be damaged. Some injuries may occur but fatalities are unlikely.

Potential Losses to Existing Development

The total annualized expected losses (including building and income losses) are presented in Table 3.28 and ranked from highest total losses to lowest. Included in the table are the

annualized loss ratio and a ranking based on this loss ratio. The loss-ratio column in Table 3.28 represents the ratio of the average annualized losses divided by the entire building inventory by county as calculated by HAZUS-MH. The loss ratio is an indication of the economic impacts an earthquake could have, and how difficult it could be for a particular community to recover from an event. The top 10 counties in terms of the highest annualized loss ratio are highlighted in grey. Loss per capita is also shown in the table. The table indicates that the highest risk is to the counties closest to the New Madrid Seismic Zone, which are likely to have considerable portions of the building inventory damaged during an earthquake.

Impact of Previous and Future Development

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

Table 3.28 HAZUS-MH Earthquake Loss Estimation: Annualized Loss Scenario

HAZUS-MH Earthquake Loss Estimation: Annualized Loss Scenario

County	Total Losses, in $ Thousands	Loss Per Capita, in $ Thousands	Loss Ratio, in $ per Million
St. Louis	$20,877	$0.0209	$150
St. Louis City	$11,025	$0.0345	$235
Cape Girardeau	$5,394	$0.0713	$613
Scott	$5,204	$0.1328	$1,289
St. Charles	$4,846	$0.0134	$116
Dunklin	$3,943	$0.1234	$1,325
New Madrid	$3,571	$0.1884	$2,023
Pemiscot	$3,170	$0.1733	$1,930
Jefferson	$3,128	$0.0143	$141
Stoddard	$2,655	$0.0886	$888
Butler	$2,554	$0.0597	$616
Mississippi	$2,043	$0.1423	$1,833
St. Francois	$1,400	$0.0214	$227
Greene	$1,337	$0.0049	$42
Franklin	$947	$0.0093	$83
Perry	$941	$0.0496	$421
Howell	$678	$0.0168	$191
Boone	$552	$0.0034	$30
Ste. Genevieve	$484	$0.0267	$224
Jackson	$478	$0.0007	$5
Ripley	$430	$0.0305	$380
Cole	$372	$0.0049	$35
Wayne	$361	$0.0267	$288
Pulaski	$342	$0.0065	$64
Phelps	$334	$0.0074	$70
Bollinger	$319	$0.0258	$308
Madison	$297	$0.0243	$262
Washington	$265	$0.0105	$153
Crawford	$260	$0.0105	$109
Christian	$248	$0.0032	$32
Lincoln	$240	$0.0046	$51
Iron	$222	$0.0208	$226
Camden	$217	$0.0049	$26
Warren	$210	$0.0065	$60
Jasper	$191	$0.0016	$16
Taney	$189	$0.0037	$31
Laclede	$182	$0.0051	$57
Oregon	$178	$0.0164	$200
Dent	$177	$0.0113	$122
Texas	$172	$0.0066	$75
Reynolds	$167	$0.0249	$249
Callaway	$158	$0.0036	$36
Carter	$157	$0.0251	$302
Shannon	$154	$0.0182	$226
Clay	$149	$0.0007	$5
Webster	$124	$0.0034	$45
Wright	$118	$0.0063	$74
Audrain	$118	$0.0046	$44
Gasconade	$114	$0.0075	$60
Barry	$107	$0.0030	$29
Lawrence	$92	$0.0024	$26
Newton	$92	$0.0016	$17
Stone	$83	$0.0026	$21
Pettis	$81	$0.0019	$18

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

Table 3.29 Earthquake loss Estimation 2% Probability of Exceedance in 50 Year Scenario

61. Hazus Earthquake Loss Estimation 2% Probability of Exceedance in 50 Years Scena Results – Summary of Overall Impacts in Missouri

Type of Impact	Summary of Modeled Impacts
Total Buildings Damaged	Slight: 372,790 Moderate: 223,225 Extensive: 88,883 Complete: 47,549
Building and Income Related Losses	$51.4 billion
Total Economic Losses (includes building, income and lifeline losses)	$63.4 billion
Casualties (based on 2 a.m. time of occurrence)	Without requiring hospitalization: 15,454 Requiring hospitalization: 3,855 Life threatening: 512 Fatalities: 999
Casualties (based on 2 p.m. time of occurrence)	Without requiring hospitalization: 21,732 Requiring hospitalization: 5,727 Life threatening: 833 Fatalities: 1,606
Casualties (based on 5 p.m. time of occurrence)	Without requiring hospitalization: 15,480 Requiring hospitalization: 4,020 Life threatening: 574 Fatalities: 1,090
Damage to Schools	339 with at least moderate damage*
Damage to Medical Facilities	159 with at least moderate damage*
Damage to Fire Stations	194 with at least moderate damage*
Damage to Transportation Systems	819 highway bridges, at least moderate damage* 464 highway bridges, complete damage* 4 railroad bridges, moderate damage 12 airport facilities, moderate damage
Households without Power/Water Service (based on 2,375,611 households)	Power loss, Day 1: 364,335 Water loss, Day 1: 753,546 Water loss, Day 3: 730,857 Water loss, Day 7: 687,407 Water loss, Day 30: 549,352 Water loss, Day 90: 254,958
Displaced Households	48,730
Shelter Requirements	32,237 people out of 5,988,927 total population
Debris Generation	16.2 million tons

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

Table 3.30 *Results – Summary of by Occupancy Class (Millions of Dollars)

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	$0.00	$137.35	$1,494.55	$82.36	$119.30	$1,833.52
	Capital-Related	$0.00	$58.59	$1,217.03	$50.99	$30.64	$1,357.23
	Rental	$610.67	$425.50	$666.99	$30.81	$55.85	$1,789.81
	Relocation	$2,089.36	$380.76	$1,107.27	$147.23	$460.23	$4,184.85
	Subtotal	**$2,700.03**	**$1,002.20**	**$4,485.84**	**$311.39**	**$666.02**	**$9,165.41**
Capital Stock Losses	Structural	$3,581.98	$879.63	$2,018.83	$573.42	$605.33	$7,659.20
	Non-Structural	$12,295.72	$3,928.15	$5,230.69	$1,737.85	$1,559.66	$24,752.07
	Content	$3,915.69	$1,007.10	$2,641.24	$1,170.28	$799.40	$9,533.72
	Inventory	$0.00	$0.00	$72.52	$199.57	$15.57	$287.66
	Subtotal	**$19,793.39**	**$5,814.88**	**$9,963.28**	**$3,681.12**	**$2,979.96**	**$42,232.65**
	Total	**$22,493.42**	**$6,817.08**	**$14,449.12**	**$3,992.51**	**$3,645.98**	**$51,398.06**

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

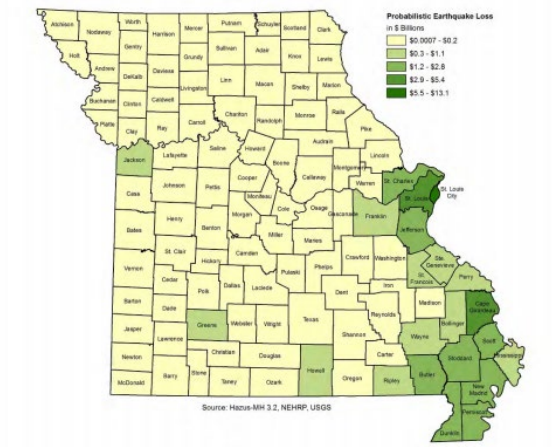
Table 3.31 *HAZUS-MH Earthquake Loss Estimation 2% Probability of Exceedance in 50 Years Direct Economic Losses Results Summary by County (Thousands of Dollars)

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
Camden	$25,407	$75,023	$23,467	$351	1.21	$15,754	$4,940	$6,219	$7,906	$159,068
Christian	$27,084	$75,350	$25,272	$573	1.32	$16,278	$3,693	$4,400	$6,180	$158,829
Oregon	$24,137	$72,964	$24,754	$447	10.90	$15,933	$3,444	$4,615	$5,410	$151,703
Texas	$23,223	$62,179	$22,454	$639	3.72	$15,051	$3,764	$5,474	$5,464	$138,246
Carter	$19,483	$63,654	$21,883	$695	16.01	$12,804	$3,052	$4,158	$4,515	$130,244
Reynolds	$19,472	$62,211	$21,814	$829	12.20	$12,608	$2,126	$4,132	$4,495	$127,687
Clay	$25,868	$52,452	$15,023	$474	0.28	$13,597	$3,751	$4,842	$5,989	$121,996
Warren	$20,203	$57,360	$21,109	$607	2.23	$12,135	$2,777	$3,508	$4,219	$121,919
Dent	$18,897	$52,441	$19,313	$513	4.91	$12,100	$3,244	$4,674	$4,095	$115,277
Jasper	$19,922	$45,641	$15,083	$527	0.54	$12,951	$4,334	$5,902	$5,320	$109,681
Laclede	$15,737	$39,201	$13,915	$528	1.71	$10,311	$3,080	$3,950	$4,089	$90,812
Callaway	$15,892	$41,449	$13,755	$296	1.30	$9,598	$2,252	$3,189	$3,876	$90,307
Shannon	$13,888	$43,013	$14,536	$330	8.38	$9,252	$1,358	$2,230	$3,344	$87,951
Stone	$14,359	$40,589	$12,805	$135	1.40	$9,678	$1,891	$2,461	$3,604	$85,522
Gasconade	$12,743	$34,070	$12,792	$382	2.48	$8,034	$2,282	$3,146	$2,855	$76,305
Webster	$12,530	$33,048	$11,254	$271	1.64	$8,408	$1,746	$2,188	$2,931	$72,376
Wright	$12,043	$30,999	$11,141	$333	2.69	$8,262	$2,096	$2,842	$2,914	$70,630
Barry	$10,373	$25,784	$9,524	$471	0.97	$6,844	$1,520	$2,266	$2,343	$59,125
Newton	$10,400	$23,237	$7,455	$243	0.61	$6,695	$1,813	$2,592	$2,581	$55,016
Marion	$8,643	$22,001	$7,606	$195	0.95	$5,458	$2,224	$3,050	$2,482	$51,658
Miller	$8,681	$22,383	$7,412	$187	1.29	$5,847	$1,528	$1,852	$2,189	$50,078
Lawrence	$8,919	$21,698	$7,374	$264	0.88	$5,744	$1,262	$1,788	$2,115	$49,165
Cass	$10,550	$22,676	$5,872	$111	0.30	$5,612	$933	$1,276	$2,125	$49,155
Ozark	$8,178	$22,834	$7,801	$190	3.35	$5,651	$836	$1,368	$1,921	$48,779
Osage	$8,207	$21,758	$8,325	$408	1.86	$4,981	$920	$1,450	$1,614	$47,663
Pettis	$8,569	$19,374	$6,821	$267	0.63	$5,430	$1,539	$2,237	$2,228	$46,464
Platte	$9,435	$20,250	$5,295	$108	0.26	$4,819	$1,290	$1,588	$2,327	$45,111
Johnson	$8,031	$19,889	$6,809	$115	0.46	$5,590	$1,064	$1,585	$1,998	$45,082
Audrain	$7,885	$19,102	$6,903	$227	1.00	$4,908	$1,414	$2,176	$1,879	$44,495
Buchanan	$8,580	$16,843	$5,189	$199	0.24	$5,166	$2,025	$2,853	$2,173	$43,028
Polk	$7,744	$18,811	$6,147	$148	0.98	$5,063	$1,163	$1,721	$1,911	$42,707
Douglas	$7,074	$19,431	$6,529	$151	2.53	$5,119	$830	$1,149	$1,671	$41,953
Morgan	$7,694	$18,730	$5,831	$140	0.92	$5,133	$1,024	$1,305	$1,794	$41,651
Pike	$7,013	$17,351	$6,186	$174	1.31	$4,375	$1,150	$1,618	$1,836	$39,703
Montgomery	$6,777	$16,153	$5,990	$282	1.64	$4,076	$907	$1,247	$1,536	$36,967

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/MO_Hazard_Mitigation_Plan2018.pdf

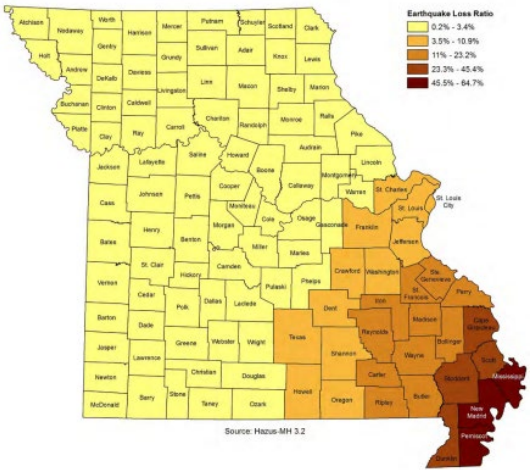
Figure 3.10. HAZUS-MH Earthquake Loss Estimation with a 2% Probability of

Exceedance in 50 Years Scenario—Total Building Loss



Source: https://www.fema.gov/emergency-managers/risk-management/earthquake/nehrp

Figure 3.13 HAZUS-MH Earthquake Loss Estimation with a 2% Probability of Exceedance in 50 Years Scenario—Loss Ratio



Source: https://www.fema.gov/emergency-managers/risk-management/earthquake/nehrp

Hazard Summary by Jurisdiction

Earthquake intensity is not likely to vary greatly throughout the planning area, the risk of occurrence is the same throughout. However, damages will differ where there are variations in the planning area based on percentage of structures build prior to 1939. For example, if one community has a high percentage of residences built prior to 1939 than the other participants, that

community is likely to experience higher damages.

Problem Statement

There is little likelihood of earthquake events that will significantly impact the Jasper and Newton County Planning. The damages that would be expected would apply to structures older than 1939. These older structures could perhaps be retrofitted with earthquake resistance measures to ensure their stability in the event of an earthquake of severe magnitude. Potential damages to future development can be mitigated by adopting and enforcing IBC 2012 building codes

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3.4.5 Land Subsidence/Sinkholes

Hazard Profile

Hazard Description

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

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

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

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

Sinkholes are a regular occurrence in Missouri, but usually occur with little significance. There have been occasional damages related to sinkholes. Sinkhole collapses have occurred in sewage lagoons in a number of towns in southern Missouri, but most were abandoned at the time of their collapse. Mining-related collapses have also occurred in the Joplin area where mining for lead and zinc once occurred. Figures 3.56 and 3.57 demonstrate the location of mines in Jasper and

Newton counties.

Geographic Location

According to spatial data from Missouri Geological Survey, there are 101 sinkhole formations have been identified in Jasper County and 28 in Newton County. Figure 3.21 below, provides the location of known sinkholes in the county. Although the risk of sinkhole formation exists countywide, the map shows that the unincorporated areas of the county and in particular the locales in the eastern half of the county have an elevated risk to sinkhole formation than other areas of the ***county.***

Strength/Magnitude/Extent

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

Previous Occurrences

As noted in the 2018 State Plan, sinkholes are a regular occurrence in Missouri, but rarely are the events of any significance. There are no significant sinkholes listed in the Mo State Hazard Mitigation plan for Jasper or Newton County. See pg. 3.226 of the 2018 Missouri Hazard Mitigation county.

Probability of Future Occurrence

Based on local information and the 2018 Missouri State Hazard Mitigation Plan, there have been zero documented sinkhole formations or expansions in the county during an eleven year period from 2006-2018. This equates to a 0% probability of a sinkhole formation in any given year in the county. However, in considering the large number of known sinkholes in Jasper or Newton County, it is likely that unreported sinkhole formation occurs every year.

Changing Future Conditions Considerations

Direct effects from changing climate conditions such as an increase in droughts and could contribute to an increase in sinkholes. These changes raise the likelihood of extreme weather, meaning the torrential rain and flooding conditions which often lead to the exposure of sinkholes are likely to become increasingly 3.2273 Risk Assessment common. Certain events such as a heavy precipitation following a period of drought can trigger a sinkhole due to low levels of groundwater combined with a heavy influx of rain. See 2018 State Plan, Chapter 3, Section 3.3.1, Changing Future Conditions Considerations.

Vulnerability

Vulnerability Overview

Sinkholes in Missouri are a common feature where limestone and dolomite outcrop. Dolomite is a rock similar to limestone with magnesium as an additional element with the calcium normally present in the minerals that form the rocks. While some sinkholes may be considered a slow changing nuisance; other more sudden catastrophic collapses can destroy property, delay construction projects, contaminated groundwater resources, and damage underground utilities.

The entire county is underlain with limestone and dolomite bedrock.

Potential Losses to Existing Development

The sinkhole hazard layer was used in conjunction with the MSDIS structure file to determine structures that fall within sinkhole areas as well as structures that are within a buffered distance of 50 feet of sinkholes. The number of mines per county was reported as available from the Department of Natural Resources. Based on natural breaks in the data, a rating value of 1 through 5 was assigned with the designations shown below. According to the 2018 Mo State HMP Plan there is minimal chance of a sinkhole occurrence.

Impact of Previous and Future Development

Future development in areas of known risk to sinkhole formation in the planning area will increase vulnerability to this hazard. Population and development in these areas, specifically in south eastern Jasper County will increase exposure to sinkhole occurrence. While no building codes currently restrict construction within a certain distance of known sinkholes, in is encouraged that local officials explore options to implement this regulatory condition.

Hazard Summary by Jurisdiction

The risk of sinkhole damage for individual communities and school districts is limited to the amount of exposure of buildings and infrastructure. The entire county is at risk for potential sinkhole development, southwester Jasper County has areas with high density of known sinkholes. This indicates that the subsurface conditions are currently favorable for the development of sinkhole features. It is unlikely that school districts will be greatly affected by sinkholes due to the localized nature of their exposure.

Problem Statement

It is likely that more sinkholes will occur as development occurs within the county. Sinkholes can be remediated with fill material. Once a sinkhole has been remediated, building should be prohibited at the site. Existing sinkholes can expand if surface runoff erodes the edges of the sinkhole. Best efforts to divert stormwater runoff from known sinkholes should be made. Jasper County has a high density of sinkholes and the effects of collapse sinkholes on the built environment should be noted as a public service to the county's residents.

3.4.6 Drought

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 State Plan, which are as follows.

- Meteorological drought is defined in terms of the basis of the degree of dryness (in comparison to some "normal" or average amount) and the duration of the dry period. A meteorological drought must be considered as region-specific since the atmospheric conditions that result in deficiencies of precipitation are highly variable from region to region.

- Hydrological drought is associated with the effects of periods of precipitation (including snowfall) shortfalls on surface or subsurface water supply (e.g., streamflow, reservoir and lake levels, ground water). The frequency and severity of hydrological drought is often defined on a watershed or river basin scale. Although all droughts originate with a deficiency of precipitation, hydrologists are more concerned with how this deficiency plays out through the hydrologic system. Hydrological droughts are usually out of phase with or lag the occurrence of meteorological and agricultural droughts. It takes longer for precipitation deficiencies to show up in components of the hydrological system such as soil moisture, streamflow, and ground water and reservoir levels. As a result, these impacts also are out of phase with impacts in other economic sectors.

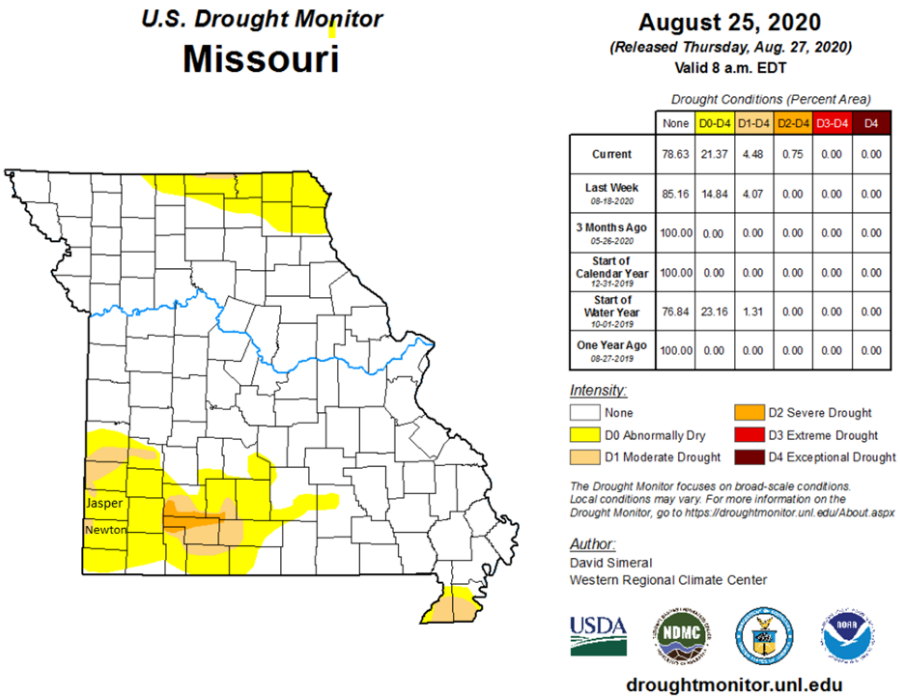
- Agricultural drought focus is on soil moisture deficiencies, differences between actual and potential evaporation, reduced ground water or reservoir levels, etc. Plant demand for water depends on prevailing weather conditions, biological characteristics of the specific plant, its stage of growth, and the physical and biological properties of the soil.

- Socioeconomic drought refers to when physical water shortage begins to affect people.

Geographic Location

Droughts are regional climatic events that can impact large areas and multiple counties. The entire county is as risk to the impacts of drought. However, drought most directly impacts the agricultural sector, so areas within the county where there is extensive agricultural land use can experience significant impacts. As noted previously in the plan, Jasper and Newton County is home to intensive livestock production. All incorporated communities in the county rely on wells for water supply. The impact of drought on deeper public wells would not be significant unless the drought was of such historic severity to reduce groundwater levels.

Figure 3.14 U.S. Drought Monitor Map of Missouri on Date



Source: U.S. Drought Monitor, https://droughtmonitor.unl.edu/Maps/MapArchive.aspx

Strength/Magnitude/Extent

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.

- **Phase I: Advisory Phase**—Requires a drought monitoring and assessment system to provide enough lead time for state and local planners to take appropriate action;
- **Phase II: Drought Alert**—When the PDSI reads -1.0 to -2.0, and stream flows,

reservoir levels, and groundwater levels are below normal over a several month period, or when the Drought Assessment Committee (DAC) determines that Phase II conditions exist based on other drought determination methods;

- **Phase III: Conservation Phase**—When the PDSI reads -2.0 to -4.0, and stream flows, reservoir levels, and groundwater levels continue to decline, along with forecasts indicating an extended period of below-normal precipitation, or when the DAC determines that Phase III conditions exist based on other drought determination models;
- **Phase IV: Drought Emergency**—When the PDSI is lower than -4.0, or when the DAC determines that Phase IV conditions exist based on other drought determination methods.

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.

Previous Occurrences

The NCEI storm events database includes 10 drought events occurring in Jasper County from 2000 through 2020. Many of these were multiple reports from persistent drought conditions that lasted several months. The NCEI reports indicate that there were four distinct drought periods during a 20 year timeframe. Table 3.33 provides a summary of these events. The NCEI storm events database includes 20 drought events occurring in Newton County from 2000 through 2020. Many of these were multiple reports from persistent drought conditions that lasted several months. The NCEI reports indicate that there were six distinct drought periods during a 20 year timeframe. Table 3.19 provides a summary of these events

Table 3.32 Drought events occurring in Jasper and Newton County from 2000-2020

EVENT ID	County	BEGIN DATE	EVENT TYPE	Property Damage	Crop Damage
5486492	JASPER (ZONE)	1/1/2006	Drought	0	0
5490801	JASPER (ZONE)	2/1/2006	Drought	0	0
5494258	JASPER (ZONE)	3/1/2006	Drought	0	0
5516497	JASPER (ZONE)	4/1/2006	Drought	0	0
338267	JASPER (ZONE)	7/1/2011	Drought	0	0
337361	JASPER (ZONE)	8/1/2011	Drought	0	10000000
343343	JASPER (ZONE)	9/1/2011	Drought	0	0
351991	JASPER (ZONE)	10/1/2011	Drought	0	0
354341	JASPER (ZONE)	11/1/2011	Drought	0	0
387152	JASPER (ZONE)	7/1/2012	Drought	0	0
407150	JASPER (ZONE)	8/1/2012	Drought	2500000	29650000

407281	JASPER (ZONE)	9/1/2012	Drought	0	0
411990	JASPER (ZONE)	10/1/2012	Drought	0	0
418308	JASPER (ZONE)	12/1/2012	Drought	0	0
422867	JASPER (ZONE)	1/1/2013	Drought	0	0
427724	JASPER (ZONE)	2/1/2013	Drought	0	0
435978	JASPER (ZONE)	3/1/2013	Drought	0	0
924439	JASPER (ZONE)	10/1/2020	Drought	0	0
5482537	NEWTON (ZONE)	12/21/2005	Drought	0	0
5486493	NEWTON (ZONE)	1/1/2006	Drought	0	0
5490800	NEWTON (ZONE)	2/1/2006	Drought	0	0
5494257	NEWTON (ZONE)	3/1/2006	Drought	0	0
5516496	NEWTON (ZONE)	4/1/2006	Drought	0	0
334923	NEWTON (ZONE)	7/1/2011	Drought	0	0
337363	NEWTON (ZONE)	8/1/2011	Drought	0	15000000
343347	NEWTON (ZONE)	9/1/2011	Drought	0	0
351994	NEWTON (ZONE)	10/1/2011	Drought	0	0
354340	NEWTON (ZONE)	11/1/2011	Drought	0	0
387159	NEWTON (ZONE)	7/1/2012	Drought	0	0
407157	NEWTON (ZONE)	8/1/2012	Drought	1800000	10880000
407288	NEWTON (ZONE)	9/1/2012	Drought	0	0
411997	NEWTON (ZONE)	10/1/2012	Drought	0	0
418311	NEWTON (ZONE)	12/1/2012	Drought	0	0
422870	NEWTON (ZONE)	1/1/2013	Drought	0	0
427725	NEWTON (ZONE)	2/1/2013	Drought	0	0
435979	NEWTON (ZONE)	3/1/2013	Drought	0	0
917881	NEWTON (ZONE)	9/1/2020	Drought	0	0
924442	NEWTON (ZONE)	10/1/2020	Drought	0	0

Source: ncdc.noaa.gov, NCDC.noaa.gov

The impact of these events are described in the NCEI storm event narratives:

- 2006 – Rainfall remained scarce for most of the Ozarks, as only areas of south central and central Missouri received normal rainfall. Otherwise very dry conditions

persisted across southwest Missouri and extreme southeast Kansas, receiving less than two inches of precipitation for the entire month. All time record dry conditions for the month of February were experienced at both Springfield and Joplin as less than one tenth of an inch of precipitation fell at both ASOS locations. Springfield recorded a total of 0.09 inches while Joplin only recorded 0.01 inches. Southwest and west central Missouri had already been experiencing drought conditions going into the month of February, therefore these low rainfall totals increased the intensity of the drought heading into March.

- 2011 – Significant portions of the southwestern district were especially hard hit during the month of July with as much as 80 to 90% of crops in very poor condition. Complete crop failures were reported in portions of southwest Missouri. Burned up pastures forced livestock producers to feed hay as many were suffering from major grazing issues. Less than an inch and a half of rainfall occurred during the month for much of the county. In general, some of the most exceptionally dry areas were found in parts of southwest Missouri where around 25 percent of the normal rainfall fell during the month. This drought began in July and was ongoing through the month of September. The U.S Drought Monitor reported Severe Drought (D2) throughout the month of August. While the region received some rainfall during the month, the coverage was limited across portions of southwestern Missouri. As a result of the limited rainfall combined with the excessive heat, the USDA Service center in Jasper County indicated that crop losses were reached 80 percent of the spring planting. Many farmers and ranchers reported having to feed hay as pastures stopped growing and became dry through the month which added to operation costs. Crop damage is recorded at over 10 million.
- 2012 – The U.S Drought Monitor continued to report Extreme Drought (D3) to Exceptional Drought (D4) throughout the month of August. The region started seeing some rainfall by the end of the month. The COOP station near Carthage reported 5.43 of rainfall for the month of August. The Joplin ASOS reported 3.13 of rainfall for the month of August. This is a continuation of the drought that began across the region in June. As a result of the limited rainfall combined with the excessive heat, the USDA Service center in Jasper County indicated that crop losses were 75 percent of the spring planting. Many farmers and ranchers reported having to feed hay as pastures stopped growing and became dry through the month which added to operation costs. Monetary crop loss figures are estimates using information from the National Agricultural Statistics database, local FSA and USDA offices and other local, state or federal agency information. Livestock losses, if they occurred or were reported are listed in the property section. Crop loss recorded at 29.65 M and property damage at 2.5M.
- 2013- Dry conditions continued through much of the month of October, continuing the drought conditions which began in August. The 30/60/90 Day precipitation amounts continued to decline with Severe (D2) and Extreme (D3) drought developing or expanding across portions of the Ozarks. Low stream flows were noted on some area rivers and KBDI indices rose indicating enhanced fire weather concerns. Some indication in the agricultural community were beginning to occur with some farmers starting feeding hay about a month early. Much of the impacts felt through the increasing drought were limited by the end of the growing season. Primary impacts were limited for the most part to surface and and ground water issues and fire weather concerns.
- 2020-Dry conditions continued through much of the month of October, continuing the drought conditions which began in August. The 30/60/90 Day precipitation amounts

continued to decline with Severe (D2) and Extreme (D3) drought developing or expanding across portions of the Ozarks. Low stream flows were noted on some area rivers and KBDI indices rose indicating enhanced fire weather concerns. Some indication in the agricultural community were beginning to occur with some farmers starting feeding hay about a month early. Much of the impacts felt through the increasing drought were limited by the end of the growing season. Primary impacts were limited for the most part to surface and and ground water issues and fire weather concerns

Probability of Future Occurrence

Over the 20 year period from October 2000 to October 2020 Jasper County was in a drought for 19 months. There are a total of 240 months in the record period. The calculated risk percent from the number of months of drought and the total number of months in the record period equates to the annual average percentage of **7.9%** probability of drought occurrence in the county.

Over the 20 year period from October 2000 to October 2020 Newton County was in a drought for 20 months. There are a total of 240 months in the record period. The calculated risk percent from the number of months of drought and the total number of months in the record period equates to the annual average percentage of **8.3%** probability of drought occurrence in the county.

Although drought is not predictable, long-range outlooks and predicted impacts of climate change could indicate an increased chance of drought.

Changing Future Conditions Considerations

The Great Plains is a diverse region where climate and water are woven into the fabric of life. Day-to-day, month-to-month, and year-to-year changes in the weather can be dramatic and challenging for communities and their commerce. The region experiences multiple climate and weather hazards, including floods, droughts, severe storms, tornadoes, hurricanes, and winter storms. In much of the Great Plains, too little precipitation falls to replace that needed by humans, plants, and animals. These variable conditions in the Great Plains already stress communities and cause billions of dollars in damage; climate change will add to both stress and costs.

The people of the Great Plains historically have adapted to this challenging climate. Although projections suggest more frequent and more intense droughts, severe rainfall events, and heat waves, communities and individuals can reduce vulnerabilities through the use of new technologies, community-driven policies, and the judicious use of resources. Adaptation (means of coping with changed conditions) and mitigation (reducing emissions of heat-trapping gases to reduce the speed and amount of climate change) choices can be locally driven, cost effective, and beneficial for local economies and ecosystem services.

Significant climate-related challenges are expected to involve 1) resolving increasing competition among land, water, and energy resources; 2) developing and maintaining sustainable agricultural systems; 3) conserving vibrant and diverse ecological systems; and 4) enhancing the resilience of the region's people to the impacts of climate extremes. These growing challenges will unfold against a changing backdrop that includes a growing urban population and declining rural population, new economic factors that drive incentives for crop and energy production, advances in technology, and shifting policies such as those related to farm and energy subsidies

Vulnerability

Vulnerability Overview

The agriculture sector is particularly vulnerable to drought. Periods of dry weather can reduce stock ponds and force the early sale of livestock. Crop production can be disrupted, and vegetative diseases can spread, reducing yields. Cities that operate water wells can experience water shortages during persistent drought periods like the seven-month drought period in 2012. Those that rely on private wells are more likely to be impacted by reductions in the groundwater supply due to the fact that public wells are far deeper than private wells.

Potential Losses to Existing Development

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

The 2018 State Plan states that from 1998 through 2016 there or $0 in insured crop loss payments in Newton or Jasper County. The absence of payment could be due to the absence of crop insurance. There are no anticipated structural losses, loss of life, or injuries associated with this hazard. In addition, according to the NCEI estimates there were $65.53M in crop losses from 2000-2020. According to this data, the total losses divided by the 20 year timeframe equals $2.98 M in estimated annualized crop losses.

Impact of Previous and Future Development

Increases in acreage planted with crops would add to exposure to drought-related agricultural losses. In addition, increases in population result in increased demand for treated water, adding additional strain on natural water supply systems.

Changing Future Conditions Considerations

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

Most of the state has warmed one-half to one degree (F) in the last century, and floods are becoming more frequent. In the coming decades, the state will have more extremely hot days, which may harm public health in urban areas and corn harvests in rural areas. Although springtime in Missouri is likely to be wetter, summer droughts are likely to be more severe. Higher evaporation and lower summer rainfall are likely to reduce river flows. The drought of 2012 narrowed navigation channels, forced lock closures, and caused dozens of barges to run aground on the Mississippi River along the Missouri shoreline. The resulting impact on navigation cost the region more than $275 million. The drought of 2012–2013 also threatened municipal and industrial water users along the Missouri River.

Hazard Summary by Jurisdiction

Although the probability of drought is the same for the entire county, farming and livestock enterprises in the unincorporated parts of the county would feel the greatest impact. These impacts can be mitigated somewhat by the purchase of crop insurance. The existence of private farms and ranches are widespread throughout the county. Some municipalities and rural schools in Jasper and Newton County utilize groundwater wells for public water supply and could potentially be impacted during water shortages due to the reliance on these limited source wells.

Problem Statement

Although drought most likely will not cause structure damage, the impact is greatest on the agriculture sector and if persistent enough, could cause reductions in groundwater and water shortages in communities that provide potable water services. Potential solutions to mitigate the impact of drought would be for communities to develop an ordinance to restrict the use of public water resources for non-essential usage, such as landscaping, washing cars, filling swimming pools, etc. during extreme drought periods. School districts can also implement water conservation measures at all district facilities.

3.4.7 Extreme Temperatures

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 weeks. Ambient air temperature is one component of heat conditions, with relative humidity being the other. The relationship of these factors creates what is known as the apparent temperature. The Heat Index chart shown 3.15 uses both of these factors to produce a guide for the apparent temperature or relative intensity of heat conditions.

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.

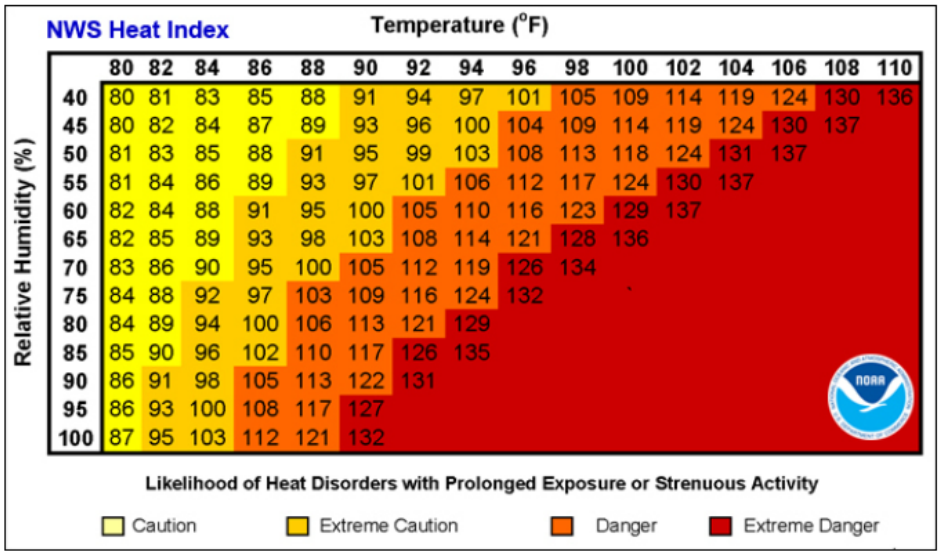
Geographic Location

Extreme temperatures are an area-wide hazard event, the risk of extreme heat or cold does not vary within the counties.

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.

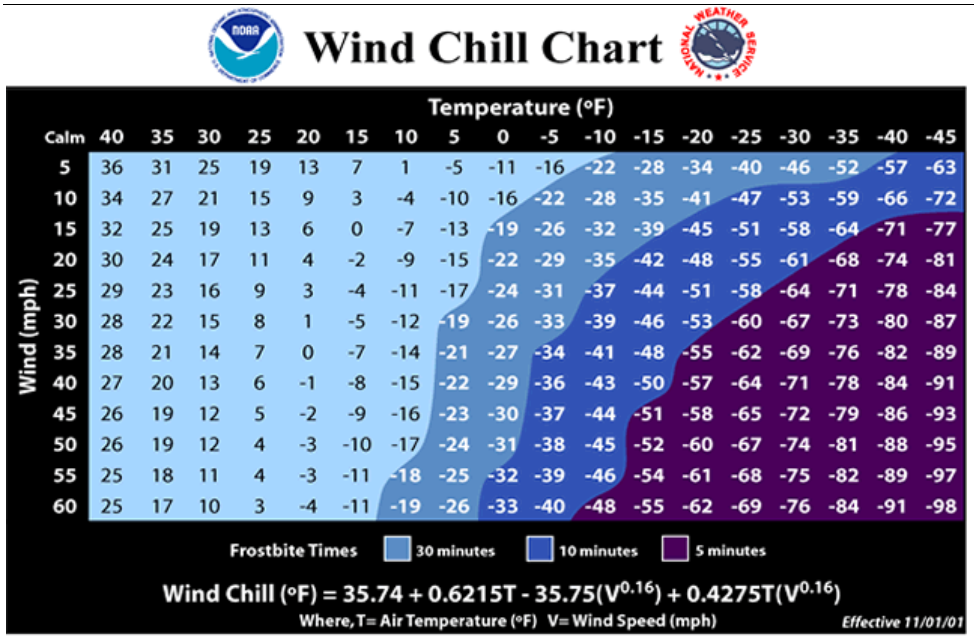
Table 3.15 Heat Index (HI) Chart



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.

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. 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.

Table 3.16 Wind Chill Chart



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

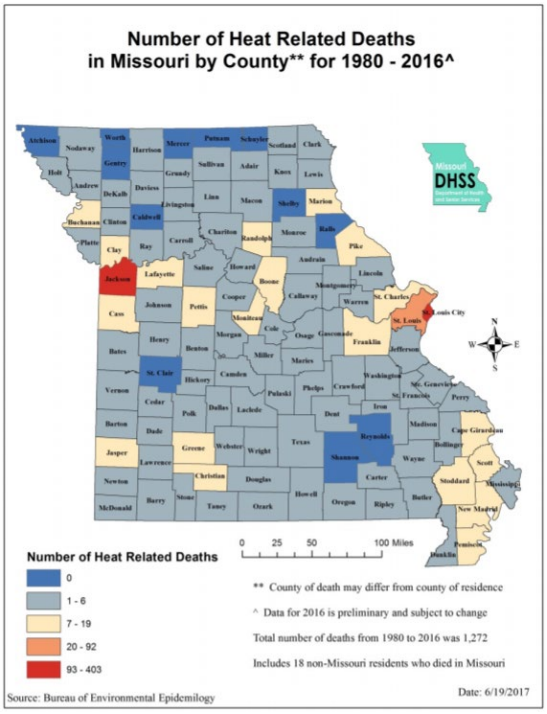
Previous Occurrences

There are (2) recorded extreme heat events in the National Center for Environmental Information (NCEI) database from October 2000 to October 2020 for Jasper County. There was 1 deaths and no injuries. Or property and crop damage associated with these events in the NCEI data for Jasper County County. Both extreme heat events in Jasper County were recorded in the first week of August 2011.

There are (0) recorded extreme heat events in the National Center for Environmental Information (NCEI) database from October 2000 to October 2020 for Newton County. There were zero deaths and no injuries. or property and crop damage associated with these events in the NCEI data for Newton County.

Figure 3.17 is a map created by the Missouri Department of Health and Senior Services (DHSS) for heat related fatalities by county. The map indicates that there has been one heat related fatalities in Newton County from 1980 - 2016.

Table 3.17 Heat Related Deaths in Missouri 2000 - 2016



Source: https://health.mo.gov/living/healthcondiseases/hyperthermia/pdf/stat-report.pdf

Extreme heat can cause stress to crops and animals. According to USDA Risk Management Agency, losses to insurable crops during the 10-year time period from 2005 to 2019 were $4,329,946,533. Extreme heat can also strain electricity delivery infrastructure overloaded during peak use of air conditioning during extreme heat events. Another type of infrastructure damage from extreme heat is road damage. When asphalt is exposed to prolonged extreme heat, it can cause buckling of asphalt-paved roads, driveways, and parking lots.

From 1988-2011, there were 3,496 fatalities in the U.S. attributed to summer heat. This translates to an annual national average of 146 deaths. During the same period, 1 death was recorded in the planning area, according to NCEI data. The National Weather Service stated that among natural hazards, no other natural disaster—not lightning, hurricanes, tornadoes, floods, or earthquakes—causes more deaths.

Probability of Future Occurrence

The probability that an extreme heat event will occur in Jasper County in any given year is .05% or once every 20 years This equates to dividing the number of events (1) by the number of years in the sample set (20.The events recorded in the NCEI database describe prolonged periods where temperatures rose above at least 90 degrees for at least twelve consecutive days. Heat advisories and warnings are issued for shorter periods of extreme heat nearly every year and may not meet

the threshold for consecutive days in the NCEI database. This data limitation indicates that extreme heat events could be underreported in the NCEI

The probability that an extreme heat event will occur in Newton County in any given year is 0%. This equates to dividing the number of events (0) by the number of and multiplying by 100. The events recorded in the NCEI database describe prolonged periods where temperatures rose above at least 90 degrees for at least twelve consecutive days. Heat advisories and warnings are issued for shorter periods of extreme heat nearly every year and may not meet the threshold for consecutive days in the NCEI database. This data limitation indicates that extreme heat events could be underreported in the NCEI.

Changing Future Conditions Considerations

Across the globe, hot days are getting hotter and more frequent, while we're experiencing fewer cold days. Over the past decade, daily record temperatures have occurred twice as often as record lows across the continental United States, up from a near 1:1 ratio in the 1950s. Heat waves are becoming more common, and intense heatwaves are more frequent in the U.S. West, although in many parts of the country the 1930s still holds the record for number of heat waves (caused by the Dust Bowl and other factors).

By midcentury, if greenhouse gas emissions are not significantly curtailed, the coldest and warmest daily temperatures are expected to increase by at least 5 degrees F in most areas by mid-century rising to 10 degrees F by late century. The National Climate Assessment estimates 20-30 more days over 90 degrees F in most areas by mid-century. A recent study projects that the annual number of days with a heat index above 100 degrees F will double, and days with a heat index above 105 degrees F will triple, nationwide, when compared to the end of the 20th century. Center for Climate and Energy Solutions

Vulnerability

Vulnerability Overview

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

Potential Losses to Existing Development

Based on the information in the 2018 State Plan, NCEI and DHSS, there has been one heat related deaths to have occurred in Jasper County in the past 22 years and zero heat related deaths in Newton County. Despite the few heat-related fatalities, it is clear that extreme heat is one of the

most dangerous events that could affect the planning area and proper measures should be in place when the county is exposed to a heat wave.

Impact of Previous and Future Development

Population growth can result in increases in the age-groups that are most vulnerable to extreme heat. Population growth also increases the strain on electricity infrastructure, as more electricity is needed to accommodate the growing population. The population of Jasper County has increased dramatically since the 1990 and 2000 census time periods. According to 2008 Census estimates, the current population of Jasper County is 116,813, an increase of 12,127 persons, or 11.6% from the 2000 census. The population in Newton County increased from the 2000 census by 3,484 persons to 56,120 according to 2008 estimates, growing by 6.6%. Both Jasper and Newton counties have exceeded the growth estimates from the 2000 CNSUS.

Include discussion of any jurisdictions in a growth mode.

EMAP Consequence Analysis

Table 3.34 EMAP Impact Analysis: Extreme Temperatures

Subject	Detrimental Impacts
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the areas at the time of the incident.
Continuity of Operations	Unlikely to necessitate execution of the Continuity of Operations Plan. Extent of agricultural damage depends on duration. Water supplies and electricity may be disrupted.
Property, Facilities, and Infrastructure	Nature of hazard expected to minimize any serious damage to facilities. Asphalt parking lots and roads are routinely damaged during periods of extreme heat as the hot asphalt becomes less rigid and can be displaced by heavy equipment or automobiles.
Environment	Potential for crop damage; May cause disruptions in wildlife habitat, increase interface with people, and reduce numbers of animals.
Economic Condition of Jurisdiction	Local economy and finances dependent on stable electricity and water supply adversely affected for duration of heat wave.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Hazard Summary by Jurisdiction

Those at greatest risk for heat-related illness and deaths include children up to five years of age, people 65 years of age and older, people who are overweight, and people who are ill or on certain medications. To determine jurisdictions within the planning area with populations more vulnerable to extreme heat, demographic data was obtained from the 2010 census on population percentages in each jurisdiction comprised of those under age 5 and over age 65. Data was not available for overweight individuals and those on medications vulnerable to extreme heat. **Table 3.35** 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 3.35 Jasper and Newton Population Under Age 5 and Over Age 65, 2010 Census Data

Jurisdiction	% Population Under 5 yrs	%Population 65 yrs and over
Jasper County	6.6	16
City of Alba	5.6	6.8
City of Asbury	4.39	12.09
City of Carl Junction	8.1	13.3
City of Carterville	5.9	10.02
City of Carthage	9.1	13
City of Duenweg	7.7	15.91
City of Duquesne	4.65	24.39
Village of Fidelity	5.84	18.29
City of Jasper	6.55	13.43
City of Neck City	7.6	20.33
City of Oronogo	11.89	5.67
City of Sarcoxie	5.79	17.29
City of Waco	5.75	16.09
Newton County	6.1	18.4
Diamond	7.65	15.41
Granby	7.97	15.28
Leawood	6.16	15.54
Neosho	8.4	14.9
Seneca	8.05	17.29
Stark City	3.6	20.14
Wentworth	2.04	12.24
Schools		
Avilla R-XIII	0	0
Joplin R-VIII	11.71	0
Westview C-VI	7.9	0

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

Problem Statement

Older and younger segments of the population are more vulnerable to the impact of extreme heat. Jasper/Newton County has a very high percentage of its population that is 65 years of age or older. In addition people living below the poverty level may be more vulnerable during periods of extreme heat hue to lack of air conditions or proper utilities in their homes. Jasper/Newton County, has income levels well below National Standards and falling within severe poverty guidelines. Institutionalized populations such as those living in nursing homes become more vulnerable to extreme heat due to power outages. This problem would best be mitigated by installation of emergency generators at these institutional facilities. Provision and advertisement of cooling centers in the county would help mitigate the impact on vulnerable populations in the planning area.

3.4.8 Severe Thunderstorms Including High Winds, Hail, and Lightning

Hazard Profile

Thunderstorms

A thunderstorm is defined as a storm that contains lightning and thunder which is caused by unstable atmospheric conditions. When cold upper air sinks and warm moist air rises, storm clouds or 'thunderheads' develop resulting in thunderstorms. This can occur singularly, as well as in clusters or lines. The National Weather Service defines a thunderstorm as "severe" if it includes hail that is one inch or more, or wind gusts that are at 58 miles per hour or higher. At any given moment across the world, there are about 1,800 thunderstorms occurring. Severe thunderstorms most often occur in Missouri in the spring and summer, during the afternoon and evenings, but can occur at any time. Other hazards associated with thunderstorms are heavy rains resulting in flooding (discussed separately in **3.4.1**) and tornadoes (discussed separately in **Section 3.4.10**).

High Winds

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

Lightning

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

Hail

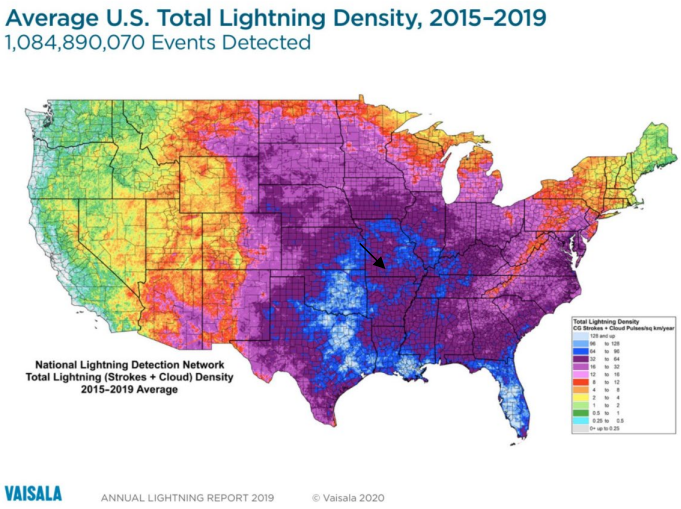
According to the National Oceanic and Atmospheric Administration (NOAA), hail is precipitation that is formed when thunderstorm updrafts carry raindrops upward into extremely cold atmosphere causing them to freeze. The raindrops form into small frozen droplets. They continue to grow as they come into contact with super-cooled water which will freeze on contact with the frozen rain droplet. This frozen droplet can continue to grow and form hail. As long as the updraft forces can support or suspend the weight of the hailstone, hail can continue to grow before it hits the earth.

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

Geographic Location

Thunderstorms/high winds/hail/lighting events are an area-wide hazard that can happen anywhere in the county. Although these events occur similarly throughout the planning area, they are more frequently reported in the incorporated communities. In addition, damages are more likely to occur in more densely developed parts of the county. Figure 3.18 shows lightning frequency in the state. Jasper/Newton County is located in the 6 to 8 flash density zone on the map.

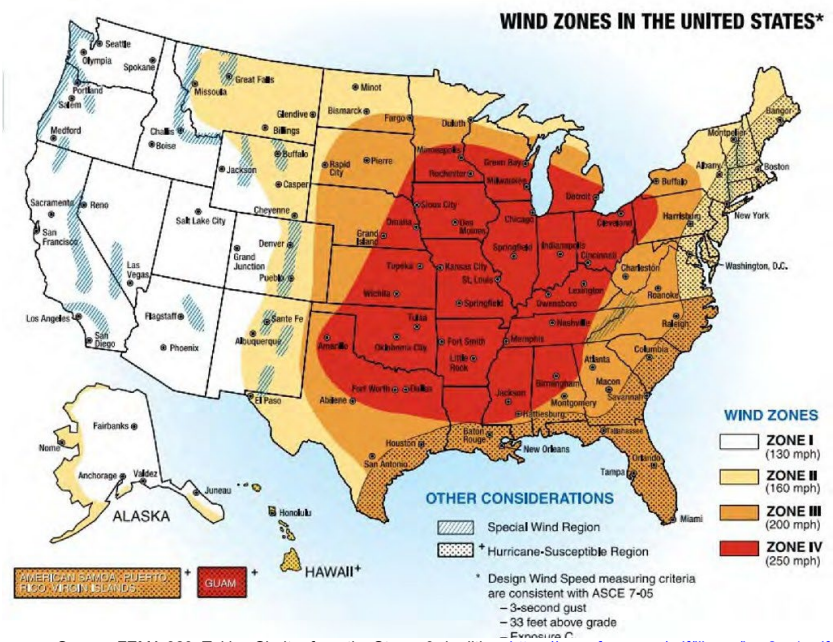
Figure 3.18 Location and Frequency of Lightning in Missouri



Source: National Weather Service,, http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx.

Figure 3.19 on the following page shows wind zones in the United States. Jasper and Newton, Missouri is located in Zone IV which can experience wind speeds of up to 250 miles per.

Figure 3.19 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

Strength/Magnitude/Extent

Based on information provided by the Tornado and Storm Research Organization (TORRO), **Table 3.36** below describes typical damage impacts of the various sizes of hail.

Table 3.36 Tornado and Storm Research Organization Hailstorm Intensity Scale

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

Intensity Category	Diameter (mm)	Diameter (inches)	Size Description	Typical Damage Impacts
			> Soft ball	
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.

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

Thunderstorm, Wind

Jasper County

There are 106 days with Thunderstorm wind events reported to the NCEI from 2010 through 202020. There were 37 events with reported damages. The total damages from these events include in property damages with average losses per damaging event totaling $982,500.

The costliest event occurred on 4/28/20 A large complex of strong to severe thunderstorms developed ahead of a cold front during the afternoon and evening as a dry line and cold front moved across the region and interacted with a very unstable air mass. The storms produced widespread straight-line wind damage from Columbus, Kansas to Springfield to Eminence.

See Appendix A, Chapter 3, Tab 1 for NCEI Events and Damages from Thunderstorms-Wind for Jasper County.

Newton County

There are 48 days with Thunderstorm wind events reported to the NCEI from 2010 through 202020. There were 48 events with reported damages and three recorded deaths. The total damages from these events include in property damages with average losses per damaging event totaling $651,500.

The costliest event occurred on 9/1/2014. A cold front moving into the area produced severe thunderstorms with damaging winds, large hail, and isolated tornadoes. Several camper trailers were blown over just east of Reddings Mill. Two minor injuries were reported near the Riverbend Campground with overturned camper trailers. Numerous large trees and power lines were reported down across northern Newton County.

See Appendix A, Chapter 3, Tab 2 for NCEI Events and Damages from Thunderstorms-Wind for Newton County

Hail

Jasper County

There are 99 days with Hail events reported to the NCEI from 2010 through 2020 Severe thunderstorms moved out of southeastern Kansas and produced a swath of hail across Jasper County from Waco to Avilla. Hail from quarter to baseball in size were reported along the path of the storms. In Waco, as the storm entered Missouri, half dollar hail was reported. In Purcell, golf ball to tennis ball hail lasted for nearly 30 minutes causing damage to vehicles and homes. The hail continued across the county impacting Oronogo, where golf ball sized hail occurred, to the eastern edge of the county where ping pong to baseball sized hail fell in Avilla damaging homes and breaking windows out of vehicles. Damage estimates ranged considerably, partially due to the widespread nature of the hail as well as multiple events over successive days. Estimated damages were $2.8 Million.

See Appendix A, Chapter 3, Tab 3 for NCEI Events and Damages from Hail for Jasper County

Newton County

There are 47 days with Hail events reported to the NCEI from 2010 through 2020.The worst occurring on March 9, 2017 Severe thunderstorms producing numerous reports large hail along with scattered wind damage and a couple of tornadoes impacted Missouri Ozarks and southeastern Kansas. Baseball size hail was reported from social media with pictures. There were multiple reports of damage to cars and homes in the area. Estimated damage, $100,000

See Appendix A, Chapter 3, Tab 4 for NCEI Events and Damages from Hail for Jasper County

Lightning

Jasper County

Limitation 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. There are eleven lightning events recorded in the NCEI data for Jasper County from 2000 through 2020. The most severe event caused by lightning strike occurred on 6/15/13 Two house fires were started due to lightning strikes

Table 3.37 NCEI List of Lightening Events for Jasper County 2010-2020

EVENT ID	County	Begin Location	Begin Date	Event	Deaths	Injuries	Damage Property	Damage Crops
296305	JASPER	JOPLIN	5/23/2011	Lightning	1	1	0	0
447012	JASPER	JOPLIN	6/15/2013	Lightning	0	0	100000	0
527944	JASPER	CARL JCT	8/7/2014	Lightning	0	0	1000000	0
534665	JASPER	JOPLIN	9/18/2014	Lightning	0	0	50000	0
538642	JASPER	JOPLIN	10/2/2014	Lightning	0	0	10000	0
636566	JASPER	CARTHAGE	7/7/2016	Lightning	0	0	5000	0
636606	JASPER	DUENWEG	7/12/2016	Lightning	0	0	2000	0
694692	JASPER	SARCOXIE	5/11/2017	Lightning	0	0	1000	0
697926	JASPER	SARCOXIE	5/27/2017	Lightning	0	0	5000	0
883687	JASPER	KENDRICKTO	4/2/2020	Lightning	0	0	15000	0
892660	JASPER	DUENWEG	5/22/2020	Lightning	0	0	25000	0
				TOTAL	1	1	1213000	0
337357	NEWTON	NEOSHO	8/10/2011	420	Lightning	0	0	50000

Source: https://www.weather.gov/media/sgf/hazard_book/Hazard_Book_Jasper.pdf
NCEI

Probability of Future Occurrence

Thunderstorm Wind

Thunderstorms, hail, and straight-line winds are regular occurrences in both Jasper County and Newton County. The severities of these storms vary greatly. These statistics suggest a probable future risk for the two-county region. The probable risk is calculated by dividing the number of events by the number of years, multiplying by 100 to create a risk percentage. 488 thunderstorm and high wind events occurred in Jasper and Newton County between 1955 and 2018. 582 hail events occurred between 1955 and 2018. During this period of time, a total of 1,070 events occurred in 63 years. Therefore, the probability for a thunderstorm or hail event in any given year for Jasper and Newton Counties is 100%. In other words, a severe thunderstorm is statistically likely to occur in any given year (1,070 events / 63 years *100= 1,698.4%).

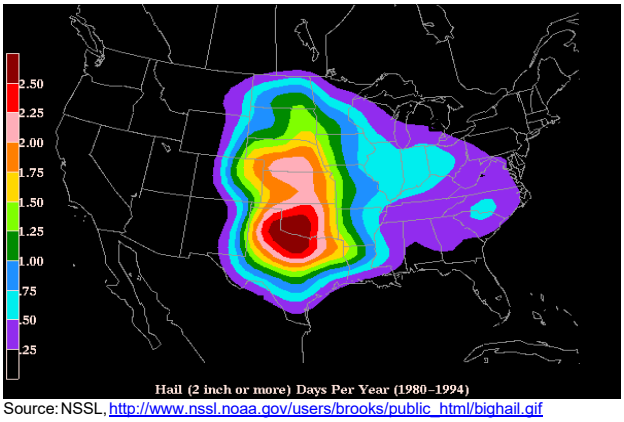
Hail

There have been 200 days with recorded hail events over a 23 year period from 2010 to 2020. This equates to 5.4 hail events in any given year with a 100% probability of occurrence. There were 14 events that resulted in 2.98M in property damage. This approximately equates to 43% probability of occurrence (2" diameter or larger) based on number of days per year. Jasper and Newton County is inside the dark blue zone on the map meaning that the county can be expected to experience hail greater than 2" in diameter approximately one day per year.

Lightening

It is known that the occurrence of severe thunderstorms include the risk of damaging and potentially life- threatening lightning strikes. The NCEI database includes 12 recorded occurrences of damaging lightning events from the years 2010 to 2020. Therefore, the occurrence probability of lightning events is .325% (12/3684 days).

Figure 3.20 Annual Hailstorm Probability (2" diameter or larger), U 1980- 1994



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

Changing Future Conditions Considerations

NASA's Earth Observatory provides an analysis on how climate change could, theoretically, increase potential storm energy by warming the surface and putting more moisture in the air through evaporation. The presence of warm, moist air near the surface is a key ingredient for summer storms that meteorologists have termed "convective available potential energy," or CAPE. With an increase in CAPE, there is greater potential for cumulus clouds to form. The study also counters this theory with the theory that warming in the Arctic could lead to less wind shear in the mid-latitude areas prone to summer storms, making the storms less likely. Predicted increases in temperature could help create atmospheric conditions that are fertile breeding grounds for severe thunderstorms and tornadoes in Missouri. Possible impacts include an increased risk to life and

property in both the public and private sectors. Public utilities and manufactured housing developments will be especially prone to damages. Jurisdictions already affected should be prepared for more of these events, and should thus prioritize mitigation actions such as construction of safe rooms for vulnerable populations, retrofitting and/or hardening existing structures, improving warning systems and public education, and reinforcing utilities and additional critical infrastructure.

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. http://www.vaisala.com/en/products/thunderstormandlightningdetectionsystems/Pages/NLDN.aspx and http://www.lightningsafety.noaa.gov/

Potential Losses to Existing Development

The average annual loss determined from historical losses for high wind and hail are indicators of the potential losses to existing development. High wind events in the county have the potential to damage critical facilities, school facilities, local government properties, and private property alike. Potential annual losses for high wind and hail events are $55,562 and $12,695, respectively.

Previous and Future Development

Joplin, Carthage, and Neosho are the fastest growing communities in Jasper/Newton County. All other municipalities are growing, but at a smaller rate. The unincorporated parts of the county is also gaining population. Additional development in these areas will result in the exposure of more households and business vulnerable to damages from high winds, hail and lightning.

Table 3.38 Total Jasper and Newton County Vulnerability Assessment

	Number of people	Number of	Number of people	Number of	Number of people	Number of
Current Data				Future	Growth	Projections
Residential	117,404	50,240	$4,527,406,000	14,088	6,029	$543,288,720
Commercial	23,246	1,745	$1,443,518,000	2,790	209	$173,222,160
Industrial	7,044	233	$438,005,000	845	28	$52,560,600
Agricultural	704	10,798	$45,571,000	84	1,296	$5,468,520
Government	1,056	9	$67,918,000	126	1	$8,150,160
Education	9,745	105	$604,383,000	1,169	13	$139,733,773
Religious / Other	2,818	262	$172,749,000	67	31	$20,729,880
Total	**117,404**	**63,392**	**$7,299,550,000**	**19,169**	**7,607**	**$943,193,813**
NEWTON						
Residential	58,845	26,600	$2,109,962,000	4,708	2,128	$168,796,960
Commercial	12,887	3,668	$747,605,000	1,031	293	$59,808,400
Industrial	4,304	1,710	$163,775,000	344	137	$13,102,000
Agricultural	733	13,942	$21,072,000	59	1,115	$1,685,760
Government	1,024	49	$39,103,000	82	4	$3,128,240
Education	16,797	193	$259,532,000	1,344	15	$20,762,560
Religious / Other	243	981	$77,425,000	19	78	$6,194,000
Total	**58,845**	**58,845**	**$3,418,474,000**	**7,587**	**3,770**	**$273,477,920**

Source: https://dnr.mo.gov/env/hwp/docs/090624finaljaspnewtdap.pdf

EMAP Consequence Analysis

For communities with emergency management programs seeking EMAP accreditation, complete 40to summarize the detrimental impacts from severe thunderstorms.

Table 3.39 EMAP Impact Analysis: Severe Thunderstorms

Subject	Detrimental Impacts
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the areas at the time of the incident.
Continuity of Operations	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads, facilities, and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities, and Infrastructure	Localized impact to facilities and infrastructure in the area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for incident areas and moderate to light for other areas affected by the storm or HazMat spills.
Economic Condition of Jurisdiction	Losses to private structures covered, for the most part, by private insurance.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/risk-assessment.docx

Hazard Summary by Jurisdiction

Although thunderstorm high winds, hail and lightning are area-wide events, the communities of Jasper County and Newton County have varying degrees of percentage of structure built prior to 1939 – which are considered to be more vulnerable to the impacts of these events. The highest percentage of structures built prior to 1939 is the Jasper County at 16% (8032 buildings), followed by Newton County at 12.6% (3043 Buildings). (9.6%). Jasper and Newton County have several rural school districts that have not been modernized and are at risk of storm damage. Additionally, most districts have outbuildings used for storage and maintenance that may be at higher risk to high wind and hail events.

Problem Statement

Poorly built structures, barns, outbuildings are more vulnerable to the impact of high winds during thunderstorms. High winds can topple utility poles and lead to widespread or localized power outages. Both high winds and hail can damage roofs. Hail can also damage crops and vehicles. People are also at risk to injury and death during high wind and lightning events. Crop insurance can mitigate the risk to farmers and the agriculture sector within the county. Lightning events have also been known to cause structure fires.

The risk of property damage, injury and death in the county can potentially be mitigated by identifying safe refuge areas in public buildings, nursing homes and other facilities that house vulnerable populations that do not currently have a safe room. Retrofitting school district facilities with protective filming of windows and installation of blast proof doors will provide more protection for students and staff at school facilities. Additional warnings and alerts will also provide the public and schools more time to take cover during high wind events. In addition, public safety fairs and expos in the county could provide an opportunity to disseminate information to citizens about individual saferoom construction. Education and hazard awareness programs in public schools

would also increase public safety in the event of severe thunderstorm occurrence.

3.4.9 Severe Winter Weather

Hazard Profile

Hazard Description

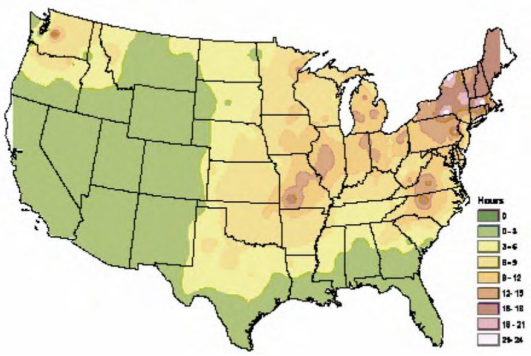
A major winter storm can last for several days and be accompanied by high winds, freezing rain or sleet, heavy snowfall, and cold temperatures. The National Weather Service describes different types of winter storm events as follows.

- **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

The entire county is vulnerable to heavy snow, ice, extreme cold temperatures and freezing rain. Figure 3.21 depicts the average number of hours per year with freezing rain. Jasper and Newton County is located in a zone that can expect 12-18 hours of freezing rain per year.

Figure 3.21 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 heavy snowfall, ice, and strong winds which can push the wind chill well below zero degrees in the planning area.

For severe weather conditions, the National Weather Service issues some or all of the following products as conditions warrant across the State of Missouri. NWS local offices in Missouri may collaborate with local partners to determine when an alert should be issued for a local area.

- Winter Weather Advisory — Winter weather conditions are expected to cause significant inconveniences and may be hazardous. If caution is exercised, these situations should not become life threatening. Often the greatest hazard is to motorists.
- Winter Storm Watch — Severe winter conditions, such as heavy snow and/or ice are possible within the next day or two.
- Winter Storm Warning — Severe winter conditions have begun or are about to begin.
- Blizzard Warning — Snow and strong winds will combine to produce a blinding snow (near zero visibility), deep drifts, and life-threatening wind chill.
- Ice Storm Warning -- Dangerous accumulations of ice are expected with generally over one quarter inch of ice on exposed surfaces. Travel is impacted, and widespread downed trees and power lines often result.
- Wind Chill Advisory -- Combination of low temperatures and strong winds will result in wind chill readings of -20 degrees F or lower.
- Wind Chill Warning -- Wind chill temperatures of -35 degrees F or lower are expected. This is a life-threatening situation.

Previous Occurrences

Table 3.40 NCEI Jasper and Newton Winter Weather Events Summary, 2010-2020

Type of Event	Inclusive Dates	Magnitude	# of Injuries	Property Damages	Crop Damages
437816	JASPER	2/21/2013	Winter Storm	0	0
481550	JASPER	12/20/2013	Winter Storm	0	0
484916	JASPER	1/5/2014	Winter Storm	0	0
502461	JASPER)	3/2/2014	Winter Storm	0	0
557324	JASPER	2/15/2015	Winter Storm	0	0
281501	NEWTON (ZONE)	2/1/2011	Winter Storm	0	0
437825	NEWTON (ZONE)	2/21/2013	Winter Storm	0	0
481523	NEWTON (ZONE)	12/5/2013	Winter Storm	0	0
481548	NEWTON (ZONE)	12/20/2013	Winter Storm	0	0
502449	NEWTON (ZONE)	3/2/2014	Winter Storm	0	0
557328	NEWTON (ZONE)	2/15/2015	Winter Storm	0	0
877740	JASPER (ZONE)	2/5/2020	Heavy Snow	0	0
877713	NEWTON (ZONE)	2/5/2020	Heavy Snow	0	0

Source: NCEI, NOAA, data accessed 2021

Heavy Snow

Jasper County

According to the NOAA Weather event database, there was only 1 event of heavy snow. On 2/5/2020 A complex winter storm began as light precipitation in the form of rain and freezing rain.

However, as colder temperatures moved into the region a heavy snow fell from southeast Kansas into central Missouri, where 2 to 5 inches of snow snow fell, with some locally higher amounts of 6 inches. Widespread reports of two to four were received around the county. Oronogo reported 4.0 inches, Joplin 4.0 inches and Carthage 3.5 inches

Newton County

According to the NOAA Weather event database, there was only 1 event of heavy snow. On 2/5/2020 a complex winter storm began as light precipitation in the form of rain and freezing rain. However, as colder temperatures moved into the region a heavy snow fell from southeast Kansas into central Missouri, where 2 to 5 inches of snow fell, with some locally higher amounts of 6 inches. Widespread two to four inches of snow fell across the county. Seneca reported 4.0 inches and Neosho 3.0 inches.

Blizzards

According to NOAA here are no recorded blizzard events in Jasper or Newton Counties from 2010-2020.

Cold/Wind, Extreme Cold

According to NOAA there are no recorded cold wind or extreme cold events in Jasper or Newton Counties from 2010-2020

Ice Storms, Sleet

According to NOAA there are no recorded Ice storms or sleet events in Jasper or Newton Counties from 2010-2020

Of the 13 events listed in the NCEI data, 2 were Heavy Snow events, and the remainder term generally as “Winter Storm”. There are no reported deaths, injuries, or crop damage associated with these winter weather events.

Probability of Future Occurrence

The probability for all of the different types of winter weather are included as one probability, since one storm generally includes a lot of the different types of events. There were 13 severe winter weather events in Jasper and Newton County from 2010-2020. This equates to a 100% probability of occurrence in any given year.

Changing Future Conditions Considerations

A shorter overall winter season and fewer days of extreme cold may have both positive and negative indirect impacts. Warmer winter temperatures may result in changing distributions of native plant and animal species and/or an increase in pests and non-native species. Warmer winter temperatures will result in a reduction of lake ice cover. Reduced lake ice cover impacts aquatic ecosystems by raising water temperatures. Water temperature is linked to dissolved oxygen levels and many other environmental parameters that affect fish, plant, and other animal populations. A lack of ice cover also leaves lakes exposed to wind and evaporation during a time of year when they are normally protected. As both temperature and precipitation increase during the winter months, freezing rain will be more likely. Additional wintertime precipitation in any form will contribute to saturation and increase the risk and/or severity of spring flooding. A greater proportion of wintertime precipitation may fall as rain rather than snow/

Vulnerability

Vulnerability Overview

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 excessive 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. People over 65 and those living in poverty have an increased risk of hypothermia and frostbite due to extreme cold and wind chill hazards.

In the 2018 State Plan, seven factors were considered in determining overall severe winter storm vulnerability as follows: housing density, likelihood of occurrence, building exposure, crop exposure, average annual property loss ratio, average annual crop insurance claims and social vulnerability. The state ranked each of these criteria using a scale from one to five, one being lowest and five being the highest, to rank each county's vulnerability to severe winter weather. Jasper County received a vulnerability rating of medium and Newton County received a vulnerability rating of medium low.

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.

Potential Losses to Existing Development

During the 10 year period of record from 2010 to 2020, a total of $0 in property losses equates to $0 in average annual losses countywide.

Previous and Future Development

Increased development and resulting increase in population will increase exposure to damage from severe winter weather. Future commercial development can expect functional downtime and decreased revenues during periods of severe winter weather. Road construction in the county will increase the need for snow removal and slat to keep transportation lifelines open during periods of severe winter weather

EMAP Consequence Analysis

For communities with emergency management programs seeking EMAP accreditation, complete 1 to summarize the detrimental impacts from severe winter weather.

Table 3.41 EMAP Impact Analysis: Severe Winter Weather

Public	Localized impact expected to be severe for affected areas and moderate to light for other less affected areas.
Responders	Adverse impact expected to be severe for unprotected personnel and moderate to light for trained, equipped, and protected personnel.
Continuity of Operations	Unlikely to necessitate execution of the Continuity of Operations Plan. Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities, and Infrastructure	Localized impact to facilities and infrastructure in the areas of the incident. Power lines and roads most adversely affected.
Environment	Environmental damage to trees, bushes, etc.
Economic Condition of Jurisdiction	Local economy and finances may be adversely affected, depending on damage.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Hazard Summary by Jurisdiction

Severe winter weather can cause power outages and put structures at risk to fires when individuals in homes resort fuel heaters. The risk of extreme cold deaths and frostbite varies among segments of the populations. People over 65 and those living below the poverty level have an increased vulnerability to severe winter weather. Jasper has 18.8% of families below the poverty level and 16% of the population over 65. Newton has 13.2% of families under the poverty level and 18.4% over 65. Both counties have large percentages of families living below the poverty level.

Table 3.23. Problem Statement

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 travelled extremely difficult and hazardous. People over 65 and those living in poverty have an increased

risk of hypothermia and frostbit due to extreme cold and wind chill.

It is important that Jasper and Newton County EMA maintain a list of heating centers throughout the county as they become available. These locations could be promoted through avenues such as radio, Facebook or the county government's website. These locations can provide individuals who are at risk refuge from periods of extreme cold. Public works departments can develop snow removal plans and maintain adequate snow removal equipment and slat to quickly open roads after periods of heavy snow and freezing rain. The county and cities can work with local electric cooperatives to development vegetation management programs in rights of way to minimize damages of falling tree limbs laden with ice resulting from ice storms to minimize power outages throughout the county.

3.4.10 Tornado

Hazard Profile

Hazard Description

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. The unique geography of the central United States allows for the development of thunderstorms that spawn tornadoes. The jet stream, which is a high-velocity stream of air, determines which area of the central United States will be prone to tornado development. The jet stream normally 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.

Tornadoes spawn from the largest thunderstorms. The associated cumulonimbus clouds can reach heights of up to 55,000 feet above ground level and are commonly formed when Gulf air is warmed by solar heating. The moist, warm air is overridden by the dry cool air provided by the jet stream. This cold air presses down on the warm air, preventing it from rising, but only temporarily. Soon, the warm air forces its way through the cool air and the cool air moves downward past the rising warm air. This air movement, along with the deflection of the earth's surface, can cause the air masses to start rotating. This rotational movement around the location of the breakthrough forms a vortex, or funnel. If the newly created funnel stays in the sky, it is referred to as a funnel cloud. However, if it touches the ground, the funnel officially becomes a tornado.

A typical tornado can be described as a funnel-shaped cloud that is "anchored" to a cloud, usually a cumulonimbus that is also in contact with the earth's surface. 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

Tornadoes can occur anywhere in the planning area.

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 (see **Table 3.43**) 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 3.42 Enhanced F Scale for Tornado Damage

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

Source: The National Weather Service, www.spc.noaa.gov/faq/tornado/ef-scale.html

The wind speeds for the EF scale and damage descriptions are based on information on the NOAA Storm Prediction Center as listed in **Table 3.43**. The damage descriptions are summaries. For the actual EF scale it is necessary to look up the damage indicator (type of structure damaged) and refer to the degrees of damage associated with that indicator. Information on the Enhanced Fujita Scale's damage indicators and degrees or damage is located online at www.spc.noaa.gov/efscale/ef-scale.html.

Table 3.43 Enhanced Fujita Scale with Potential Damage

Enhanced Fujita Scale			
Scale	Wind Speed (mph)	Relative Frequency	Potential Damage
EF0	65-85	53.5%	Light. Peels surface off some roofs; some damage to gutters or siding; branches broken off trees; shallow-rooted trees pushed over. Confirmed tornadoes with no reported damage (i.e. those that remain in open fields) are always rated EF0).
EF1	86-110	31.6%	Moderate. Roofs severely stripped; mobile homes overturned or badly damaged; loss of exterior doors; windows and other glass broken.

EF2	111-135	10.7%	Considerable. Roofs torn off well-constructed houses; foundations of frame homes shifted; mobile homes complete destroyed; large trees snapped or uprooted; light object missiles generated; cars lifted off ground.
EF3	136-165	3.4%	Severe. Entire stores of well-constructed houses destroyed; severe damage to large buildings such as shopping malls; trains overturned; trees debarked; heavy cars lifted off the ground and thrown; structures with weak foundations blown away some
EF4	166-200	0.7%	Devastating. Well-constructed houses and whole frame houses completely levelled; cars thrown and small missiles generated.
EF5	>200	<0.1%	Explosive. Strong frame houses levelled off foundations and swept away; automobile-sized missiles fly through the air in excess of 300 ft.; steel reinforced concrete structure badly damaged; high rise buildings have significant structural deformation; incredible phenomena will occur.

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

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

Previous Occurrences

Table 3.44 that includes NCEI reported tornado events and damages since 1996 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 3.44 Recorded Tornadoes in Jasper and Newton County, 1996 – 2019

EVENT_ID	County	BEGIN_ DATE	TOR F SCALE	DEATHS	INJURIES	DAMAGE PROPERTY	DAMAGE CROPS
10332100	JASPER CO.	10/8/1993	F2	0	0	5000000	0
10332101	JASPER CO.	10/8/1993	F2	0	0	500000	0
10332104	JASPER CO.	4/9/1994	F0	0	0	500	0
5551436	JASPER CO.	4/28/1996	F1	0	12	12000000	0
5576780	JASPER CO.	4/28/1996	F1	0	0	1000000	0
5706820	JASPER CO.	6/28/1999	F1	0	0	220000	0
5326268	JASPER CO.	12/18/2002	F1	0	0	50000	0
5358178	JASPER CO.	5/4/2003	F3	2	15	21200000	0
5358179	JASPER CO.	5/4/2003	F0	0	0	0	0
5404310	JASPER CO.	6/12/2004	F0	0	0	0	0
5479560	JASPER CO.	11/27/2005	F0	0	0	0	0
5504547	JASPER CO.	4/6/2006	F1	0	0	100000	0
99255	JASPER CO.	5/10/2008	EF1	1	10	1000000	0
296617	JASPER CO.	5/22/2011	EF5	158	1150	2800000000	0
441619	JASPER CO.	5/19/2013	EF1	0	0	200000	0
562227	JASPER CO.	4/2/2015	EF0	0	0	10000	0
827983	JASPER CO.	5/20/2019	EFU	0	0	0	0
828159	JASPER CO.	5/22/2019	EF3	0	0	5250000	0

827982	JASPER CO.	5/22/2019	EF0	0	0	0	0
828195	JASPER CO.	5/22/2019	EF3	0	0	275000	0
			TOTAL	**161**	**1187**	**2846805500**	**0**
10331871	NEWTON CO.	Seneca	10/8/1993	Tornado	F1	0	0
10331777	NEWTON CO.	Diamond	9/25/1994	Tornado	F0	0	0
10331778	NEWTON CO.	Diamond	9/25/1994	Tornado	F0	0	0
5574795	NEWTON CO.	BOULDER CITY	9/26/1996	Tornado	F1	0	0
5239785	NEWTON CO.	REDINGS MILL	4/15/2001	Tornado	F1	0	1
5239678	NEWTON CO.	NEOSHO	4/15/2001	Tornado	F1	0	0
5247275	NEWTON CO.	DIAMOND	5/20/2001	Tornado	F0	0	0
5326270	NEWTON CO.	FAIRVIEW	12/17/2002	Tornado	F0	0	0
5358438	NEWTON CO.	RITCHEY	5/4/2003	Tornado	F2	0	0
5413477	NEWTON CO.	HORNET	7/4/2004	Tornado	F1	0	0
5456150	NEWTON CO.	DIAMOND	6/13/2005	Tornado	F0	0	0
5456273	NEWTON CO.	REDINGS MILL	6/30/2005	Tornado	F0	0	0
5456274	NEWTON CO.	RACINE	6/30/2005	Tornado	F0	0	0
5493642	NEWTON CO.	NEOSHO	3/12/2006	Tornado	F1	0	1
5493643	NEWTON CO.	NEOSHO	3/12/2006	Tornado	F0	0	0
89900	NEWTON CO.	SENECA	3/31/2008	Tornado	EF1	0	0
89906	NEWTON CO.	BELFAST	3/31/2008	Tornado	EF0	0	3
99241	NEWTON CO.	HORNET	5/10/2008	Tornado	EF4	14	200
296616	NEWTON CO.	REDINGS MILL	5/22/2011	Tornado	EF2	0	0
296620	NEWTON CO.	SAGINAW	5/22/2011	Tornado	EF2	0	0
296624	NEWTON CO.	PEPSIN	5/22/2011	Tornado	EF2	0	0
441630	NEWTON CO.	SENECA	5/20/2013	Tornado	EF1	0	0
532297	NEWTON CO.	SAGINAW	9/1/2014	Tornado	EF1	0	0
532303	NEWTON CO.	SAGINAW	9/1/2014	Tornado	EF1	0	0
532304	NEWTON CO.	WENTWORTH	9/1/2014	Tornado	EF0	0	0
566506	NEWTON CO.	SENECA	5/16/2015	Tornado	EF0	0	0
625401	NEWTON CO.	SENECA	4/26/2016	Tornado	EF1	0	0
689747	NEWTON CO.	MC ELHANY	4/4/2017	Tornado	EF0	0	0
698521	NEWTON CO.	FREDVILLE	5/10/2017	Tornado	EF0	0	0
698521	NEWTON CO.	FREDVILLE	5/10/2017	Tornado	EF0	0	0
698447	NEWTON CO.	NEOSHO	5/19/2017	Tornado	EF0	0	0
780781	NEWTON CO.	RITCHEY	8/19/2018	Tornado	EF0	0	0
					TOTAL	**14**	**205**

Source: National Centers for Environmental Information, http://www.NCEI.noaa.gov/stormevents/

Jasper County

There were 20 tornado events recorded in the NCEI database from 1996 – 2019 in Jasper County. The damages from these events resulted in 161 deaths and 1187 injuries and resulted in $ 2,846,805,500 in property damage and zero dollars in crop damage. Two of the most damaging tornado events are summarized below:

5/22/11. National Weather Service survey teams rated the tornado that tracked across the southwest through east central portion of Joplin, Missouri, as an EF5 tornado. Maximum winds were estimated to have exceeded 200 miles per hour. The tornado had a maximum width of one mile and an overall path length of nearly 21.6 miles, nearly nine miles of which occurred in Jasper County.

The tornado killed 158 directly, three indirectly, and injured over 1150 people. Sadly, on May 24 a police officer who was volunteering from another department, was struck by lightning while serving in the response efforts and later died. Equally, a 56 year old man

who had been included as a direct fatality was later determined to have died of a heart attack. Over 10,200 people filed for disaster assistance following the tornado.

The EF-5 rating (greater than 200 mph wind speeds) was mainly arrived at by the total destruction of vehicles, including some vehicles tossed several blocks and semi-trucks thrown a quarter of a mile. Parking stops weighing over 300 pounds and re-barred into asphalt were uprooted and tossed. Other factors in the rating included damage to reinforced concrete structures, and that St. Johns Hospital building structure was compromised.

Seven thousand homes were severely damaged or destroyed and another 900 damaged. Other substantial buildings damaged or destroyed included the Joplin High School and Technical Center along with five other city schools. Numerous retailers including Home Depot, Sports Academy, Dillons, and Walmart were also destroyed. The most substantial building impacted was St John's hospital which will be razed due to the tornado. It was calculated that 2 million cubic yards of debris is attributable to the storm across its relatively short length on the ground.

The tornado initially touched down one half mile southwest of the intersection of JJ Highway and Newton Road in Newton County where several large trees were toppled.

The tornado rapidly intensified as it moved toward the intersection of Country Club Drive and 32nd Street where it crossed into Jasper County. Damage became more widespread as the tornado crossed Maiden Lane, breaking nearly all windows on three sides of St. Johns Hospital as well as damage to the roof and exterior walls on several floors. Two patients on oxygen were indirectly suffocated when the generator and a backup generator were damaged after power was cut off. Three additional patients may have succumbed similarly though sufficient data as to the cause of death was not available. An additional indirect fatality occurred due to psychological trauma.

The tornado further intensified as it destroyed homes and businesses to the immediate east and north of the hospital. A church school was completely destroyed with the exception of a portion of the sanctuary. Significant damage to the Greenbriar Nursing Home resulted in the death of 20 mostly elderly patients.

The tornado continued to destroy hundreds of frame homes between 32nd and 20th Streets, leading to nearly a fifth of the deaths. Three story apartment complexes had the top two floors removed; other two story complexes were partially leveled. Fourteen deaths occurred in apartments along the track. Eleven additional deaths occurred in churches along this path. There were two fatalities in a mobile home (Joplin has a city ordinance prohibiting mobile home parks).

Well built structures that were heavily damaged or destroyed along this area included the Joplin High School, Franklin Technical Center and Irving Elementary, all of which were free of students due to the weekend. The tornado also damaged three additional elementary schools. A bank was totally destroyed with the exception of the vault. A large grocery store was also destroyed.

The tornado crossed Rangeline Road near 20th Street. Damage included significant to complete damage to several restaurants and large long-span retail buildings; including Home Depot, Sports Academy and Walmart in this area. Twenty deaths occurred

indoors or in the parking lots of these structures. Semi trucks on the back side of Walmart were thrown more than a quarter mile.

The tornado continued to move eastward along and south of 20th Street destroying numerous warehouse style facilities, a portion of Joplin East Middle School, and residences through Duquesne Road.

The tornado continued destroying numerous homes as it began weakening. It turned southeast toward Interstate 44 where it threw several semi-trucks as it crossed the interstate and moved into Newton County at 32nd Street just west of Kodiak Road.

5/22/2019 A National Weather Service storm survey confirmed an EF-3 tornado with maximum winds of 142 mph. This was the last in a series of at least four tornadoes produced by a supercell that tracked out of northeast Oklahoma and southeast Kansas into Jasper County, Missouri. The tornado touched down near the intersection of Redbud and CR 100, downing power lines and uprooting trees. Wind speeds increased to an estimated 120 mph as it took the roof off a residence on Redbud before tracking northeast and damaging homes and outbuildings as it crossed the intersections of Sumac and County Road 90, Thorn and Highway T, and then into Barton County.

Newton County

There were 31 tornado events recorded in the NCEI database from 1996 – 2019 in Newton County. . The damages from these events resulted in 14 deaths and 205 injuries and resulted in $43,582,520 in property damage and zero dollars in crop damage. Two of the most damaging tornado events are summarized below:

5/10/2008. Three tornadoes were spawned from supercell thunderstorms that developed over southeast Kansas. These storms quickly moved into southwest Missouri causing devastating damage to homes, businesses, and trees in Newton, Barry, and Jasper counties. One tornado, with an intensity that ranged from EF-4 to EF-1, killed 15 people as it tracked through Newton and Barry counties, while another tornado killed one person in Jasper County.

5/4/2003 A seven mile long path of rural east central Newton County was affected from the initial stages of a large tornado. Three homes and outbuildings were destroyed while five more were damaged causing approximately one half million dollars in monetary loss. This tornado then tracked through Lawrence, Christian, and southwestern Greene counties

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

Probability of Future Occurrence

Generally, the risk of tornado is of particular significance for both Jasper and Newton County. Both Jasper and Newton County fall within the top 5% of tornado-affected counties. The probable risk is calculated by dividing the number of events by the number of years, multiplying by 100 to create a risk percentage. Between the years 1996 – 2019, Jasper and Newton counties experienced 51 events. Therefore, the probability for a tornadic event in any given year for Jasper and Newton

counties is 100% (51 events/21 Years*100= 242%.

Changing Future Conditions Considerations

Tornadoes have been recorded all over the world, but the United States experiences around a thousand of them each year, which is far more than anywhere else on the planet. Most of these occur in "Tornado Alley," an area of the Great Plains region, where the atmospheric conditions are just right for massive, tornado-spawning thunderstorms. The resulting tornadoes leave a trail of destruction in their wake, often with deadly consequences Scientists agree that the climate is changing, and humans are responsible. The burning of fossil fuels, such as coal, oil, and gas, releases huge amounts of carbon dioxide (CO2) into the atmosphere every year, which is leading to a rise in global temperatures, known as global warming.

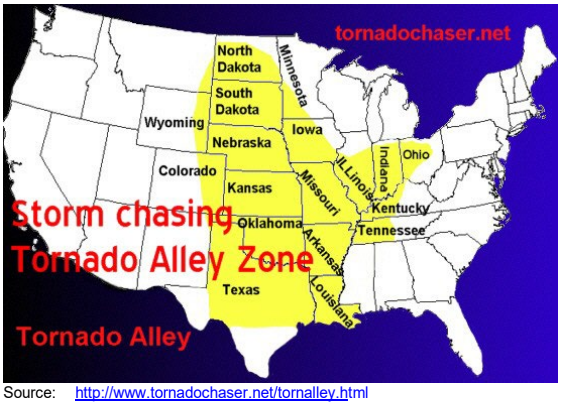
Global warming is just one symptom of the larger problem of climate change. Climate change has also caused an increase in extreme weather events all over the world. It is clear, there have been changes in tornado patterns in recent years. Research has shown that there are fewer days with at least one tornado but more days with over thirty, even as the total number of tornadoes per year has remained relatively stable. In other words, tornado events are becoming more clustered. There is also evidence to suggest that tornado patterns have shifted geographically. The number of tornadoes in the states that make up Tornado Alley are falling, while tornado events have been on the rise in the states of Mississippi, Alabama, Arkansas, Missouri, Illinois, Indiana, Tennessee, and Kentucky.

Vulnerability

Vulnerability Overview

Jasper and Newton County is located in a region of the United States with high frequency of dangerous and destructive tornadoes referred to as "Tornado Alley" as is the entire State of Missouri. Figure 3.21 illustrates the areas where dangerous tornadoes historically have occurred. The 2018 State Plan applies a certain methodology to each county in the state to determine each county's vulnerability to tornadoes. While this approach attempts to prioritize tornado vulnerable counties, it does not identify any particular geographic patters to tornado risk. The state's analysis combines annualized losses and frequency of occurrence to determine the greatest likelihood of being impacted by a tornado. The state's vulnerability rating ranged from very high, high, and moderate. The vulnerability for Jasper and Newton County was rated as high.

Figure 3.22 Tornado Alley in the U.S.



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

Potential Losses to Existing Development

During the 21-year period from 1996 to 2019, a total of $2,890,388,020 in property losses equates to$34,309,812.90 in average annual losses countywide. This value indicates that potential future losses in the county will remain significant. The most common tornado events recorded in the county are EF1 magnitude. The average magnitude for tornado events in the county is 1.5 on the Enhanced Fujita Scale.

Previous and Future Development

Jasper and Newton County can be considered to have significant growth, relative to other rural counties across the state. Inside the county, fastest growing communities are the City of Joplin and the City of Neosho. It is anticipated that the unincorporated county will see the most growth along the U.S. Highway 43 corridor throughout the central part of the county. Additional population growth and development will increase exposure and risk to tornado events due to the area-wide geographic nature of this hazard.

EMAP Consequence Analysis

For communities with emergency management programs seeking EMAP accreditation, complete Table 3.45 to summarize the detrimental impacts from tornadoes.

Table 3.45 EMAP Impact Analysis: Tornadoes

Subject	Detrimental Impacts
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the areas at the time of the incident.
Continuity of Operations	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads, facilities, and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities, and Infrastructure	Localized impact to facilities and infrastructure in the area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for incident areas and moderate to light for other areas affected by the storm or HazMat spills.
Economic Condition of Jurisdiction	Local economy and finances adversely affected, possibly for an extended period of time.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/risk-assessment.docx

Hazard Summary by Jurisdiction

Although tornado events are area-wide events, the communities of Jasper and Newton County have varying degrees of percentage of structure built prior to 1939 – which are considered to be more vulnerable to the impacts of these events. The highest percentage of structures built prior to 1939 is the Jasper County at 16% (8032 buildings), followed by Newton County at 12.6% (3043 Buildings). (9.6The county's school districts have mostly modernized facilities and are considered well-built structures. However, most districts have outbuildings used for storage and

maintenance that may be at higher risk to the high winds associated with tornadic storms.

School district facilities and student populations are at risk to the damages of tornadoes. The larger school districts have FEMA safe rooms. However, numerous rural schools in the outlying jurisdictions still do not have safe rooms.

Problem Statement

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. Significant tornado events in Jasper and Newton County since 1996 have resulted in deaths (175) numerous injuries (1392) and trillions of dollars in property damage ($2.8T). Information in the 2018 State Plan indicates that Jasper and Newton County has a high vulnerability to tornadoes based on frequency of occurrence and previous damages.

The risk of property damage, injury and death in the county can be mitigated by constructing FEMA standard saferooms in facilities that house vulnerable populations such as nursing homes, government buildings, and schools. In addition, identifying safe refuge areas in public buildings, nursing homes and other facilities with protective filming of windows and installation of blast proof doors will provide more protection for students and staff and school facilities that are not served by FEMA standard saferooms. Additional warnings and alerts will also provide the public and schools more time to take cover during tornado warnings. Aldo, public safety fairs and expos in the county hosted by communities provide an opportunity to disseminate information to homeowners about individual saferooms construction in residences.

Cities can adopt or update and enforce IBC 2012 building codes that include construction techniques such as roof tie down straps to mitigate damage to future development Examples of risks are located within the surveys collected for each jurisdiction. See Appendix.

3.4.11 Wildfire

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.

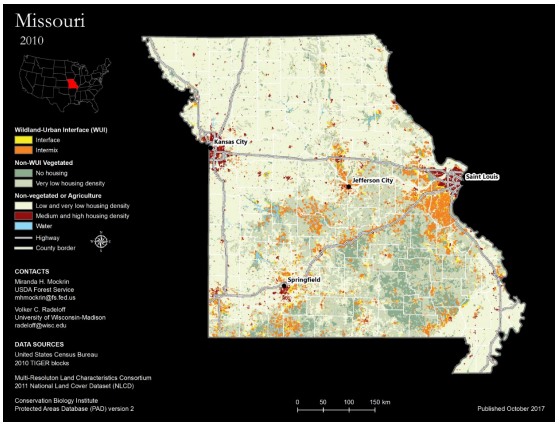
The Forestry Division of the Missouri Department of Conservation (MDC) is responsible for protecting privately owned and state-owned forests and grasslands from wildfires. To accomplish this task, eight forestry regions have been established in Missouri for fire suppression. The Forestry Division works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

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

Geographic Location

The term refers to the zone of transition between unoccupied land and human development and needs to be defined in the plan. Within the WUI, there are two specific areas identified: 1) Interface and 2) Intermix. The interface areas are those areas that abut wildland vegetation and the Intermix areas are those areas that intermingle with wildland areas.

Figure 3.23 Wildfire Potential Planning in Area



Source: http://silvis.forest.wisc.edu/GeoData/WUI_cp12/maps/gifs/black/Missouri_WUI_cp12_black_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.

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

Previous Occurrences

No Missouri fires are listed among the significant wildfires in the U.S. since 1825. Fires covering more than 300 acres are considered large in Missouri. Missouri averages 3,200 fires a year with 52,000 acres burned, or an average fire size of 16.25 acres20. Both Jasper and Newton County have significant portions of land in urban settlement, but also large areas of rural and agricultural land. Jasper County experienced 472 wildfires from 2004 - 2016, with an average 244 acres burned per year and a total of 3,168.54 acres. Newton County experienced 1,759 wildfires from 2004 – 2020, with an average impact of 556 acres per year and a total of 7,221.89 acres.

Probability of Future Occurrence

Although there is always a risk of fire in the two-county region, there is little historical precedent for significant wildfires threatening the County on any large scale. Due to the predominantly agricultural nature of the rural portions of Jasper and Newton County, it is likely that small-scale brush fires may occur in the County, but the threat is minimal. Local fire districts reported during the meeting process that the majority of these reported wildfires were more likely controlled burns by local farmers. Controlled burns, however, can potentially result in larger fires. Therefore, the probability of a wildfire event in Jasper and Newton Counties in any given year is near 100% (2,231 events / 12 years*100 =223,100%%).

Changing Future Conditions Considerations

Climate change has been a key factor in increasing the risk and extent of wildfires in the Western United States. Wildfire risk depends on a number of factors, including temperature, soil moisture, and the presence of trees, shrubs, and other potential fuel. All these factors have strong direct or indirect ties to climate variability and climate change. Climate change enhances the drying of organic matter in forests (the material that burns and spreads wildfire), and has doubled the number of large fires between 1984 and 2015 in the western United States.

Research shows that changes in climate that create warmer, drier conditions. Increased drought, and a longer fire season are boosting these increases in wildfire risk. For much of the U.S. West, projections show that an average annual 1 degree C temperature increase would increase the median burned area per year as much as 600 percent in some types of forests. In the Southeastern United States modeling suggests increased fire risk and a longer fire season, with at least a 30 percent increase from 2011 in the area burned by lightning-ignited wildfire by 2060.

Once a fire starts—more than 80 percent of U.S. wildfires are caused by people—warmer temperatures and drier conditions can help fires spread and make them harder to put out. Warmer, drier conditions also contribute to the spread of the mountain pine beetle and other insects that can weaken or kill trees, building up the fuels in a forest.

Land use and forest management also affect wildfire risk. Changes in climate add to these factors and are expected to continue to increase the area affected by wildfires in the United States.

Vulnerability

Vulnerability Overview

Wildfires occur throughout wooded and open vegetation areas of Missouri. They can occur any time of year, but mostly occur during long, dry hot spells. Any small fire, if not quickly detected and suppressed, can get out of control. Most wildfires are caused by human carelessness or negligence. However, some are precipitated by lightning strikes, and in rare instances, spontaneous combustion. Structures and people in Wildland-Urban Interface areas in the county and cities are more vulnerable to the impact of wildfires due to the level of fuel mixed with structures.

There are limitations of the data presented. For example, National Fire Incident Reporting System (NFIRS) data from 2004 to 2008 was used to determine vulnerability it is stated in the State Plan. However, only 61 percent of fire departments in Missouri reported to the NFIRS).

Potential Losses to Existing Development

The data for wildfire at this time is insufficient to craft a successful loss model. For the purposes of this plan and based on the vulnerability assessment completed by the State of Missouri, it is estimated that less than 5% of any given jurisdiction may be at risk for damage before the fire is contained due to surrounding agricultural land and the potential for lost control during managed burning. Resulting damages would most likely be light, weighing in at less than 10% for any impacted land or structure.

Impact of Previous and Future Development

It is anticipated that there will be future development in WUI areas throughout incorporated and unincorporated areas of the county. Future growth in WUI areas of the county will increase the risk and exposure to wildfires.

EMAP Consequence Analysis

For communities with emergency management programs seeking EMAP accreditation, complete Table 3.46 to summarize the detrimental impacts from wildfire.

Table 3.46 EMAP Impact Analysis: Wildfire

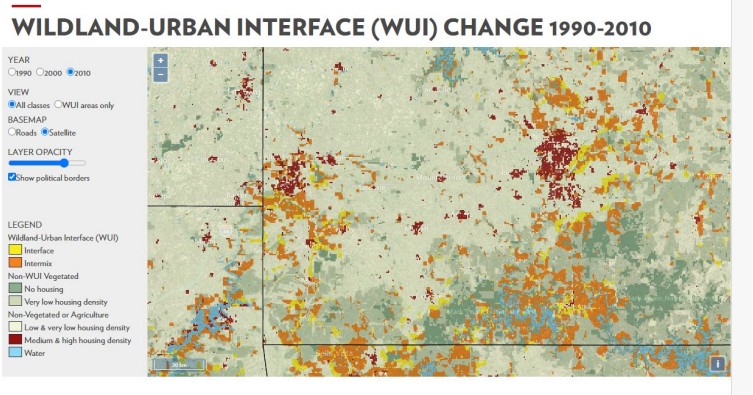
Subject	Detrimental Impacts
Public	Localized impact expected to be severe for incident areas and moderate to light for other adversely affected areas.
Responders	Localized impact expected to limit damage to personnel in the incident areas at the time of the incident.
Continuity of Operations	Damage to facilities/personnel in the area of the incident may require temporary relocation of some operations. Localized disruption of roads and/or utilities caused by incident may postpone delivery of some services.
Property, Facilities, and Infrastructure	Localized impact to facilities and infrastructure in the area of the incident. Some severe damage possible.
Environment	Localized impact expected to be severe for incident areas and moderate to light for other areas affected by smoke or HazMat remediation.
Economic Condition of Jurisdiction	Local economy and finances may be adversely affected, depending on damage and length of investigations.
Public Confidence in the Jurisdiction's Governance	Ability to respond and recover may be questioned and challenged if planning, response, and recovery not timely and effective.

Source: https://sema.dps.mo.gov/docs/programs/LRMF/mitigation/risk-assessment.docx

Hazard Summary by Jurisdiction

In referencing the wildfire hazard map on the following page, it's apparent that the southwestern portion of Jasper County and the Southwest portion of Newton have the highest concentration of wildfire hazard areas Rural areas and their surrounding areas are the population centers nearest to elevated wildfire risk areas. Many rural school district campuses in the county are located inside the WUI area.

Figure 3.24 Jasper-Newton Wildfire Hazard Map



Source: http://silvis.forest.wisc.edu/data/wui-change/

Problem Statement

Summarize Wildfire occurrence is rare within Jasper and Newton County. These events can destroy, damage, and threaten structures in hazard prone areas. Populations and structures in WUI areas of the county have an increased risk to wildfires due to the level of fuel mixed with built environments. Cities have not adopted landscape ordinances that could potentially include fire safe landscape design requirements. The unincorporated areas of the county have the highest risk and exposure to wildfires. Thankfully, many of these areas are sparsely population. However, when new construction is occurring promoting the use of fire-resistant construction materials is highly advisable. More information about these materials and techniques are available in the MDC publication Living with Wildfire.

4 MITIGATION STRATEGY

44 CFR Requirement §201.6(c)(3): The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section presents the mitigation strategy updated by the Mitigation Planning Committee (MPC) based on the [updated] risk assessment. The mitigation strategy was developed through a collaborative group process. The process included review of [updated] general goal statements to guide the jurisdictions in lessening disaster impacts as well as specific mitigation actions to directly reduce vulnerability to hazards and losses. The following definitions are taken from FEMA's Local Hazard Mitigation Review Guide (October 1, 2012)

- **Mitigation Goals** are general guidelines that explain what you want to achieve. Goals are long-term policy statements and global visions that support the mitigation strategy. The goals address the risk of hazards identified in the plan.

- **Mitigation Actions** are specific actions, projects, activities, or processes taken to reduce or eliminate long-term risk to people and property from hazards and their impacts. Implementing mitigation actions helps achieve the plan's mission and goals.

4.1 Goals

44 CFR Requirement §201.6(c) (3) (i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified

This planning effort is an update to Jasper and Newton County's existing hazard mitigation plan approved by FEMA on April 8th , 2016. Therefore, the goals from the 2015 Jasper and Newton County Hazard Mitigation Plan were reviewed to see if they were still valid, feasible, practical, and applicable to the defined hazard impacts. During planning meetings, MPC members and local stakeholders held a discussion in order to review and update the plan goals. To ensure that the goals developed for this update were comprehensive and supported State goals, the 2018 State Hazard Mitigation Plan goals were reviewed. The MPC also reviewed the goals from current surrounding county plans. On the 2015 plan, the organization of the plan goals included a broad goals and a set of objectives linking the actions to the goals. The 2019 Jasper and Newton County Hazard Mitigation Plan Goals are as follows:

Goal 1: Increase internal capabilities to mitigate the effects of natural hazards of Jasper and Newton County

Objective 1.1: Promote enhancement of floodplain management activities and building code requirements.

a. Action 1.1.1 Revise and update regulatory floodplain maps in conjunction with state and federal agencies and monitor for DFIRM development
b. Action 1.1.2: Adopt and enforce the International Building Code (IBC) and International Residential Code (IRC).Promote enhancement of floodplain management activities and building code requirements.
c. Action 1.1.3: Continue compliance and implementation of NFIP policies through ordinance and enforcement.

Objective 1.2 : Promote the entities' capability to conduct hazard risk assessments, demonstrate funding needs, and track mitigation activities throughout the entity.

a. Action 1.2.1: Incorporate risk assessment and hazard mitigation principles into comprehensive planning efforts.
b. Action 1.2.2: Support infrastructure changes that may mitigate the impact of natural hazards (i.e. burying power lines, building reinforcements, elevation projects, storm water drainage management, and construction of tornado safe rooms.)
c. Action 1.2.3: Monitor for the development of inundation data for dams in the two-county region
d. Action 1.2.4: Monitor the development of wildfire data to better assess the potential impact on the two-county region.
e. Action 1.2.5: Monitor the development of sinkhole data to better assess the potential impact on the two-county region.

Objective 1.3 : Track adequacy of emergency services to protect public health and safety.

a. Action 1.3.1: Participate in the National Weather Service Storm Ready program.
b. Action 1.3.2: Continually update and monitor the Emergency Operations Plan (EOP) for each county and regional disaster responses.
c. Action 1.3.3: Execute and maintain mutual aid agreements with all relevant agencies. Develop written agreements between agencies as documentation
d. Action 1.3.4:Maintain a publicly accessible list of names, positions, contract information, roles, and responsibilities for all public safety positions and departments
e. Action 1.3.5: Review emergency access routes and evacuation routes; mitigate any problem areas
f. Action 1.3.6: Continue to upgrade and expand warning systems throughout Jasper and Newton counties as necessary.
g. Action 1.3.7: Provide training for officials, county employees, and other local jurisdictions regarding the bi-county hazard mitigation plan, emergency operations plan, and other disaster preparedness programs

Objective 1.4 : Increase regional economic resistance to disasters.

a. Action 1.4.1 Encourage the development and maintenance of disaster plans for local businesses, schools, hospitals, and other entities as necessary that are coordinated with regional disaster plans
b. Action 1.4.2 Maintain emergency lists with names and phone numbers of plant managers and other large area employers

Goal 2: Enhance existing policies that will help reduce the potential damaging effects of hazards

Objective 2.1: Take action to minimize the effects of natural disasters on people, property, and building contents.

a. Action 2.1.1 Encourage citizens who reside in the floodplain to purchase flood insurance and reduce their risk through mitigation actions such as structure elevation.
b. Action 2.1.2 Provide an effective warning system to alert citizens in flood- prone areas and on low-lying roadways when flash flooding is imminent
c. Action 2.1.3 Enforce NFIP policies
d. Action 2.1.4: Continue to support the building of community shelters and private safe rooms throughout the two-county

Objective 2.2: Incorporate drills, education programs, and planning strategies that focus on disaster response by varying populations.

a. *Action 2.2.1* Conduct tornado drills in schools and other public buildings
b. *Action 2.2.3* Support schools in the development of all-hazard plans, education programs, and other strategies to prepare students and faculty for potential disasters.
c. *Action 2.2.4* Plan for and maintain adequate road and debris clearing capabilities.
d. *Action 2.2.5*: Develop an ongoing campaign to educate the community about seasonal hazards. Coordinate this campaign with a variety of advertising resources to maximize the number of citizens reached in a timely manner.
e. *Action 2.*2.6: Expand public information campaigns to focus on sheltering-in-place preparation

<u>Goal 3: Protect entities most vulnerable populations, buildings, and critical facilities through the implementation of cost effective technically feasible mitigation projects</u>

Objective 3.1: Identify and protect locations vulnerable to disasters.

a. Action 3.1.1 Take inventory of areas which were subject to damage in past natural hazards and use information in future development
b. Action 3.1.2 Maximize the use of available hazard mitigation grant programs to protect the entities' most vulnerable population and structures

Objective 3.2: Ensure that all vital / critical facilities are protected from the effects of natural hazards to the maximum extent possible

a. Action 3.2.1 Encourage installation of lightning protection devices and methods on communication infrastructure and critical facilities
b. Action 3.2.2 Encourage the adoption of storm water regulation and installation of infrastructure to aid with drainage
c. Action 3.2.3: Utilize grant funds and local resources to purchase and install back-up generators for critical infrastructure sites (i.e. water treatment plant, wastewater treatment facilities, sheltering sites

d. Action 3.2.4: Encourage all utility providers to assess their facilities and distribution systems for vulnerabilities and make improvements to ensure continued service during a disaster

Goal 4: Protect public health, safety, and welfare by increasing the public awareness and by fostering both individual and public responsibility in mitigating these risks due to these hazards

Objective 4.1: Increase the level of knowledge and awareness of residents on the hazards that routinely threaten the area

a. Action 4.1.1 Develop and implement a multi-hazard public awareness program to educate the public concerning the risks associated with each hazard, methods to mitigate the impacts of hazards, and emergency preparedness
b. Action 4.1.2 Promote the purchase and use of NOAA weather radios by residents.
c. Action 4.1.3 Expand public information campaigns to focus on disaster readiness, including in-place sheltering, coordinated aid to the elderly, and other programs as they become available

Objective 4.2: Identify the citizens most vulnerable to disasters and plan accordingly

a. Action 4.2.1 Develop a coordinated response and accommodation schematic for disaster sheltering based on federal guidelines in conjunction with local and state agencies
b. Action 4.2.2 Work with the Red Cross, National Guard, and other local agencies to develop an inventory of facilities with generators / emergency power that can be used as shelters in the event of a disaster

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 hazard mitigation planning meetings in the county and at the final MPC work session, the results of the risk assessment update were provided to the participants for review and the key issues were identified for specific hazards. Changes in risk since adoption of the previously approved plan were discussed. The meetings concluded with the distribution of a list of possible mitigation actions submit to the MPC for their review and approval. The list included possible new mitigation actions, as well as actions from the previously approved plan that were candidates for removal, due to the nature of them not being measurable or fundable. Actions from the previous plan included completed actions, on-going actions, and actions upon which progress had not been made. HARRY S TRUMAN COORDINATING COUNCIL planners discussed SEMA's identified funding priorities and the types of mitigation actions generally recognized by FEMA.

The focus of the MPC work session then shifted to development the mitigation strategy. For a comprehensive range of mitigation actions to consider, the HARRY S TRUMAN COORDINATING COUNCIL planners provided information to the MPC reviewing the following information:

- A list of actions proposed in the previous mitigation plan, the current State Plan, and approved plans in surrounding counties;
- Key issues from the risk assessment and vulnerability analysis;
- State priorities established for Hazard Mitigation Assistance grants, and
- Public input via the online survey tool, and other efforts to involve the public in the plan development process.

Table 4.1 Action Status Summary: provides Completed and deleted actions from the previous plan. The 2015 Plan had a series of county-wide mitigation actions that address mitigation goals. Based on the status updates, there were 28 completed actions, 27 deleted actions, and 88 continuing actions.

Table 4.1 Action Status Summary

Jurisdiction	Completed Actions	Continuing Actions (ongoing or modify)	Deleted Actions
Alba	2	7	0
Asbury	0	3	1
Carl Junction	4	3	0
Carterville	2	8	0
Carthage	2	8	0
Duquesne	0	7	0
Fidelity	1	4	1
Jasper City	x	x	x
Jasper County	1	5	3
Neck City	1	4	3
Oronogo	2	5	3
Sarcoxie	2	8	0
Waco	0	0	0
Diamond	0	2	1
Granby	0	0	0
Leawood	0	0	0
Neosho	1	7	0
Newton County	1	5	3

Seneca	1	8	0
Stark City	0	1	0
Wentworth	0	0	0
Avilla R-XIII	2	1	5
Joplin R-VIII	3	1	4
Westview C-VI	2	1	3

Table 4.2 provides a summary of the completed and deleted actions from the previous plan.

Table 4.2 Summary of Completed and Deleted Actions from the Previous Plan

	Completed Actions	Completion Details
1	City of Airport Drive: NFIP- Enforce Floodplain Ordinance	Completed
2	City of Airport Drive: Enforce Building Codes	Completed
3	City of Airport Drive: Active Code Enforcement	Completed
4	City of Alba: Apply for Grant funding for safe rooms	Completed, City now has 3 storm shelter
5	City of Alba: Expand Storm Sirens	Completed
6	City of Carterville: Build Community Strom Shelter at Elementary School	Completed
7	City of Carterville: Apply for grants for backup power source	Completed, generator purchased for police and waterworks
8	City of Fidelity: Develop Emergency Preparedness Plan	Completed. 2016 with HSTCC
9	City of Neck City: Buy Portable Electric Generators	Completed, 4 generators bought
10	City of Oronogo: NIMS Training	Completed
11	City of Jasper: Apply for funding for tornado shelter	Completed
12	Joplin R-VIII: Severe Weather drills for students and staff	Completed
13	Joplin R-VIII Building Evacuation Drills for students and staff	Completed
14	Joplin R-VIII: Create Emergency Response Team	Completed
15	Avilla R-XIII: Building evacuation drills for staff and students	Completed
16	Avilla R-XIII: Create Emergency Response team	Completed
17	Westview C-VI Create Emergency Response Team	Completed
18	Westview C-VI: Building evacuation drills	Completed
	Deleted Actions	Reason for Deletion
1	City of Airport Drive: Promote Private Insurance	Response/Preparedness action not a mitigation action
2	City of Airport Drive: Promote Storm water regulations and Practices	Response/Preparedness action not a mitigation action
3	Joplin	Response/Preparedness action not a mitigation action
4	City of Airport Drive: Encourage residents and businesses to clean up creeks	Response/Preparedness action not a mitigation action
5	City of Asbury: Promote Reverse 9-1-1 and NOAA Radios	Response/Preparedness action not a mitigation action
6	City of Carthage: Promote Private Insurance	Response/Preparedness action not a mitigation action
6	City of Carthage: Promote storm water regulations and practices	Response/Preparedness action not a mitigation action
8	City of Duquesne: Promote Private Insurance	Response/Preparedness action not a mitigation action
9	City of Fidelity: Promote Private Insurance	Response/Preparedness action not a mitigation action
10	City of Fidelity: Promote NOAA weather radios and salerooms	Response/Preparedness action not a mitigation action

11	Jasper County: Educate public on impacts of major disease outbreaks	Response/Preparedness action not a mitigation action
12	Jasper County: Promote community shelters in mobile home parks	Response/Preparedness action not a mitigation action
13	Jasper County: Reverse 9-1-1	No longer a priority. Switched to email and text
14	Jasper County: Educate residents on the impacts of severe weather	Response/Preparedness action not a mitigation action
15	City of Neck City: Apply for tornado shelter	No support, funding
16	City of Neck City: Promote NOAA Weather radios and reverse 9-1-1	Response/Preparedness action not a mitigation action
17	City of Neck City: Develop local waterworks	Sold Waterworks
18	City of Oronogo: Promote Private Insurance	Response/Preparedness action not a mitigation action
19	City of Oronogo: Promote NOAA weather radios and reverse 9-1-1	Response/Preparedness action not a mitigation action
20	City of Oronogo: Encourage residents and businesses to clean up creeks	Response/Preparedness action not a mitigation action
21	City of Waco: Promote reverse 9-1-1	Response/Preparedness action not a mitigation action
22	Village of Leawood: Promote basement sharing for tornado warnings	Response/Preparedness action not a mitigation action
23	Village of Leawood: Promote reverse 9-1-1	Response/Preparedness action not a mitigation action
24	City of Neosho: Encourage Plans and drills for private dwellings and public facilities	Response/Preparedness action not a mitigation action
25	City of Neosho: Promote Weather warning awareness	Response/Preparedness action not a mitigation action
26	City of Neosho: Develop Public Works Dept.	Sold waterworks
27	Newton County: Promote crop insurance	Response/Preparedness action not a mitigation action
28	Newton County: Educate on the impacts of lightening	Response/Preparedness action not a mitigation action
29	Newton County: Educate the public on the impacts of a major disease outbreak	Response/Preparedness action not a mitigation action
30	City of Seneca: Educate on the impacts of lightening	Response/Preparedness action not a mitigation action
31	City of Stark City: Promote 9-1-1 Reversal	Response/Preparedness action not a mitigation action
32	City of Wentworth: Promote NOAA weather radios and reverse 9-1-1	Response/Preparedness action not a mitigation action

Source: Previously approved County Hazard Mitigation Plan; Data Collection Questionnaire

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.

A cost benefit review of all new and continuing actions in the finalized plan was conducted during the MPC work session. Throughout the MPC consideration and discussion, emphasis was placed on the importance of a benefit-cost analysis in determining project priority. The Disaster Mitigation Act requires benefit-cost review as the primary method by which mitigation projects should be prioritized. The MPC decided to pursue implementation according to when and where damage occurs, available funding, political will, jurisdictional priority, and priorities identified in the Missouri State Hazard Mitigation Plan. The benefit/cost review at the planning stage primarily consisted of a qualitative analysis, and was not the detailed process required grant funding application. For each action, the plan sets forth a narrative describing the types of benefits that could be realized from action implementation. The cost was estimated as closely as possible, with further refinement to be supplied as project development occurs.

FEMA's STAPLEE methodology was used to assess the costs and benefits, overall feasibility of mitigation actions, and other issues impacting project. During the prioritization process, the MPC used worksheets to assign scores. The worksheets posed questions based on the STAPLEE elements as well as the potential mitigation effectiveness of each action. Scores were based on the responses to the following questions and ensuing discussion.

Definitely “YES”	Maybe “YES”	Probably “NO”	Definitely “NO”
3 points	2 points	1 point	Zero points

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)

The resulting list of actions were summed and divided into classes and labeled as high, medium, or low priorities. The result of the STAPLEE analysis is found in the forthcoming mitigation action worksheets.

Figure 4.1. Blank STAPLEE Worksheet

XXXXXX COUNTY
MULTI-JURISDICTIONAL
LOCAL HAZARD MITIGATION PLAN

Action Title:	**Jurisdiction:**
Action ID:	

STAPLEE Criteria	Evaluation Rating Definitely YES = 3 Maybe YES = 2 Probably NO = 1 Definitely NO = 0	Score
S: Is it Socially acceptable?		
T: Is it Technically feasible and potentially successful?		
A: Does the jurisdiction have the administrative capacity to execute this action?		
P: Is it Politically acceptable?		
L: Is there Legal authority to implement?		
E: Is it Economically beneficial?		
E: Will the project have either a neutral or positive impact on the natural environment? (score a 3 if positive impact, 2 if neutral impact)		
Will historic structures be saved or protected?		
Could it be implemented quickly?		
STAPLEE Score		

Mitigation Effectiveness Criteria	**Evaluation Rating**	**Score**
Will the implemented action result in lives saved?	Assign from 5-10 points based on the likelihood that lives would be saved.	
Will the implemented action result in a reduction of disaster damages?	Assign from 5-10 points based on the relative reduction of disaster damages.	
Mitigation Effectiveness Score		

Total Score (STAPLEE Score + Mitigation Effectiveness Score): _____

Priority Level: ☐ High (30+ points) ☐ Medium (25-29 points) ☐ Low (less than 25 points)

Completed by (name/title/phone #): _____

In addition to the STAPLEE cost benefit review prioritization at the final MPC meeting, an implementation plan for each action was discussed. An action worksheet was used to develop the implementation plan. The action worksheets are presented on the following pages.

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Airport Drive
Risk / Vulnerability	
Problem being Mitigated:	Determining areas most at risk for dangerous storms
Hazard(s) Addressed:	Tornados, Severe Storms
Action or Project	
Action/Project Number:	**Airport Drive 1.1**
Name of Action or Project:	Airport Drive Comprehensive Plan
Action or Project Description:	Development of Comprehensive Plan
Applicable Goal Statement:	Goal 1
Estimated Cost:	$4000
Benefits:	Update current development patterns and trends as well as where future development should not occur which will lead to lives and property saved
Plan for Implementation	
Responsible Organization/Department:	Board of Trustees
Supporting Organization/Dept.	Harry S Truman Coordinating Council, Regional Planning Commission
Action/Project Priority:	Med
Timeline for Completion:	One year
Potential Fund Sources:	Property Taxes
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	New
Report of Progress	New

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Stark City
Risk / Vulnerability	
Problem being Mitigated:	City has no emergency management plan
Hazard(s) Addressed:	Various
Action or Project	
Action/Project Number:	**Stark1.1**
Name of Action or Project:	
Action or Project Description:	Research and create local emergency management plan
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2500 to $5000
Benefits:	Protect the lives of population. Mitigate catastrophic property damage and damage to businesses and parks
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS, Regional Planning Commission
Action/Project Priority:	High
Timeline for Completion:	1 to 2 years
Potential Fund Sources:	CDBG,FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Wentworth
Risk / Vulnerability	
Problem being Mitigated:	City has no emergency management plan
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	**Went1.1**
Name of Action or Project:	
Action or Project Description:	Research and create an emergency management plan
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2500 to $5000
Benefits:	Protect the lives of population. Mitigate catastrophic property damage and damage to businesses and parks
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS, Regional Planning Commission
Action/Project Priority:	High
Timeline for Completion:	1 to 2 years
Potential Fund Sources:	CDBG,FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Carl Junction
Risk / Vulnerability	
Problem being Mitigated:	Aging buildings and infrastructure
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**CJ 1.1**
Name of Action or Project:	Code Enforcement
Action or Project Description:	Enforce adopted building codes and floodplain management regulations.
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$15,000
Benefits:	Identify vulnerable properties and structures
Plan for Implementation	
Responsible Organization/Department:	City Administrator
Supporting Organization/Dept.	
Action/Project Priority:	Med
Timeline for Completion:	2-4 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Buildings and Infrastructure under inspection

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Alba
Risk / Vulnerability	
Problem being Mitigated:	No back up power source to operate water/sewer system
Hazard(s) Addressed:	Various
Action or Project	
Action/Project Number:	**Alba 1.1**
Name of Action or Project:	Backup generator
Action or Project Description:	Carry out and find funding for backup generators
Applicable Goal Statement:	Goal 1
Estimated Cost:	$5000
Benefits:	Ensure continued operations of critical facilities during emergencies
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	Two-three Years
Potential Fund Sources:	SEMA/FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Asbury
Risk / Vulnerability	
Problem being Mitigated:	Lack of available safe room for shelter during a tornado
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**Asbury1.1**
Name of Action or Project:	Tornado Shelter
Action or Project Description:	Locate funding to purchase a tornado shelter
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$15,000
Benefits:	Protect the lives of population
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	
Action/Project Priority:	High
Timeline for Completion:	3-5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Carterville
Risk / Vulnerability	
Problem being Mitigated:	Lack of backup power source to operate water system
Hazard(s) Addressed:	Various Storms
Action or Project	
Action/Project Number:	**Carterville1.1**
Name of Action or Project:	Emergency Backup Power System
Action or Project Description:	Purchase and install backup generator to ensure continuity of service for residents
Applicable Goal Statement:	Goal 1
Estimated Cost:	$10,000-20,000
Benefits:	Residents will be able to access utilities during emergencies
Plan for Implementation	
Responsible Organization/Department:	City Administrator
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing not started
Report of Progress	Trying to locate funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Carthage
Risk / Vulnerability	
Problem being Mitigated:	Lack of backup power source to operate power systems
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	**Carthage1.1**
Name of Action or Project:	Emergency Backup Power System
Action or Project Description:	Purchase and install backup generator to ensure continuity of service for residents
Applicable Goal Statement:	Goal 1
Estimated Cost:	$10,000-20,000
Benefits:	Residents will be able to access utilities during emergencies
Plan for Implementation	
Responsible Organization/Department:	Fire Dept.
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing not started
Report of Progress	Trying to locate funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Duenweg
Risk / Vulnerability	
Problem being Mitigated:	Lack of backup power source to operate power systems
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	**Duenweg1.1**
Name of Action or Project:	Emergency Backup Power System
Action or Project Description:	Purchase and install backup generator to ensure continuity of service for residents
Applicable Goal Statement:	Goal 1
Estimated Cost:	$10,000-20,000
Benefits:	Residents will be able to access utilities during emergencies
Plan for Implementation	
Responsible Organization/Department:	City Administrator
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing not started
Report of Progress	Trying to locate funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Duquesne
Risk / Vulnerability	
Problem being Mitigated:	Road erosion and flooding
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**Duquesne1.1**
Name of Action or Project:	Localized Flood Reduction
Action or Project Description:	Regulate residential density increases, expenditure of public funds and the location of critical facilities within flood zones.
Applicable Goal Statement:	Goal 1
Estimated Cost:	$20,000 to $100,000
Benefits:	Reduce flood damage to public and private property
Plan for Implementation	
Responsible Organization/Department:	City Administrator
Supporting Organization/Dept.	
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	CDBG, FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	New
Report of Progress	New

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Fidelity
Risk / Vulnerability	
Problem being Mitigated:	Lack of backup power source
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	**Fidelity1.1**
Name of Action or Project:	EOC backup
Action or Project Description:	Purchase and install backup generator to ensure continuity of city services
Applicable Goal Statement:	Goal 1
Estimated Cost:	$5000 to $15,000
Benefits:	Ensure the continued operations of critical city facilities to minimize the impacts of natural disasters
Plan for Implementation	
Responsible Organization/Department:	City Administrator
Supporting Organization/Dept.	
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	In progress, funding being applied for and information sent out in newsletters

Mitigation Action Worksheet	
Name of Jurisdiction:	Jasper County
Risk / Vulnerability	
Problem being Mitigated:	Repetitive Flood damage in low water crossing areas
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**JasperCo1.1**
Name of Action or Project:	Flood Mitigation
Action or Project Description:	Apply and allocate funding to replace low water crossings and install culvert in rural areas
Applicable Goal Statement:	Goal 1
Estimated Cost:	Unknown, need engineering assessment
Benefits:	Increase accessibility and save lives for residents and reduce property damage for county
Plan for Implementation	
Responsible Organization/Department:	County EMS and Commission
Supporting Organization/Dept.	MoDOT
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA/SEMA, CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	In progress, several bridges have been replaced. More are in need of replacement

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Airport Drive, City of Alba, City of Asbury, City of Carl Junction, City of Carterville, City of Carthage, City of Duenweg, City of Duquesne, City of Fidelity, City of Joplin, City of Neck City, City of Oronogo, City of Webb City
Risk / Vulnerability	
Problem being Mitigated:	Repetitive Flood damage in low water crossing areas
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**JasperCo1.1**
Name of Action or Project:	Flood Mitigation
Action or Project Description:	Apply and allocate funding to replace low water crossings and install culvert in rural areas
Applicable Goal Statement:	Goal 1
Estimated Cost:	Unknown, need engineering assessment
Benefits:	Increase accessibility and save lives for residents and reduce property damage for county
Plan for Implementation	
Responsible Organization/Department:	County EMS and Commission
Supporting Organization/Dept.	MoDOT
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA/SEMA, CDBG
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	In progress, several bridges have been replaced. More are in need of replacement

Mitigation Action Worksheet	
Name of Jurisdiction:	Neck City
Risk / Vulnerability	
Problem being Mitigated:	No tornado shelters
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**Neck1.1**
Name of Action or Project:	Tornado Shelter
Action or Project Description:	Apply for funding for community tornado shelter
Applicable Goal Statement:	Goal 1
Estimated Cost:	$5,000 to $15,000
Benefits:	Save lives of residents
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA/SEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	Continuing, looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Oronogo
Risk / Vulnerability	
Problem being Mitigated:	Lack of backup power source for PD
Hazard(s) Addressed:	A
Action or Project	
Action/Project Number:	**Oronogo1.1**
Name of Action or Project:	EOC Backup
Action or Project Description:	Purchase backup generator for PD and FD
Applicable Goal Statement:	Goal 1
Estimated Cost:	$5,000 to $15,000
Benefits:	Ensure continued operations of critical facilities to minimize the impacts of natural disasters
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS Services
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA/SEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	Continuing, looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Sarcoxie
Risk / Vulnerability	
Problem being Mitigated:	Lack of backup power source for city operations
Hazard(s) Addressed:	All Hazards
Action or Project	
Action/Project Number:	**Sarcoxie1.1**
Name of Action or Project:	EOC Backup
Action or Project Description:	Purchase backup generators for multiple locations including PD, FD, water towers, sewer systems and city hall, nursing home
Applicable Goal Statement:	Goal 1
Estimated Cost:	$25,000 to $75,000
Benefits:	Ensure continued operations of critical facilities to minimize the impacts of natural disasters
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS Services
Action/Project Priority:	High
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA/SEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	Continuing, looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Diamond
Risk / Vulnerability	
Problem being Mitigated:	Lack of available community safe room for shelter during a tornado
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**Diamond1.1**
Name of Action or Project:	Tornado Shelter
Action or Project Description:	Purchase a tornado shelter
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$25,000
Benefits:	Protect the lives of population
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	3-5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Granby
Risk / Vulnerability	
Problem being Mitigated:	Many residents live in areas where storm sirens do not reach
Hazard(s) Addressed:	Tornado/Severe Storms
Action or Project	
Action/Project Number:	**Granby1.1**
Name of Action or Project:	Expand Sirens
Action or Project Description:	Purchase additional sirens
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$25,000
Benefits:	Protect the lives of population. Provide sufficient warning for sheltering and protection reducing injury and loss of life
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	2-5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	Village of Leawood
Risk / Vulnerability	
Problem being Mitigated:	Many residents live in areas where storm sirens do not reach
Hazard(s) Addressed:	Tornado/Severe Storms
Action or Project	
Action/Project Number:	**Leawood1.1**
Name of Action or Project:	Expand Sirens
Action or Project Description:	Purchase additional siren for Southern Hills
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2500 to $5000
Benefits:	Protect the lives of population. Provide sufficient warning for sheltering and protection reducing injury and loss of life
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	2-5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Neosho
Risk / Vulnerability	
Problem being Mitigated:	Severe Repetitive Flooding along Buffalo Creek
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**Neosho1.1**
Name of Action or Project:	Flood Mitigation
Action or Project Description:	Research and participate in Flood Plain Buyouts
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2 million to $10 million
Benefits:	Protect the lives of population. Mitigate catastrophic property damage and damage to businesses and city parks
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	5 to 10 years
Potential Fund Sources:	CDBG,FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Funding applied for

Mitigation Action Worksheet	
Name of Jurisdiction:	Newton County
Risk / Vulnerability	
Problem being Mitigated:	Severe Repetitive Flooding along Buffalo Creek
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**NewtonCo1.1**
Name of Action or Project:	Flood Mitigation
Action or Project Description:	Research and participate in Flood Plain Buyouts
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2 million to $10 million
Benefits:	Protect the lives of population. Mitigate catastrophic property damage and damage to businesses and parks
Plan for Implementation	
Responsible Organization/Department:	EMS
Supporting Organization/Dept.	City Officials
Action/Project Priority:	High
Timeline for Completion:	5 to 10 years
Potential Fund Sources:	CDBG,FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Funding applied for

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Diamond, City of Granby,City of Leawood, City of Neosho, City of Sarcoxie, City of Seneca, City of Stark City, City of Wentworth
Risk / Vulnerability	
Problem being Mitigated:	Severe Repetitive Flooding along Buffalo Creek
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**NewtonCo1.1**
Name of Action or Project:	Flood Mitigation
Action or Project Description:	Research and participate in Flood Plain Buyouts
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2 million to $10 million
Benefits:	Protect the lives of population. Mitigate catastrophic property damage and damage to businesses and parks
Plan for Implementation	
Responsible Organization/Department:	EMS
Supporting Organization/Dept.	City Officials
Action/Project Priority:	High
Timeline for Completion:	5 to 10 years
Potential Fund Sources:	CDBG,FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Funding applied for

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Seneca
Risk / Vulnerability	
Problem being Mitigated:	Severe Repetitive Flooding along Buffalo Creek
Hazard(s) Addressed:	Flooding
Action or Project	
Action/Project Number:	**Seneca1.1**
Name of Action or Project:	Flood Mitigation
Action or Project Description:	Research and participate in Flood Plain Buyouts
Applicable Goal Statement:	Goal 1
Estimated Cost:	$2 million to $10 million
Benefits:	Protect the lives of population. Mitigate catastrophic property damage and damage to businesses and parks
Plan for Implementation	
Responsible Organization/Department:	Regional Flood Coordinator
Supporting Organization/Dept.	EMS
Action/Project Priority:	High
Timeline for Completion:	5 to 10 years
Potential Fund Sources:	CDBG,FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	Westview C-VI
Risk / Vulnerability	
Problem being Mitigated:	Lack of available safe room for shelter during a tornado
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**West1.1**
Name of Action or Project:	Tornado Shelter
Action or Project Description:	Purchase a tornado shelter
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$15,000
Benefits:	Protect the lives of students
Plan for Implementation	
Responsible Organization/Department:	Principal
Supporting Organization/Dept.	Regional Planning Commission
Action/Project Priority:	High
Timeline for Completion:	3-5 Years
Potential Fund Sources:	SEMA/FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	Avilla R-XIII
Risk / Vulnerability	
Problem being Mitigated:	Lack of available safe room for shelter during a tornado
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**Avilla1.1**
Name of Action or Project:	Tornado Shelter
Action or Project Description:	Purchase a tornado shelter
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$15,000
Benefits:	Protect the lives of students
Plan for Implementation	
Responsible Organization/Department:	Principal
Supporting Organization/Dept.	Regional Planning Commission
Action/Project Priority:	High
Timeline for Completion:	3-5 Years
Potential Fund Sources:	SEMA/FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Waco
Risk / Vulnerability	
Problem being Mitigated:	Public doesn't fully understand the effects of severe weather on their lives and property
Hazard(s) Addressed:	Severe thunderstorms, severe winter weather, tornados, extreme heat, drought, flooding
Action or Project	
Action/Project Number:	**Waco1.1**
Name of Action or Project:	Public Awareness of severe weather
Action or Project Description:	Raise public awareness by distributing pamphlets with severe weather classes, resources, advertisements
Applicable Goal Statement:	Goal 1
Estimated Cost:	$500 to $2500
Benefits:	Decrease injury, loss of life, property damage due to improper planning
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	Regional Planning Commission
Action/Project Priority:	Med
Timeline for Completion:	5 Years
Potential Fund Sources:	FEMA/SEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing
Report of Progress	Continuing, looking for funding

Mitigation Action Worksheet	
Name of Jurisdiction:	City of Jasper
Risk / Vulnerability	
Problem being Mitigated:	Lack of available safe room for shelter during a tornado
Hazard(s) Addressed:	Tornado
Action or Project	
Action/Project Number:	**Jasper1.1**
Name of Action or Project:	Tornado Shelter
Action or Project Description:	Purchase a tornado shelter
Applicable Goal Statement:	Goal 1
Estimated Cost:	$7000-$15,000
Benefits:	Protect the lives of population
Plan for Implementation	
Responsible Organization/Department:	Mayor
Supporting Organization/Dept.	
Action/Project Priority:	High
Timeline for Completion:	3-5 Years
Potential Fund Sources:	FEMA
Local Planning Mechanisms to be Used in Implementation, if any:	
Progress Report	
Action Status	Continuing, in progress
Report of Progress	Still looking for funding

Table 4.3. Mitigation Action Matrix

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Airport Drive1.1	Development of Comprehensive Plan	Airport Drive	Med	1	Tornados, Severe Storms		✓	
Stark1.1	Develop emergency management plan	Stark City	High	1	Various	✓		✓
Went1.1	Develop emergency management plan	Wentworth	High	1	Various	✓		✓
CJ1.1	Building code and enforcement	Carl Junction	Med	1	Tornado	✓		✓
Alba1.1	Find funding for backup generators	Alba	High	1	Various	✓		✓
Asbury1.1	Purchase a tornado shelter	Asbury	High	1	Tornado	✓		
Carterville1.1	Purchase and install backup generator to ensure continuity of service for residents	Carterville	High	1	Various storms	✓		
Carthage1.1	Purchase and install backup generator to ensure continuity of service for residents	Carthage	High	1	Various storms	✓		
Duenweg1.1	Purchase and install backup generator to ensure continuity of service for residents	Duenweg	High	1	Various storms	✓		
Duquesne1.1	Make site specific drainage improvements at problematic sites	Duquesne	High	1	Flooding		✓	✓
Fidelity1.1	Purchase and install backup generator to ensure continuity of service for residents	Fidelity	High	1	Various storms	✓	✓	✓
Jasper1.1	Purchase a tornado shelter	Jasper	High	1	Tornado			
JasperCo1.1	Apply for funding replace low water bridges in rural areas	Jasper Co.	High	1	Flooding	✓		✓
Neck1.1	Apply for funding for community tornado shelter	Neck City	High	1	Tornado	✓		
Oronogo1.1	Purchase backup generator for PD and FD	Oronogo	High	1	Various	✓		
Sarcoxie1.1	Purchase backup generator for PD, FD, water towers, sewer systems and city Hall, nursing home	Sarcoxie	High	1	Various	✓		
Diamond1.1	Purchase a tornado shelter	Diamond	High	1	Tornado	✓		
Granby1.1	Purchase additional sirens	Granby	High	1	Tornado/severe storms	✓		
Leawood1.1	Purchase additional siren for Southern Hills	Leawood	High	1	Tornado/severe storms	✓		
Neosho1.1	Flood Plain Buyouts, retention ponds, Drainage	Neosho	High	1	Flooding	✓		✓
NewtonCo1.1	Flood Plain Buyouts, retention ponds, Drainage	Newton Co.	High	1	Flooding	✓		✓
Seneca1.1	Flood Plain Buyouts, retention ponds, Drainage, Dredging	Seneca	High	1	Flooding	✓		✓
West1.1	Purchase a tornado shelter	Westview C-6	High	1	Tornado	✓		
Avilla1.1	Purchase a tornado shelter	Avilla R-XIII	High	1	Tornado	✓		

#	Action	Jurisdiction	Priority	Goals Addressed	Hazards Addressed	Address Current Development	Address Future Development	Continued Compliance with NFIP
Waco1.1	Distribute pamphlets with severe weather classes, resources, advertisements	Waco	Med	1	Severe thunderstorms, severe winter weather, tornados, extreme heat, drought, flooding	✓		✓

5 PLAN MAINTENANCE PROCESS

This chapter provides an overview of the overall strategy for plan maintenance and outlines the method and schedule for monitoring, updating and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.

5.1 Monitoring, Evaluating, and Updating the Plan

44 CFR Requirement 201.6(c)(4): The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

5.1.1 Responsibility for Plan Maintenance

The MPC is not a standing committee, with oversight by a responsible agency or elected body. The MPC representatives and stakeholders are represented on the Local Emergency Planning Committee (LEPC) in Jasper County and Newton County and the Regional Homeland Security Oversight Committee (RHSOC), both counties in Region D. The LEPC is responsible for developing and implementing the Local Emergency Operations Plan and is a standing committee that meets regularly and is administered through both Jasper County Emergency Management agency and the Newton County Emergency Management agency. The RHSOC is responsible for developing and implementing the Threat Hazard Identification Risk Assessment for the region, including Jasper County and Newton County. The goals and actions and representation are aligned with the missions of the RHSOC, which is a standing committee. As such, the RHSOC will be responsible for plan monitoring, evaluation, and maintenance:

- 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 RHSOC 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 RHSOC agrees to meet annually and after a state or federally declared hazard event as appropriate to monitor progress and update the mitigation strategy. Both Jasper County and Newton County Emergency Management Directors will be responsible for initiating the plan reviews and will invite members of the Jasper/Newton County contingent to the RHSOC meeting.

In coordination with all participating jurisdictions, the Emergency Management Director will be responsible for initiating a five-year written update of the plan to 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. The State Emergency Management Agency Staff and the Missouri Association of Council of Governments Statewide Planning Coordinator will initiate the 5-year written update. The Harry S Truman Coordinating Council will be prepared to complete the plan update.

5.1.3 Plan Maintenance Process

Progress on the proposed actions can be monitored by evaluating changes in vulnerabilities identified in the plan. The RHSCOC 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[10(b)] 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 RHSCOC deems appropriate and necessary. Changes will be approved by the both Jasper County and Newton County Board of Commissioners and the governing boards of the other participating jurisdictions.

5.2 Incorporation into Existing Planning Mechanisms

44 CFR Requirement §201.6(c)(4)(ii): [The plan shall include a] process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.

Where possible, plan participants, including school and special districts, will use existing plans and/or programs to implement hazard mitigation actions. Those existing plans and programs were described in Section 2, Community Profile ad Capabilities of this plan. Based on the capability assessments of the participating jurisdictions, communities in both Jasper and Newton 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:

- Master plans of participating cities;
- Ordinances of participating cities;
- Jasper County Emergency Operations Plan;
- Newton County Emergency Operations Plan;
- Comprehensive Economic Development Strategy;
- School and Special District Plans and budgets;
- Harry S Truman Coordinating Council Transportation Plan

The RHSCOC members involved in updating these existing planning mechanisms will be responsible for integrating the findings and actions of the mitigation plan, as appropriate. The RHSCOC 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 Jasper County Emergency Management Director and the Newton County Emergency Management Director will provide the updated Mitigation Strategy with current status of each mitigation action to the respective County Boards of Commissions as well as all Mayors, City Clerks, and School District Superintendents. The Emergency Manager Director will request that the mitigation strategy be incorporated, where appropriate, in other planning mechanisms.

Table 5.1 below lists the planning mechanisms by jurisdiction into which the 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
• Alba • Carl Junction • Carterville • Carthage • Duenweg • Duquesne • Fidelity • Jasper County • Neck City • Oronogo • Sarcoxie • Waco • Diamond • Granby • Leawood • Neosho • Newton County • Seneca • Stark City • Wentworth	Southwest Regional Transportation Plan	Jasper County and Newton County Public Representatives on the Regional Transportation Advisory Committee (TAC) committee shared project priorities for transportation improvements that overlap with hazard mitigation action items.	Members of the regional TAC committee served on the MPC and also become HMP planning stakeholders. In doing so, they shared project priorities for transportation improvements that overlap with hazard mitigation action items
• Alba • Carl Junction • Carterville • Carthage • Duenweg • Duquesne • Fidelity • Jasper County • Neck City • Oronogo • Sarcoxie • Waco • Diamond • Granby • Leawood • Neosho • Newton County • Seneca • Stark City • Wentworth	Jasper County Emergency Operations Plan/Newton County Emergency Operations Plan	None	The goals of the EOP were presented and discussed during initial planning meetings in Jasper County and Newton County

• Alba • Carl Junction • Carterville • Carthage • Duenweg • Duquesne • Fidelity • Jasper County • Neck City • Oronogo • Sarcoxie • Waco • Diamond • Granby • Leawood • Neosho • Newton County • Seneca • Stark City • Wentworth	Southwest Missouri Comprehensive Economic Development Strategy (CEDS)	None	The new CEDS requires a chapter related to disaster resiliency. The goals outlined in the CEDS regarding mitigation aligns with goals 1 and 2 within this HMP. Several mitigation actions were identified concurrently in this update of the Jasper/newton County HMP and the CEDS
• Avila R-XIII • Joplin Schools • Westview C-6	Capital Improvement Plans	None	School Districts wishing to construct FEMA 361-standard safe rooms for the protection of staff & students have identified said safe rooms within their respective capital improvement plans, which have carried over in the mitigation actions of the HMP.
• Avila R-XIII • Joplin Schools • Westview C-6 • Alba • Carl Junction • Carterville • Carthage • Duenweg • Duquesne • Fidelity • Jasper County • Neck City • Oronogo • Sarcoxie • Waco • Diamond • Granby • Leawood • Neosho • Newton County • Seneca • Stark City • Wentworth		None	The planning activities of the Regional Homeland Security Oversight Committee (RHSOC) during its THIRA development process, aligns very well with the purpose of the multi-jurisdictional HMP. Many of the identified hazards and mitigating actions identified in the THIRA have been rolled over into the County's HMP. Additionally, The RHSOC will review the HMP annually and recommend updates as needed.

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 both Jasper County and Newton County's websites following each annual review of the mitigation plan and will solicit comments from the public based on the annual review. 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.